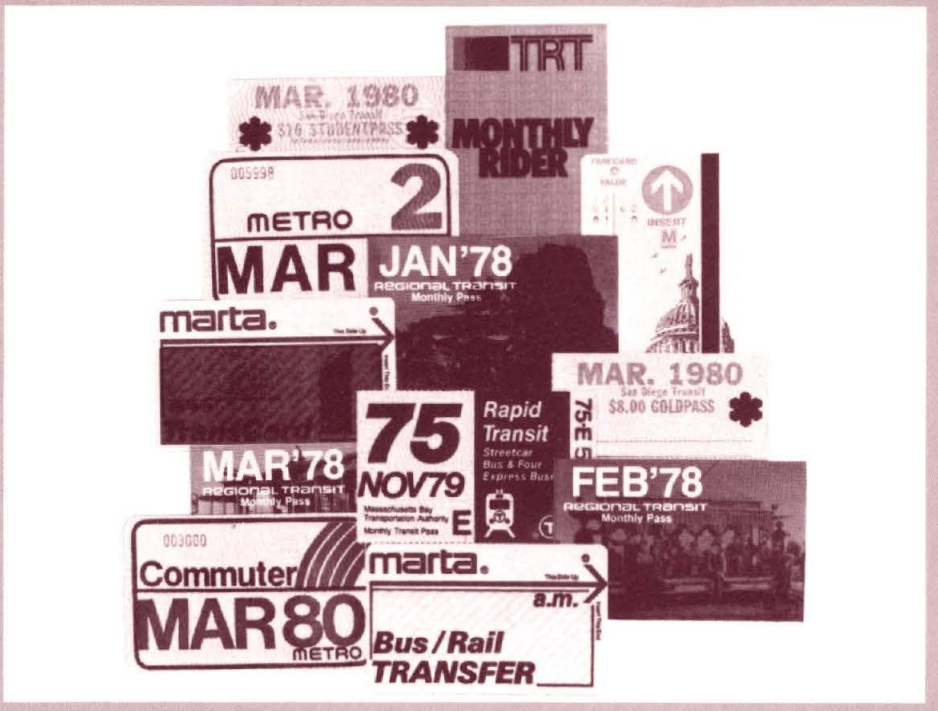
UMTA-OH-06-0036-84-1
DOT-TSC-UMTA-84-32

U.S. Department
of Transportation
**Urban Mass
Transportation
Administration**

The Pass Pricing Demonstration in Cincinnati, OH

UMTA/TSC Evaluation Series

Final Report
November 1984



UMTA Technical Assistance Program

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UMTA-OH-06-0036-84-1		

4. Title and Subtitle	5. Report Date
THE PASS PRICING DEMONSTRATION IN CINCINNATI, OH	November 1984
	6. Performing Organization Code: DTS-64
7. Author(s): Daniel Fleishman	8. Performing Organization Report No.: DOT-TSC-UMTA-84-32
9. Performing Organization Name and Address: Multisystems, Inc.* 1050 Massachusetts Ave. Cambridge MA 02138	10. Work Unit No. (TRAIS): UM527/R5631
	11. Contract or Grant No.: DOT-TSC-1756
12. Sponsoring Agency Name and Address: U.S. Department of Transportation Urban Mass Transportation Administration Office of Management Research and Transit Service Washington DC 20590	13. Type of Report and Period Covered: Final Report Oct 1981 - May 1983
	14. Sponsoring Agency Code: URT-30

15. Supplementary Notes

*Under contract to: U.S. Department of Transportation
Research and Special Programs Administration
Transportation Systems Center
Cambridge MA 02142

16. Abstract

This report presents an evaluation of the Cincinnati Pass Pricing Demonstration. The demonstration, implemented and operated by Queen City Metro in part through a grant from the UMTA Service and Methods Demonstration Program, began in October 1981 and ran through May 1983. The demonstration consisted of two phases. The first phase included implementation of the pass program and collection of ridership, cost, and revenue data. During the second phase, the pass price was adjusted and data were collected again.

The monthly pass (Metrocard) could be purchased in person at Queen City Metro's Customer Service Department or at a second sales office, through the mail, over the telephone, through automated bank teller machines, or at any of four participating employment sites. However, each month 75-85% of all passes were purchased in person at Queen City Metro; 6-10% were purchased at the employment sites; and most of the remaining passes were purchased through the mail.

The analysis of trip frequencies of survey respondents revealed that transit users generally buy transit passes only if they stand to benefit financially (i.e., if they make more than the "breakeven" number of trips and thus pay less for a pass than they would if paying cash). On the other hand, many transit users who would apparently benefit from buying a pass do not. Various reasons were cited for not buying a pass, including "too expensive to pay all at once," "increased pass price," "did not know where to get," and "too much trouble to get."

Considering all costs and revenues associated with the program, Metrocard resulted in a net cost to Queen City Metro. The principal components of the cost, in addition to program administration, were advertising (primarily television), lost revenue due to the diversion of cash fares from pass users, and the cost of carrying new trips by pass buyers. New revenues generated by improved cash flow and travel by new transit users did not offset the revenue loss.

17. Key Words	18. Distribution Statement
Service and Methods Demonstration, Monthly Transit Passes, Pass Pricing, Transit Fare Prepayment (TFP)	DOCUMENT IS AVAILABLE TO THE PUBLIC THROUGH THE NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VIRGINIA 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	164	

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

PREFACE

The Cincinnati Pass Pricing Demonstration was funded, in part, by the U.S. Department of Transportation under the Urban Mass Transportation Administration Service and Methods Demonstration Program. As part of that program, Multisystems, under contract to the U.S. DOT's Transportation System Center, has prepared this Final Evaluation Report.

This report is based on analyses of data collected - and information provided - by Queen City Metro (the project grantee). The author wishes to thank the following individuals for their assistance and cooperation in this effort:

- Rita Potts, Manager of Marketing of Queen City Metro and local project manager
- Kenneth Opiela of Goodell-Grivas, Inc., (the data collection subcontractor)
- Dan Krechmer of SG Associates (the pricing subcontractor)
- Lawrence Doxsey of TSC, evaluation manager
- Stewart McKeown of UMTA, project manager

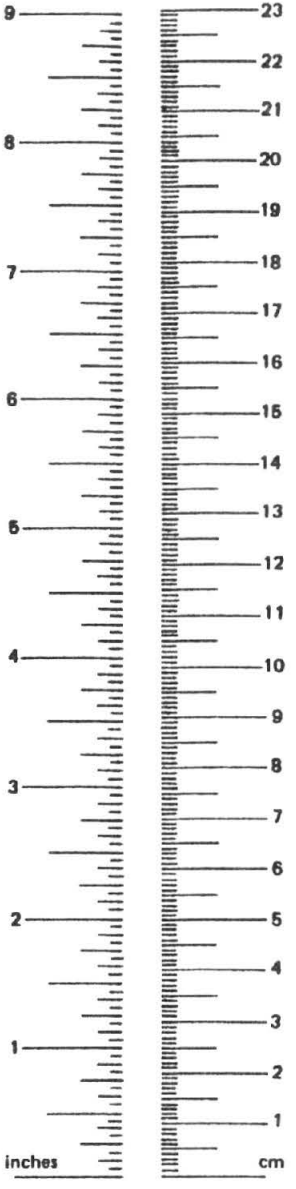
The author would also like to thank the following Multisystems staff members and consultants: Larry Englisher and Nigel Wilson, who assisted in the data analyses; Gary Ruprecht, Yosef Sheffi, and Imogene Burns, who provided input to the data analyses and interpretation; Betsy Levering and Lisa Houck, who prepared the graphics; Cherine Tulloch, Gail Pasquale, Annie Sunnerberg, Judith May and Denise Kangley, who typed the report; and John Attanucci, who provided helpful comments and suggestions in writing the report.

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 In. = 2.54 cm (exactly). For other exact conversions and more detail tables see NBS Misc. Publ. 286, Units of Weight and Measures. Price $2.25 SD Catalog No. C13 10 286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	36	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

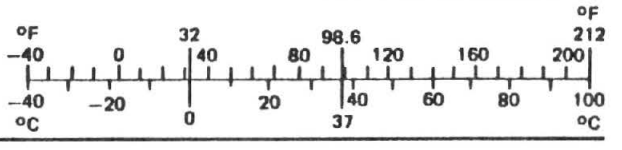


TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF ILLUSTRATIONS

Figures

Exhibits

LIST OF TABLES

EXECUTIVE SUMMARY

THE NATURE OF THE DEMONSTRATION

Between October 1981 and May 1983, Queen City Metro, the Cincinnati public transit operator, participated in a Service and Management Demonstration of a prepaid monthly transit pass program. The Cincinnati transit pass -- MetroCard -- was initially priced at $20 (base price), but was subsequently raised to $24, following an increase in the base transit fare (from $0.50 to $0.60). The MetroCard could be purchased in person at Queen City Metro's Customer Service Department, or at a second sales office, through the mail, over the telephone, through any of a series of automated bank teller machines, or at one of four participating employment sites.

The Cincinnati Demonstration was intended to address three basic goals: 1) to provide the transit industry with a comprehensive analysis of the full benefits (and full costs) of providing monthly passes; 2) to provide the transit industry with a useful methodology for setting the prices of monthly passes; and 3) to provide Queen City Metro with an optimal pass price structure aimed at meeting the transit authority's stated objectives. The data used in fulfilling these goals came from two major sources: 1) transit use and pass sales information provided by Queen City Metro; and 2) a series of surveys and special on-board measurements undertaken as part of the demonstration. Queen City Metro hired two subcontractors, to perform actual data collection activities and to develop pricing recommendations and guidelines. The other major goal -- the analysis of benefits and costs -- was carried out as part of this evaluation.

In addition to the documentation of the full range of costs associated with developing, implementing, marketing, and administering the MetroCard program, the major issues addressed in this evaluation are as follows:

- What are the net revenue impacts of a pass program, in terms of revenue gained (e.g., through attraction of new transit users, improved cash flow, and through pass users being accompanied by persons who otherwise would not use transit), and revenue lost (e.g., through diversion of cash fares and from a special discount)?

- What other benefits are produced by a transit pass program -- both to the transit operator and to individual passbuyers?

- How does an individual's travel behavior affect his/her method of fare payment?

- How does a pass program in turn impact the travel behavior of passbuyers?

- How do the socioeconomic characterisitics of passbuyers compare with those of non-passbuyers?

- How do different pass price structures affect the demand for passes?

- What types of marketing strategies are effective in attracting individuals to a pass program?

- How does a pass program affect transit level of service?

The results of the evaluation are discussed in this report, and summarized in the following sections of the Executive Summary.

PASS SALE AND MARKETING STRATGIES

As indicated above, MetroCard was available at several walk-in locations, as well as through the mail, over the telephone, or through bank teller machines. However, throughout the demonstration, by far the most popular mode of pass purchase was in-person at the two Queen City Metro sales locations. In a typical month, 75-85 percent of all passbuyers bought their passes at one of those locations, and 10-15 percent ordered their passes through the mail; very few passes were sold via telephone, bank teller machine, or at the participating employment sites.

Queen City Metro's primary marketing approach for MetroCard was on-bus advertising, although television was also used heavily at several times during the project. Surveys revealed that 43 percent of passbuyers found out about MetroCard through on-bus advertisements, while 28 percent heard about it on television; the third most common source of information was "from family or friends."

The primary target of MetroCard marketing was transit users in general, although particular emphasis was placed on marketing to regular commuters. Queen City Metro set as its original marketing objective the sale of passes to 25 percent of adult transit commuters. Since MetroCard sales eventually reached approximately 27 percent of peak adult riders, Queen City Metro was fairly successful in achieving that objective.

In terms of particular marketing strategies, the most effective single approach turned out to be a special summer discount (July, August and September 1982), during which time MetroCard was discounted by $4 over the full cash fare equivalent price. The cash fare had been raised from $0.50 to $0.60 in July, but the pass price was not increased until

October. Pass sales in the first month of the discount were 55 percent higher than in the prior month. In addition, the sales level dropped relatively little following the end of the discount period. Thus, the discount proved to be a very important strategy for attracting new passbuyers, and the pass program was then able to retain a high percentage of this gain over the remainder of the demonstration period.

IMPACTS OF THE PASS PROGRAM ON TRAVEL BEHAVIOR

Nature of Demand for Passes

The MetroCard program exerted a modest impact on the travel behavior characteristics of Queen City Metro transit users as a whole, with the impact obviously centered on pass users. In terms of market penetration, the percentage of adult transit riders who purchased MetroCard reached a maximum of nine percent (or 27 percent of weekday peak period adult riders); this penetration rate rose rather quickly, as the general rise in pass sales accompanied a general decline in overall system ridership. The absolute demand for passes grew from the opening month total of 1838 to a peak of 4655 in the final month of the discount period; the demand subsequently leveled off in the 3800-3900 range over the final five months of the demonstration. It should be noted that the demand for passes grew despite a steady decline in overall ridership.

Travel Behavior and the Passbuying Decision

In comparing the reported trip-making frequencies of passbuyers and non-passbuyers, it was found that passbuyers on the whole made considerably more transit trips -- before buying passes -- than did non-passbuyers. This held true for both work and non-work trips. Passbuyers reported making a pre-MetroCard average of nearly 12 total transit trips per week, while non-passbuyers averaged about eight trips. The fact that only 11 percent of passbuyers reported pre-pass weekly trip rates below ten strongly suggests that transit users will generally purchase passes only if they make more than the "breakeven" number of trips (i.e., related to the cash fare equivalent price of the pass). On the other hand, over 40 percent of non-passbuyers reported making at least the breakeven number of trips (ten trips per week), and 33 percent of those respondents reported work trip frequencies alone at or above ten per week. This indicates that not everyone who stands to gain economic benefit from using a prepaid pass buys one.

The major reason given for not purchasing MetroCard was, predictably, "not using the bus enough" (57 percent of survey responses); approximately 14 percent of respondents "were not aware of MetroCard," and another 14 percent found it "too expensive to pay the full price at the time of purchase." In terms of former passbuyers' reasons for discontinuing pass

purchase, less than 30 percent cited "not using the bus enough," although this was still the major reason selected. Less than seven percent of those respondents who had stopped buying MetroCard did so because the "pass price went up."

The evaluation also confirmed that tripmaking frequency is not the sole factor influencing a person's decision whether or not to buy a pass. The "convenience of not having to carry exact change" was cited as "the most important reason" for buying MetroCard by 60 percent of the passbuyer survey respondents, and by 77 percent of the respondents to the passbuyer follow-up survey as "the most important reason for continuing to buy" MetroCard. Thus, although trip frequency would seem to be the single most important factor contributing to the passbuying decision, convenience is clearly considered to be a very important attribute of a prepaid pass.

Pass Use and Impact on Transit Use

In terms of the retention rate of pass purchase, approximately 68 percent of the passbuyer follow-up respondents had bought MetroCard for a period of at least four months. Nearly half the respondents to the initial passbuyer survey (May 1982) had been purchasing the pass since the beginning of the program (i.e., eight months). However, only ten percent of the July survey respondents had been buying the pass since the beginning (i.e., ten months); in fact, 38 percent of the July respondents began purchasing MetroCard in July or August. Of course, while a number of individuals bought passes only during the discount period, the majority of passbuyers continued buying them at least in the two months immediately following the end of the discount.

MetroCard use was evenly distributed throughout Queen City Metro's routes and throughout the day; in fact, no specific run or time of day exhibited more than minimal MetroCard usage. No pass users boarded at the vast majority of bus stops observed (in a series of special on-board measurements); at only 22 percent of the stops observed were more than 20 percent of the boarders passholders.

The number of "new" transit trips resulting -- directly or indirectly -- from the use of passes was relatively small. New trips represented 1.3 percent of the total monthly ridership (or 2.5 percent of the regular monthly off-peak ridership). The bulk (70 percent) of these new trips were produced by pass users who increased their frequency of travel after buying a pass. The other source of new trips was riders (who would not otherwise have used transit) accompanying pass users. While the number of new trips was insufficient to produce any noticeable impact on system productivity or cost-effectiveness, these trips did partially offset the overall decline in Queen City Metro's general ridership. During the demonstration period, regular adult ridership dropped by 19 percent.

LEVEL OF SERVICE AND ECONOMIC IMPACTS

Level of Service

The major theoretical level of service impact of a prepaid pass program relates to reductions in boarding and vehicle dwell time, which may affect total route running times. However, analysis of boarding times in the Cincinnati demonstration did not corroborate the findings of earlier studies that, on average, pass users board buses more quickly than cash-paying riders. No definite relationship was observed between type of fare payment and boarding time, which indicates that the pass usage had no clear impact on Queen City Metro's level of service.

Program Costs and Foregone Revenue

The total expenditure for the MetroCard program during the demonstration period (excluding predemonstration development expenses) was approximately $277,000; the budget for the demonstration itself was roughly $149,000, of which UMTA paid about $133,000. Of the total, approximately $84,000 can be directly attributed to the fact that this was a demonstration project, and thus could be avoided in most transit property pass programs. Excluding those expenses (i.e., for subcontracts and reporting requirements), the total cost to Queen City Metro of administering and marketing the MetroCard program was approximatey $193,000, or just over $2.90 for each pass sold during the demonstration period. Nearly half of that total was for staff salaries and benefits, while just under 40 percent was for advertising (television accounted for 90 percent of advertising costs). The cost of developing and starting up the MetroCard program was roughly $29,000, or $0.44 per pass sold.

In addition to direct costs, a major financial impact of any pass program is represented by revenue lost through the diversion of cash fares - i.e., the revenue loss for each pass user who, before buying a pass, made more than the breakeven number of trips factored into the pass price. In Cincinnati, the average monthly revenue loss per pass user was estimated to be $3.83; the total loss for the entire demonstration period was thus approximately $254,000, or $12,700 per month. This represented roughly one percent of the total system operating revenue during the demonstration. Of course, the summer discount promotion produced an additional revenue loss - $7.87 per passbuyer during the three-month discount period or $1.56 per passbuyer over the entire demonstrations.

Finally, there may be an increase in operating costs related to serving induced passenger trips. From an operational viewpoint, the extent of this cost depends on the number of new trips (relative to existing ridership) and the nature of the operator's service monitoring and scheduling

procedures. Because of the small number of induced trips in Cincinnati (1.3 percent of total ridership), the bulk (93 percent) of which were in the off-peak, the short-run marginal cost of the induced trips may have been zero. However, from a broader economic perspective, there is a definite cost attributable to serving any induced trips. Based on marginal cost estimates developed in other transit studies, the impact on the transit system's operating deficit may be of the same general magnitude as the revenue loss mentioned above.

Increased Revenue, Cost Savings, and Non-quantifiable Benefits

Over the course of the demonstration, the total pass sale revenue represented roughly eight percent of the total system passenger revenue; the average revenue per passbuyer was $23.25. However, the amount of new revenue generated by the sale of passes was minimal. A small amount ($770 per month) of new revenue was generated by passbuyers who formerly (before buying a pass) made less than the breakeven number of transit trips. Nearly $5000 per month was generated from riders (who would not otherwise have used transit) accompanying pass users. Finally, the amount produced in increased interest on deposited revenue -- from improved cash flow -- was just over $300 per month. The total amount of new revenue attributable to the MetroCard program was thus about $6000 per month, or nearly $1.70 per passbuyer.

In addition to generating new revenue, prepaid pass programs in other locations have been alleged to produce certain types of cost savings, as well as certain non-quantifiable benefits. The major areas in which cost savings can theoretically be achieved are in overall operating costs -- due to reductions in vehicle dwell time, and in coin handling costs -- due to a reduction in the number of coins used. The chief non-quantifiable benefits tend to be related to improvements in a transit property's public image, as well as improved customer convenience.

In Cincinnati, however, this evaluation revealed no identifiable cost savings to the transit operator. As indicated earlier, there was no reduction in passenger boarding time associated with use of MetroCard -- and therefore, no change in operating costs due to shorter route running times. In terms of coin handling, although the use of passes obviously reduces the number of coins used, the extent of pass use in Cincinnati was insufficent to produce any change in either the overall amount of time spent collecting and counting fares or the cost of maintaining and replacing fareboxes.

Queen City Metro did feel that the MetroCard program produced benefits related to its public image and the improvement of customer convenience in using transit. As discussed above, the convenience of using a prepaid pass was valued very highly by users. While this represents a benefit

to riders rather than to the operator, the growth in pass sales over the course of the demonstration -- as well as the high level of retention of pass purchasers following the pass price increase -- points to the fact that Queen City Metro's public image was enhanced as well.

Impact on System Productivity

A pass program may also affect transit productivity because new trips induced by pass availability may improve service efficiency measures (e.g., passenger trips per vehicle-hour, passenger trips per vehicle-mile). These measures do not in themselves represent cost savings (or increases), but they do provide an indication of the program's impact on resource utilization. In light of the relatively small number of new transit trips induced by the MetroCard program, however, it is apparent that the program had a negligible impact on overall system productivity. Because the bulk of these trips were made during off-peak hours, the pass program did contribute to slight improvements in off-peak productivity measures; however, the decline in overall system usage effectively neutralized any gain generated by MetroCard.

CONCLUSIONS AND TRANSFERABILITY OF RESULTS

While Queen City Metro was fairly successful in meeting its basic marketing goals in terms of number of passes sold, the increased revenues and cost savings attributable to the sale and use of passes were simply insufficient to offset the costs of developing and administering the program (as well as the revenue lost). However, when compared to the overall system operating expenses, the net cost of the MetroCard program was minimal. In addition, the program costs may be substantially lower in future years, since the program is already in place and should require less in the way of supervisory and advertising costs. Furthermore, because the level of pass sales increased substantially during the demonstration, the average cost per pass sold will be substantially lower than during the demonstration. In general, the fact that the demonstration covered only the first 20 months of the pass program represents a definite limitation in terms of the ability to evaluate such a program's long term costs and benefits.

Whereas the findings from this evaluation pertain specifically to Cincinnati, some have broader applicability and should be useful to other transit operators considering implementing or modifying a pre-paid pass program. The major transferable findings are summarized below.

- The most cost-effective approach to advertising transit passes is through on-bus advertising. Television is also an effective strategy, but is

much more expensive and is not targeted directly toward the primary market for prepaid passes--the transit user.

- A special discount period can be an effective marketing tool in attracting and retaining new passbuyers. On the other hand, such a discount can also prove costly to a transit operator in terms of "lost" revenue. Therefore, an operator's objectives must be clearly defined in considering such a discount.

- Individuals generally will not purchase a transit pass unless they already make at least the breakeven number of transit trips. On the other hand, many regular transit riders who report trip frequencies high enough to warrant purchase of a pass apparently do not feel that the economic benefit is great enough to warrant the positive action required to purchase a pass.

- While economic considerations represent a crucial factor dictating decisions whether or not to buy a pass, the convenience of not having to carry exact change is highly valued by passbuyers (especially where the fare involves multiple coins).

- Providing only a small number of outlets does not necessarily deter pass sales, although it is useful to offer a variety of purchase and payment mechanisms (e.g., through the mail, through automated bank tellers, over the telephone, using credit cards, etc.). However, market penetration in Cincinnati did not reach the levels attained in other cities (e.g., Boston, where an active employer payroll deduction and subsidy program is used to market passes).

- There is no definite relationship between type of fare payment and boarding time; there is likely to be significant variation in average boarding times from one run to the next (and between stops as well), due to different behavioral patterns--of persons boarding, as well as drivers. (Furthermore, even if there were a clear relationship, the distribution of pass use in a program which has achieved only moderate market penetration may be such that few stops have sufficient passholders boarding to affect overall route running times.)

- The revenue lost through "cash fare diversion" represents a real financial impact on a transit property, although it can be partially offset by

new revenue gained through the program (i.e., from new trips made by passbuyers, from the fares of new riders accompanying passbuyers, and from increased interest gained through improved cash flow). However, the net loss should represent a very small percentage of overall system revenue. (It should be kept in mind that estimating the revenue lost to cash fare diversion is, at best, a difficult and inexact task; a property attempting to measure lost revenue should employ a detailed before-after survey effort.)

- There may be an impact on a transit system's operating deficit related to serving passenger trips induced by a pass program. The extent of this impact depends on the relative increase in trips, but may be influenced by the operator's service monitoring and scheduling procedures.

1. INTRODUCTION/BACKGROUND

1.1 INTRODUCTION

This report presents an evaluation of an Urban Mass Transportation Administration (UMTA) Service and Management Demonstration (SMD) of transit pass pricing in Cincinnati, Ohio. Queen City Metro (the Cincinnati transit system), the project grantee, offered a prepaid monthly transit pass (MetroCard) -- initially at a base price of $20 and then, following a fare increase, at $24. The pass program (and the demonstration) began in October 1981; the demonstration ran through May 1983, although the pass program continued past that point. The total cost of the demonstration was $281,666, including $133,448 through the UMTA SMD grant.

1.2 DESCRIPTION OF THE DEMONSTRATION

The Cincinnati Transit Pass Pricing Demonstration was intended to address three basic goals: 1) to provide the transit industry with a comprehensive analysis of the full benefits (and full costs) of providing monthly passes; 2) to provide the transit industry with a useful methodology for setting the prices of monthly passes; and 3) to provide Queen City Metro with an optimal pass price structure aimed at meeting the transit authority's stated objectives. The demonstration consisted of two phases. The first phase included implementation of the pass program and collection of ridership, cost, and revenue data. During the second phase the pass prices were adjusted and data were collected again.

Queen City Metro was selected as the demonstration site for the following reasons:

- Queen City Metro is a mid-size transit system, and did not have a pass program prior to the demonstration.
- Queen City Metro had an expressed interest in obtaining technical support on pass pricing and in applying an approach for setting the price for its monthly pass.
- Queen City Metro had a general fare increase just prior to the pass implementation and another fare increase was planned at a point midway through the demonstration project. This latter increase would allow an analysis of a pass price change to be easily incorporated into the program.

The fact that Queen City Metro had no transit pass program (97 percent of all transit users were cash riders at the start of the demonstration; three percent used tokens) provided an excellent opportunity to measure and document the full costs and benefits of starting up, promoting, and operating a pass program. Most of the previous prepayment demonstrations had involved building on or modifying existing prepayment programs; the Queen City Metro demonstration permitted an evaluation of a program from the ground up, without having to be concerned with the potentially distorting effects of parallel prepayment plans. (At the same time, however, it must be kept in mind that the fact that this demonstration covered only the initial 20 months of the program also presented a definite limitation in terms of the ability to assess such a program's long term costs and benefits.)

During the demonstration period, Queen City Metro sold an average of 3,258 passes per month, with a single month high of 4,655. Sales rose sharply during the summer of 1982 as a result of a special three-month promotional price. During this period, the base pass price was kept at $20 per month, despite the fact that the cash fare was raised from $0.50 to $0.60 (during peak periods). However, the sales level remained high after the promotion ended, suggesting that a substantial number of new passbuyers attracted by the effective discount remained in the program.

In terms of costs and benefits, the MetroCard program resulted in a net loss to Queen City Metro. The average cost per pass sold of developing, administering and marketing the program, excluding costs attributable solely to the fact that this was an UMTA demonstration (e.g., reporting costs) was approximately $2.35. In addition, sale and use of passes produced a net revenue loss of roughly $2.14 per pass sold. The primary cause of this revenue loss was the "diversion" of fares that would otherwise have been paid in cash (i.e., from pass users who formerly made more than the "breakeven" number of trips at which the pass is priced); the summer discount also contibuted significantly to the revenue loss.

On the other hand, the pass program also produced certain non-quantifiable benefits to both the individual passbuyers and Queen City Metro; these included greater convenience in using transit (through not having to carry around exact change), and partially offsetting overall ridership losses (e.g., through the generation of increased tripmaking by pass users). In addition, the demonstration benefited the transit industry in general by producing a manual for developing pass pricing guidelines,* as well as the identification of the full range of

---

* SG Associates. Monthly Pass Pricing Guidelines Manual, submitted to Southwest Ohio Regional Transit Authority, May 27, 1983.

benefits and costs included in this evaluation report.

The remainder of this chapter describes the organizational role and the evaluation issues addressed in this report.

1.3 ORGANIZATIONAL ROLES

Queen City Metro, the operating arm of the Southwest Ohio Regional Transit Authority, was the grantee for this demonstration and administered the MetroCard program. In carrying out the demonstration activities, Queen City Metro retained the services of two outside contractors: Goodell-Grivas, Inc. (based in Detroit) was responsible for all data collection activities, and SG Associates (of Boston and Washington) was responsibile for providing Queen City Metro with an optimal pass price structure, as well as developing a general methodology for setting pass prices.

UMTA has overall responsibility for the Service and Management Demonstration program itself, while the Transportation Systems Center (TSC) of the U.S. Department of Transportation (DOT) has overall responsibility for the evaluation of all SMD projects. This evaluation was performed by Multisystems under contract to TSC. Multisystems interacted directly with the grantee, as well as with the two subcontractors. Finally, Ecosometrics, Inc. (based in Bethesda, MD) served as the project design contractor, under contract to UMTA.

1.4 EVALUATION ISSUES AND APPROACH

The major issues addressed in this evaluation are as follows:

- What are the full costs associated with introducing and operating a monthly prepaid transit pass program? What are the expenditures within each of the following categories?
  - one-time program development expenditures
  - program administrative and marketing expenditures
  - demonstration-related expenditures (i.e., for research and data collection)
- What are the net revenue impacts of a pass program, in terms of the following categories?

  - revenue gained (e.g., through attraction of new transit users, improved cash flow, and through pass users being accompanied by persons who otherwise would not use transit)

  - revenue lost (e.g., through diversion of cash fares, and from a special price promotion)

- What other benefits are produced by a transit pass program -- both to the transit operator and to individual passbuyers?

- How does an individual's travel behavior affect his/her decision to buy a pass?

- How does a pass program impact the travel behavior of passbuyers?

- How do the socioeconomic characteristics of passbuyers compare with those of non-passbuyers?

- How do different pass price structures affect the demand for passes?

- What types of marketing strategies are effective in attracting individuals to a pass program?

- How does a pass program affect transit level of service (e.g., boarding and run times, service reliability, etc.)?

In answering these questions, Multisystems made use of three major sources of data: surveys, on-board measurements, and operator records. Seven surveys were undertaken as part of the project: on-board surveys in September 1981 and May 1982; follow-up telephone surveys (of non-passbuyers) in May 1982 and November 1982; passbuyer surveys in May 1982 (mailback) and July 1982 (on-site interviews); and a follow-up telephone survey (of passbuyers) in November 1982. The special on-board measurements, designed to collect information on boarding times and distribution of boardings by type of fare payment, were undertaken on three occasions: June, August, and November 1982; the same set of routes (and runs) were used in each case. Finally, information on pass sales, system ridership, and program costs was obtained from records maintained by the grantee; these records were supplemented through extensive discussions with the grantee's project manager.

The remainder of this report is organized as follows: Chapter 2 describes the demonstration setting; Chapter 3 discusses the implementation and administration of the project; Chapter 4 examines travel behavior characterisitics; Chapter 5 assesses economic and productivity issues; and Chapter 6 presents conclusions and discusses the transferability of the project findings.

2. THE DEMONSTRATION SETTING

This chapter provides a description of the characteristics of the Cincinnati urban area and its public transportation system.*

2.1 THE URBAN AREA

The city of Cincinnati is located in the southwestern corner of Ohio (in Hamilton County), on the Kentucky border. The City is linked to its Kentucky suburbs by interstate and arterial bridges across the Ohio River. Its location on the Ohio River gives Cincinnati year-round access to the Mississippi River. The weather is rather mild, with an annual average temperature of approximately 54°F; average annual precipitation (over the past three years) is 46 inches.

Cincinnati is Ohio's third largest city, with a (1980) population of 385,457; Hamilton County's population is 873,224, while the metropolitan area population is 1,387,000. The distribution of population by age is shown in Table 2-1. The city proper has an area of 78 square miles (Hamilton County is 414 square miles), for a density of 4942 persons per square mile (2109 for the County).

The median (1980) family income for the City is $16,800 ($21,694 for the County), while the median household income is $12,675 ($17,447 for the County) and per capita income is $6,875 ($7,871 for the County). Table 2-2 shows the distribution of income among households.

Cincinnati is the second largest industrial producer in the state (Ohio is the nation's third largest industrial state). The area's major industries are soap products, food products, automobiles and parts, and jet engines. There are 172,832 employees in the City itself, 371,368 in the County, and 514,216 in the metropolitan area. The City's major employers are the General Electric Aircraft Engine Group (14,500), Procter and Gamble (12,500), the Kroger Co. (11,320), U.S. Government (8,250), the University of Cincinnati (7,900), and the City of Cincinnati (7,700).

---

* Some of this information is taken from the Management Plan for the demonstration, prepared by Ecosometrics, Inc.; the remainder was provided by Queen City Metro and the Ohio-Kentucky-Indiana Regional Council of Governments.

TABLE 2-1. POPULATION DISTRIBUTION (BY AGE)

Age	Population Cincinnati	Hamilton Co.
5	28,781 (7%)	62,380 (7%)
5-17	68,473 (18%)	180,792 (21%)
18-64	232,491 (60%)	525,593 (60%)
65+	55,712 (14%)	104,459 (12%)
Total	385,457	873,224

Source: 1980 Census of Population and Housing

TABLE 2-2. DISTRIBUTION OF INCOME

Income Category	No. of Households Cincinnati	Hamilton Co.
$5,000	32,934 (21%)	44,410 (14%)
$5,000-$7,499	15,466 (10%)	23,557 (7%)
$7,500-$9,999	14,346 (9%)	23,473 (7%)
$10,000-$14,999	27,167 (17%)	46,787 (15%)
$15,000-$19,999	22,174 (14%)	44,945 (14%)
$20,000-$24,999	15,607 (10%)	39,232 (12%)
$25,000-$34,999	17,432 (11%)	53,360 (17%)
$35,000-$49,999	8,346 (5%)	30,031 (9%)
$50,000 or more	4,528 (3%)	16,647 (5%)
Total	15,800	322,442

Source: 1980 Census of Population and Housing

TABLE 2-3. MEANS OF TRANSPORTATION TO WORK (HAMILTON CO.)

Mode	No. of Workers (16 Years and Older)
Car, truck or van:	
drive alone	253,707 (68%)
carpool/vanpool	64,334 (17%)
Public Transportation	30,662 (8%)
Walk	15,508 (4%)
Other	2,736 (1%)
Worked at home	4,421 (1%)

Source: 1980 Census of Population and Housing

In terms of travel to work, a total of 85 percent of the workers (in the County) use cars (or trucks or vans); 68 percent drive alone and 17 percent are in carpools or vanpools (see Table 2-3); only eight percent use public transportation to get to/from work. As shown in Table 2-4, 17 percent of the County's households have no vehicles available to them, while 37 percent have one. The mean travel time for workers (in the County) is 21.3 minutes, and, as shown in Table 2-5, the majority (55 percent) of the County's workers have work trips of 20 minutes or more.

TABLE 2-4. VEHICLE AVAILABILITY (HAMILTON CO.)

No. of Vehicles	Household*
0	53,476 (17%)
1	118,750 (37%)
2	107,000 (33%)
3 or more	43,012 (13%)

*occupied housing units
Source: 1980 Census of Population and Housing

TABLE 2-5. TRAVEL TIME TO WORK (HAMILTON CO.)

Time	No. of Workers (16 and Older)*
5 minutes	9,466 (3%)
5-9 minutes	36,094 (10%)
10-14 minutes	51,820 (14%)
15-19 minutes	65,635 (18%)
20-29 minutes	103,853 (28%)
30-44 minutes	74,654 (20%)
45-59 minutes	15,220 (4%)
60 or more	10,549 (4%)

*workers who did not work at home
Source: 1980 Census of Population and Housing

2.2 PUBLIC TRANSPORTATION

2.2.1 Overview

The Cincinnati metropolitan area is served by two transit systems. Queen City Metro* is the larger of the two, and the only one providing service within the City of Cincinnati; the Transit Authority of Northern Kentucky (TANK) provides service in the Kentucky suburbs.**

Queen City Metro provides service in Cincinnati and in 30 incorporated and 100 unincorporated places in surrounding Hamilton and Clermont Counties (both in Ohio--see Figure 2-1). The system is managed by a private contractor (ATE Management and Service Company) and is under the policy direction of the Queen City Metro Board.

* Queen City Metro is the operating division of the Southwest Ohio Regional Transit Authority (SORTA), which was created in 1968.

** Beginning November 1, 1982, an agreement between SORTA and TANK instituted a reduced fare transfer policy between the two systems; this agreement allowed passengers transferring between the two systems to save the equivalent of roughly one full fare on a round trip. The agreement also provided for the coordination of the two systems' specialized programs for the handicapped (i.e., SORTA's ACCESS and TANK's RAMP).

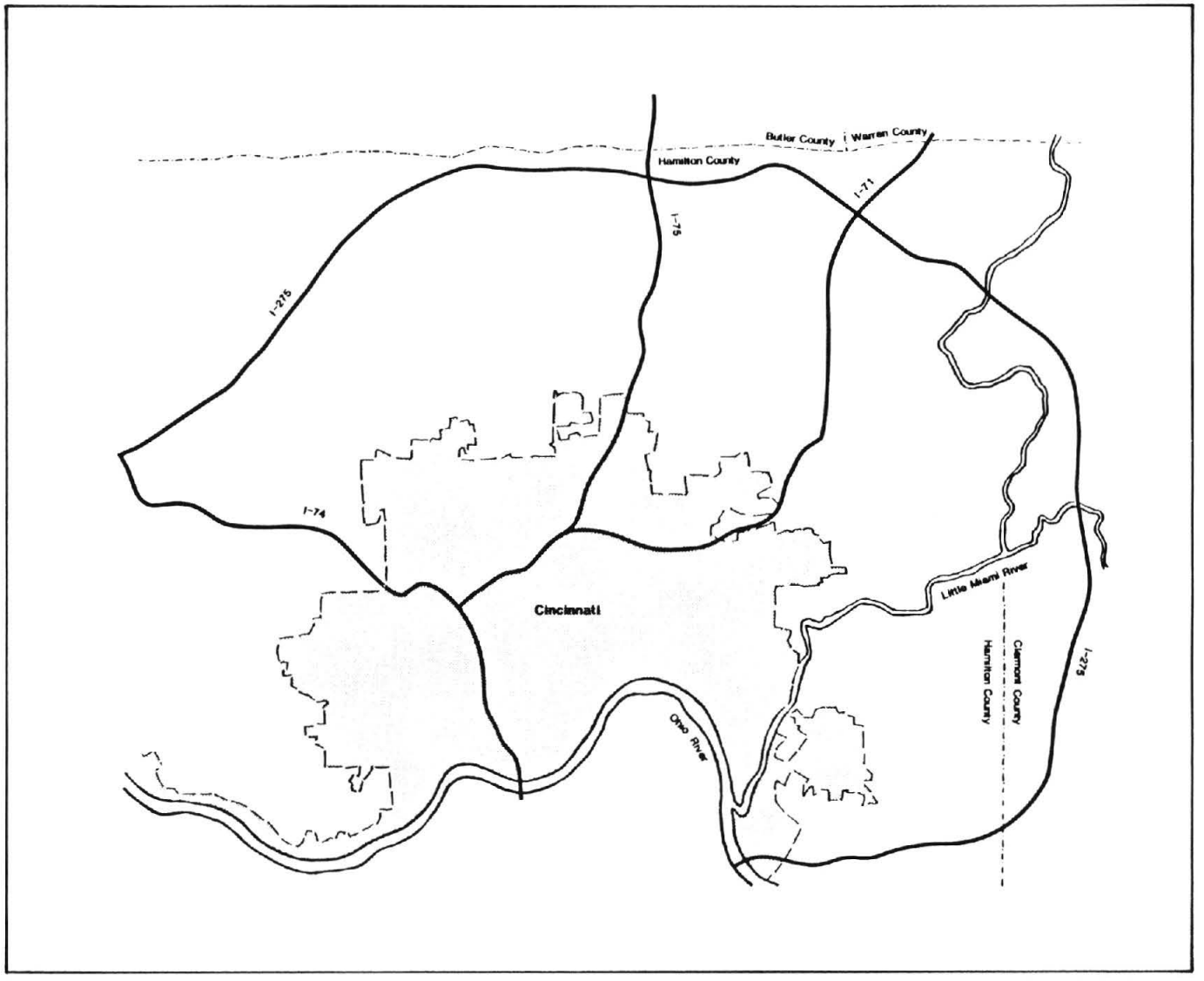


FIGURE 2-1. QUEEN CITY METRO SERVICE AREA

As of this writing, Queen City Metro was providing service on 41 routes with a fleet of 420 buses; the buses range in age from 4 to 21 years. Service was provided Monday through Saturday 4:00 a.m. - 2:00 a.m., and Sundays and holidays 5:00 a.m. - 1:00 a.m. In 1982 the system carried approximately 27.7 million passengers (an average daily ridership of 76,000); ridership has dropped by nearly 18 percent since 1980.

2.2.2 Fare Structure

The Queen City Metro fare structure (as of July 1, 1982) is as follows (transfers are free):

adult cash, peak (weekdays, 6-9 a.m., 3-6 p.m.)	$.60
adult token, off-peak (all other hours)	.50
adult cash, off-peak	.50
elderly/handicapped*	.30
additional for express service	.10
additional per zone beyond City limits (8 zones)	.10

The base fare monthly pass (instituted October 1, 1982) is $24, with an additional charge of $4 for each zone past the City limits. There is also an additional $4 for an "express route" pass; the current pass price schedule is shown in Table 2-6.

TABLE 2-6. PASS PRICE SCHEDULE

Zone	Regular Route	Express Route
1+	$24	$28
2	$28	$32
3	$32	$36
4	$36	$40
5	$40	$44
6	$44	$48
7	express only	$52
8	express only	$56

+ Zone 1 includes all areas within the Cincinnati City limits

* The rider must have a Fare Deal card issued by SORTA.

Prior to the July 1982 fare increase, the adult cash fare was $0.50, the off-peak fare was $0.40, and the elderly/handicapped fare was $0.20; the premium for express service and additional zones did not change. The fare increase represented the third increase since public takeover of the transit system in 1973.* As suggested above, the pass price structure was not revised until October 1982; until that time, each type of pass was $4 less than the cost shown in Table 2-6. (The three-month pass discount is discussed in Chapter 3.)

Queen City Metro designed the pass program to achieve the following objectives:

- provide a convenience to riders by eliminating the need to carry exact change
- speed boarding times
- earn interest on advanced cash flow
- generate off-peak travel
- improve public image due to customer convenience

The program's success in meeting these objectives is discussed in subsequent chapters of this report.

2.2.3 Costs and Revenues

Queen City Metro's operating expenses totaled approximately $37 million for 1982; this represented a 4.3 percent increase over the 1981 total, and a 153 percent increase over the 1974 total. Largely accounting for this jump is the fact that personnel costs (wages and fringe benefits) rose from less than $11 million in 1974 to over $26 million in 1982.

Passenger fares (approximately $11.5 million) accounted for 30.4 percent of the total system revenue in 1982. In all, operating revenue (i.e., including school contract, state elderly and handicapped assistance, special service, charter service, advertising, and non-transportation revenue) amounted to approximately $14.7 million, or 38.9 percent of the total. The subsidy revenue (for 1982) broke out as follows:

- local cash grants and reimbursements - $12.6 million
- state cash grants and reimbursements - $ 2.7 million
- federal cash grants and reimbursements- $ 7.3 million

---

* When SORTA assumed control of the system from the Cincinnati Transit Co. in 1973, the base fare was $0.55, the highest transit fare in the country at the time. SORTA subsequently reduced the fare to $0.25.

This left a net 1982 deficit of approximately $457,000, which represented a drop from $1.6 million in 1981.

In an effort to reduce this deficit, Queen City Metro implemented a service reduction in September 1982. By eliminating underutilized service (approximately five percent of total service), Queen City Metro hoped to improve operational efficiency and effectiveness. Queen City Metro estimated that the service reduction resulted in a cost savings of roughly $200,000 over the last four months of 1982. In light of a significant anticipated decline in Federal operating subsidies available for the coming years, the reduction of costs through management and operating efficiencies became one of Queen City Metro's most important objectives as they entered 1983.

3. PLANNING AND OPERATION OF THE DEMONSTRATION

This chapter describes the activities involved in the planning and operation of the Cincinnati pass pricing demonstration. Included are discussions of the project's design, the means through which passes were sold, marketing and promotional activities, the administration of the program, the selection of subcontractors, data collection activities, and the development of pass pricing recommendations.

3.1 PLANNING THE DEMONSTRATION

The Cincinnati demonstration plan was formally presented in a December 1981 report to UMTA by Ecosometrics, Inc.*. This plan envisioned an eighteen-month demonstration divided into two phases: 1) design and implementation of the pass program, development of a practical methodology for pass pricing, and collection of ridership, cost and revenue data; and 2) re-evaluation of the pricing methodology (following adjustment of the monthly pass price structure) and final data collection. The project officially began in October 1981 and was scheduled to run through March 1983; it was subsequently extended through May 1983, for a total length of twenty months.

Prior to the introduction of MetroCard (October 1981), Queen City Metro undertook pre-implementation activities necessary to develop and introduce the program. These included establishing the pass price structure, designing the pass, deciding on the pass sales/distribution methods, assigning project staff, and introducing the program through initial marketing activities. In addition, Queen City Metro, in conjunction with TSC, developed a "pre-pass" on-board survey, which was conducted in September. These individual activities are discussed in separate sections, below; the costs involved in developing and implementing the program are discussed in Chapter 5.

3.2 PASS DESIGN AND DISTRIBUTION METHODS

The MetroCard was designed to be a monthly flash pass (credit-card size on No. 80 card stock) good for unlimited rides; zone and express stickers are added where appropriate (i.e., when ordered by a passbuyer).** The colors of the

---

* Riese, Jeffrey, Armando Lago, and Patrick Mayworm, Management Plan for the Queen City Metro Monthly Pass Pricing Demonstration, Ecosmetrics, Inc., prepared for UMTA, December 1981.

** As of this report, the MetroCard was still being sold; thus the pass is described here in the present tense.

stickers and of the pass itself are changed monthly. The sample MetroCard shown in Exhibit 3-1 is good for express service and in zones 1 and 2. The pass can be purchased with optional plastic lamination for $0.25 above the pass price.

In establishing pass distribution methods, it was decided that, due to staff limitations, MetroCard would be available, at least initially, only through pick-up at Queen City Metro's Customer Service Department and via the mail. The feeling was that additional sales methods/outlets (e.g., employer outlets, over the counter public and private outlets, and payment through credit cards and automated teller machines) would be added later, if additional staff became available.

In terms of adding outlets, the original goal was to develop and maintain at least 25 employee and retail sales outlets by July 1982; in an effort to enlist employer cooperation, introductory letters were sent to selected employers, and these were followed up with telephone calls and promotional material. Based on initial employer response, the MetroCard staff found that the executives contacted typically felt that few of their employees were regular transit users, and that, even if many were, it would be difficult to establish subsidized pass programs as part of their fringe benefit packages because of the high number of employees who live in Kentucky (and thus would not use Queen City Metro). Hence, the employer approach was not actively pursued during the demonstration period. MetroCard was eventually offered through four employers,* as well as at the University of Cincinnati; however, relatively few passes were purchased at these locations each month (150-200 at U. of Cincinnati, 50-60 at the other four employers).

Beginning in April 1982, passes could be purchased using Mastercard or Visa, as well as via automated bank teller machines (the Fifth Third Bank's JEANIE system). Credit cards could be used in purchasing MetroCard over-the-counter, through the mail, or over the telephone. Use of the JEANIE system gave cardholders the option of buying a pass through any of 100 outlets throughout the Cincinnati area, or via touch-tone telephone; in either case, the pass was charged to the customer's account, the bank notified Queen City Metro, and Queen City Metro mailed out the pass. Queen City Metro hoped that by introducing these purchase options it would be able to attract the suburban commuter, who is likely to be a credit card and/or automated teller user; in addition, Queen City Metro sought to improve its public image by becoming identified with a well-established financial institution (the Fifth Third Bank of Cincinnati).

---

* Cincinnati Bell began selling MetroCard to its employees at the beginning of the program. Over the course of the demonstration period, the local AT&T office, Western Southern Insurance Co., and the Drakett Co. also began selling passes.

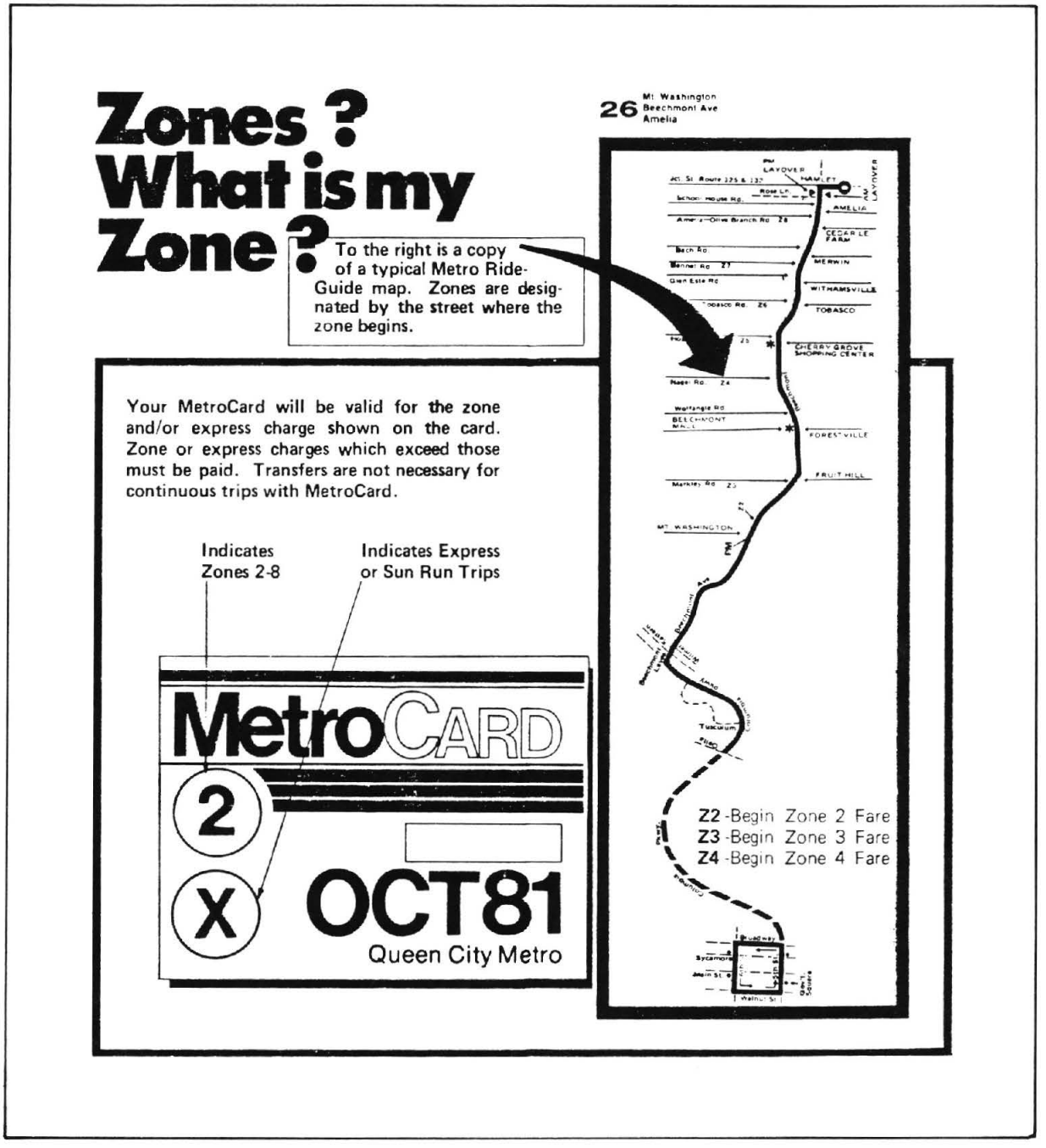


EXHIBIT 3-1. PAGE FROM METROCARD FLYER

Finally, in July 1982 Queen City Metro opened a second sales outlet of its own. This outlet, which also served as a transit information booth, was located on Fountain Square - a plaza in downtown Cincinnati.

Throughout the demonstration period, the most popular mode of pass purchase was in-person (at Queen City Metro's Customer Service counter or at Fountain Square). In a typical month, 75-85 percent of all passbuyers purchased their MetroCards at one of these locations; 6-10 percent bought passes at the outlets, and the remainder bought their passes through the mail.* Passes were available beginning on the 15th of each month (for the following month), and passes were purchased as late as the second week of the month for which they were valid. The bulk of purchases were typically made at the end of the month and in the first couple of days of the month in which the passes were valid. For June 1982, for instance, the breakdown of when passes were purchased (i.e., when people came into Queen City Metros' office and the days on which mail requests were received**) was as follows: nine percent were purchased between May 15 and 20; 17 percent between May 20 and 25; 53 percent between May 26 and June 1; 14 percent between June 2 and 5; and seven percent between June 6 and 10.***

3.3 MARKETING AND PROMOTION

3.3.1 Marketing Objectives and Target Group

The primary target group for Queen City Metro's MetroCard marketing efforts was all transit users; however, particular emphasis was placed on the regular commuting adult rider market -- i.e. persons 18 years or older who work downtown. Futhermore, since some 65 percent of Cincinnati transit users are female, much of the advertising was directed towards women. The initial marketing objective was to sell MetroCard, by December 1982, to 25 percent of those persons who regularly commuted to and from work via transit. Since, according to

---

* Only 15-25 passes per month were sold through bank teller machines

** Passes requested by mail or telephone were generally mailed out the same day they were received.

*** The revenue implications of the pass program in terms of improved cash flow are addressed in Chapter 5.

Queen City Metro's estimate (January 1982), this group comprised roughly 20,500 riders, meeting this objective would have required monthly pass sales of 5,125. At their height (September 1982), pass sales reached 4,655 (23 percent of the target market) -- only nine percent below the target figure. Of course, sales dropped somewhat following that peak -- as did overall ridership (see Chapter 4); over the last several months of the demonstration, sales represented approximately 22 percent of regular transit commuters. Thus, Queen City Metro was quite successful in achieving its original marketing objective, at least in terms of number of passes sold.

In looking at the types of passes sold (i.e., zones and express service), however, the paucity of pass sales good for travel outside of Zone 1 (about ten percent of the total each month) and for express service (about 12 percent each month)* must be noted; Zone 1 covers the area within the city limits. As discussed in Chapter 4, these proportions remained quite steady throughout the demonstration. Thus, although the numbers of suburban passbuyers increased at one point, they subsequently decreased, along with the number of urban passbuyers. Therefore, efforts during the demonstration aimed at increasing the size of the suburban commuter market were rather unsuccessful.

3.3.2 Marketing Strategies

Queen City Metro's overall marketing strategy involved creating a "consistent level of awareness" among transit users and commuters in general of MetroCard's benefits. Much of the advertising (see Exhibits 3-2, 3-3, and 3-4) emphasized the convenience of buying and using MetroCard, as opposed to paying cash. The economic benefit of using a pass (i.e., "the more you use it, the more you save") was also stressed, but less so in the efforts targeted primarily toward suburban commuters. The rationale behind that decision was that the suburban bus rider tends not to use transit for many non-work trips, and therefore is less likely to make enough weekly trips to experience any real savings.

In marketing MetroCard, Queen City Metro used transit (i.e., on-bus) advertising, television, brochures, newspaper ads and special promotions. The primary approach was transit advertising, which consisted of both interior and exterior signs; these signs were posted at the beginning of the MetroCard program and were modified three times (to reflect the introduction of the Jeanie bank teller program, the summer discount, and the pass price increase). It was felt that this form of advertising would provide a cost-effective means of

---

* It should be pointed out that these figures contain some overlap (see Chapter 4).

DETACH ALONG PERFORATION, MOISTEN, AND SEAL.

To order your MetroCard by mail, follow these steps.

1. Print your name and address CLEARLY.

Name_____

Address_____

City_____ State_____ Zip_____

2. Check the month you want to order. Check only one.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

3. Check the pass that matches the kind of ride you take:

ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 1-5 Express
☐	☐	☐	☐	☐	☐
$20	$24	$28	$32	$36	Add'l. $4

ZONE 6 Express	ZONE 7 Express	ZONE 8 Express	Card Lamination
☐	☐	☐	☐
$44	$48	$52	$.25

*** See table on opposite side for zone and pricing information.**

4. What route do you normally take?_____
5. Make check or money order payable to SORTA (Southwest Ohio Regional Transit Authority), and mail in attached envelope.
6. To use Visa or MasterCard fill in the following information and mail.

Visa acct. # ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

MasterCard acct. # ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Signature_____

Card expiration date_____

EXACT CHANGE MADE EASY.

METROCARD. CHARGE IT. TO VISA, MASTERCARD,™ OR USE JEANIE.™

FOR MORE INFORMATION, CALL 751-PASS.

EXHIBIT 3-2. PAGE FROM METROCARD FLYER

MetroCARD

THE EASY WAY TO PAY YOUR BUS FARE.

MetroCard is a convenient way to have exact change without the bother of exact change. All you have to do is purchase a MetroCard once a month. And you can use it as often as you like, on any Metro coach.

CHARGE IT TO VISA,* MASTERCARD™ OR USE JEANIE.®

Now it's easier than ever to purchase a MetroCard.

You can order over the phone by calling 751-PASS and charging MetroCard to your Visa or MasterCard.

You can order through Jeanie's Bill Payment Service by using your Jeanie card at any Jeanie automated teller machine location. Or by calling Jeanie's Private Line at 579-5555. (For questions about Jeanie payment, call Jeanie Customer Service, 579-4381.)

To order by mail, complete the attached order form and include your Visa or MasterCard information. Or simply send us the completed form with a check or money order.

You can also stop in at Queen City Metro's Customer Service Department, 6 East Fourth Street, 4th Floor, to purchase a MetroCard on the spot.

When ordering your MetroCard by mail or through Jeanie, payment must be received by the 22nd of the month for the next month's pass. For example, your payment must by received by July 22nd for the August monthly pass. Your MetroCard will automatically be mailed to you.

THE MORE YOU USE IT, THE MORE YOU SAVE.

MetroCard is not valid for special services, such as the Bengals Arrow Express or service to River Downs race track.

However, you can use it on any of Metro's 41 routes throughout the Greater Cincinnati area and there's no limit to the number of trips. Even if you live too far from a regular route, you can drive to one of our Park 'n' Ride locations, park for free, then use the Metro as much as you like. And you only pay for 40 peak-hour rides.

With MetroCard, you buy it once a month; it's good for the whole month. Everyday, including weekends. And the more you use it, the more you save.

METROCARD CALL 751-PASS

If you have any questions about MetroCard or need help in determining the cost of your pass, give us a call. We're making it easier than ever to ride the bus.

EXHIBIT 3-3. PAGE FROM METROCARD FLYER

IF YOU'RE ONE OF OUR MANY RIDERS WHO REGULARLY TAKE THE BUS TO WORK OR SCHOOL, MetroCARD™ IS FOR YOU!

It's the most convenient, economical, sensible way to Ride the Bus.

Simply purchase a **MetroCard** once each month and use it as often as you like, instead of cash, on any Metro coach. Just show your pass to the driver instead of paying your fare. **MetroCard** makes it so quick and easy.....and you no longer have to worry about transfers or carrying exact change!

MetroCard can save You Money.

There is no limit to the number of trips you can take with the **MetroCard**. You can use it every day, as many times as you like, including weekends ...and you only pay for 40 peak-hour rides. That's 4 trips less than most people take just traveling to and from work. For example, if you live within the Cincinnati city limits and take an express route, your MetroCard would cost $24 **(50 cents Peak Fare + 10 cents Express Charge X 40 trips = $24).** With MetroCard, the more you use it, the more you save!

You can use your **MetroCard** on any of Metro' 41 routes throughout the Greater Cincinnat area. Even if you live too far from a regular route you can drive to one of our Park 'n' Ride loca tions and park your car for free. During rus hours, many routes have fast, limited-stop expres service.

Use Your MetroCard On the Downtowner!

You can use your monthl pass on the Downtowner Metro's downtown shuttl service which operates Mon day through Friday, 10:3 AM to 2:30 PM. **It is no valid for any of Metro's spe cial services, such as the Red and Bengals Arrow Expres or service to River Down race track.**

To get your MetroCard, simply fill out the attached order form, insert your check or money order and drop in the mail. Or stop at Queen City Metro's Customer Service Department, 6 East Fourth Street, 4th Floor. If you have any questions about MetroCard or need help in determining the cost of your pass, call 751-PASS.

EXHIBIT 3-4. PAGE FROM METROCARD FLYER

reaching the primary target audience -- the bus rider.

Television advertising to reach the general public was used only through September 1982; its heaviest use was before the beginning of the project (ten days in September 1981) and during the first two weeks (ten days in October 1981). The TV ads were 30-second commercials, which were shown primarily during local news shows -- in both morning and evening. Queen City Metro was able to obtain a considerable amount of TV air time at a minimal cost "in trade" -- i.e, they paid roughly one-quarter the real cost of the advertising in return for posting ads for television stations on the buses.*

Brochures (see Exhibits 3-2, 3-3, and 3-4), which included order forms and return mail envelopes, were distributed on buses and at Queen City Metro offices and ride guide locations (at several stores). In addition, MetroCard inserts (see Exhibits 3-5 and 3-6) were included in Fifth Third Bank's monthly statements to announce the introduction of the Jeanie program.

Finally, in addition to regular advertising (i.e., describing the basic pass program), Queen City Metro sponsored two special promotions** to attract people to the MetroCard program. The first of these was the three-month summer relative price reduction (July, August, and September 1982), following the July 1, 1982 fare increase. Because the pass price was not increased when the fare was increased, passbuyers were able to realize a $4 "discount" compared to what the pass would have cost had its price been raised to reflect the fare increase. The purpose of this promotion was to attract new passbuyers, as well as to encourage repurchase among current passbuyers. The promotion was advertised through flyers distributed on the buses, interior transit signs, and ads in suburban newspapers (see Exhibit 3-7); the discount was also mentioned on TV commercials during the discount period. This promotion was apparently quite successful in increasing pass sales: July's sales were 55 percent higher than June's. Furthermore, of perhaps greater significance was the fact that the post-discount sales level stayed well above the pre-discount level. The impacts of the discount are addressed in Chapters 4 and 5.

The second promotion involved the sale of discounted MetroCard gift certificates. Beginning in mid-November 1982, Queen City Metro offered MetroCard buyers $2 off the purchase

---

* The advertising costs are discussed in Chapter 5.

** A third promotion, offered in conjunction with the Cincinnati Zoo, was targeted to a limited audience -- families going to the Zoo. This promotion is described in the flyer included as Exhibit 3-8.

HERE'S HOW EASY IT IS TO USE JEANIE'S PRIVATE LINE TO PURCHASE YOUR METROCARD:

When calling Jeanie's Private Line (579-5555), Jeanie will ask you for the required information, which you will supply by pressing the appropriate buttons on your Touch-Tone phone.

Customer: Call Jeanie by dialing 579-5555.
Jeanie: **HELLO...THANK YOU FOR CALLING JEANIE. PLEASE ENTER YOUR CARD NUMBER.**
Customer: 1234567# (be sure to use the number on the front of *your* card).
Jeanie: **PLEASE ENTER YOUR PASSWORD.**
Customer: EASY# (be sure to use *your* password).
Jeanie: **PLEASE ENTER TRANSACTION.**
Customer: T# (for transfer or payment from your account to the merchant).
Jeanie: **ACCOUNT TRANSFER...PLEASE ENTER "FROM ACCOUNT CODE."**
Customer: CK# (for checking account).
Jeanie: **PLEASE ENTER "TO ACCOUNT CODE."**
Customer: 888# (code number for MetroCard — Regular Service).
Jeanie: **PLEASE ENTER PAYMENT AMOUNT USING DOLLARS AND CENTS.**
Customer: 20*00# (for $20.00).
Jeanie: **PAYMENT REQUEST FOR AMOUNT TWENTY DOLLARS AND ZERO CENTS FROM CHECKING ONE TO MERCHANT 888 IS APPROVED. ENTER 1 TO COMPLETE OR ZERO TO CANCEL.**
Customer: 1#.
Jeanie: **TRANSACTION COMPLETED.**

FIFTH THIRD BANK
The only bank you'll ever need!

*Reg. In U.S. Pat. and T.M. Off.
*Service Mark owned by Midwest Payment Systems

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 535 CINCINNATI, OHIO

POSTAGE WILL BE PAID BY ADDRESSEE

Fifth Third Bank
Depositor Services Department
Attn: Jeanie Desk
P.O. Box 478
Cincinnati, Ohio 45201

Now You Can Even Use Jeanie® To Purchase Your MetroCard™!

EXHIBIT 3-5. JEANIE FLYER

IF YOU RIDE THE BUS, METROCARD AND JEANIE WILL SAVE YOU TIME AND MONEY!

MetroCard is the most convenient, economical and sensible way to ride the bus. Simply purchase a MetroCard once each month, then use it every time you ride...no need to worry about transfers or having exact change. There's no limit to the number of trips you can make. The more you ride, the more you save!

Purchase your pass through Jeanie

Purchase your MetroCard the easy way — with Jeanie. Simply use any Touch-Tone† phone at home or work to call Jeanie's Private Line* (579-5555), or use any of more than 110 Jeanie Automated Teller Machines. You must purchase your pass by the 22nd of each month to receive the next month's pass on time (for example, your April MetroCard must be purchased by March 22). Your MetroCard will automatically be mailed to you. If you don't know the cost of your MetroCard or have other Metro questions, simply call 751-PASS.

Jeanie's Bill Payment Service* saves you time, postage and money

Jeanie's Bill Payment Service makes your bill paying easier, more convenient and less costly. Just let Fifth Third know which of your monthly bills, including utilities, department stores, credit cards and any others you'd like to pay. Then use Jeanie's Private Line or any Jeanie Automated Teller and make your payments electronically...anytime...any day!

To start getting more for your money with Jeanie's Bill Payment Service, simply fill out and return the attached request form. If you have any questions about Jeanie, call 579-4381. Or call 751-PASS when you have questions come up about the MetroCard.

† Registered Trademark of AT&T Co.

SIGN UP TODAY TO PAY YOUR BILLS THROUGH JEANIE*

NAME

ADDRESS

CHOOSE WHICH CARD YOU WILL BE USING TO ACCESS YOUR MERCHANT ACCOUNTS

☐ 5/3 Jeanie # _____

☐ 5/3 VISA # _____

CITY, STATE, ZIP

HOME TELEPHONE # WORK TELEPHONE #

METROCARD	CODE #	ZONE #
REGULAR SERVICE	888	ZONE #
EXPRESS SERVICE	889	ZONE #

OTHER COMPANIES	CODE #	YOUR ACCOUNT NUMBER
CINCINNATI BELL	333	
CINCINNATI GAS & ELECTRIC	444	
UNION LIGHT, HEAT & POWER	441	
STANDARD OIL (SOHIO)	800	
SEARS	777	
OTHER		

FINANCIAL — LIST ISSUING BANK AS MERCHANT	PAYMENT ADDRESS FOR CO	FOR BANK USE ONLY	YOUR MERCHANT ACCT #
VISA			
MASTERCARD			
INSTALLMENT LOAN			
MORTGAGE LOAN			

SIGNATURE

DATE

4/82 92-8753

Fold and Tape.

YOUR TELEPHONE NUMBER PLUS THREE DIGITS IS YOUR CINCINNATI BELL ACCOUNT NUMBER: 942-3669-342

Cincinnati Bell

513 942-3669

56-....

JOAN SMITH
TWAIN AVE
CINCINNATI OH 45233

TEL CO USE
342 RRR
1714

EXHIBIT 3-6. JEANIE FLYER

CLIP US FOR FOUR BUCKS.

If you're looking for a good deal this summer, there's never been a better time to take advantage of the MetroCard. Just purchase a July, August or September monthly MetroCard pass and get a $4 discount.* For more information, call 751-PASS.

Save $4 with our MetroCard Summer Special.

*Based on new fares effective July 1.

EXHIBIT 3-7. NEWSPAPER AD FOR SUMMER DISCOUNT

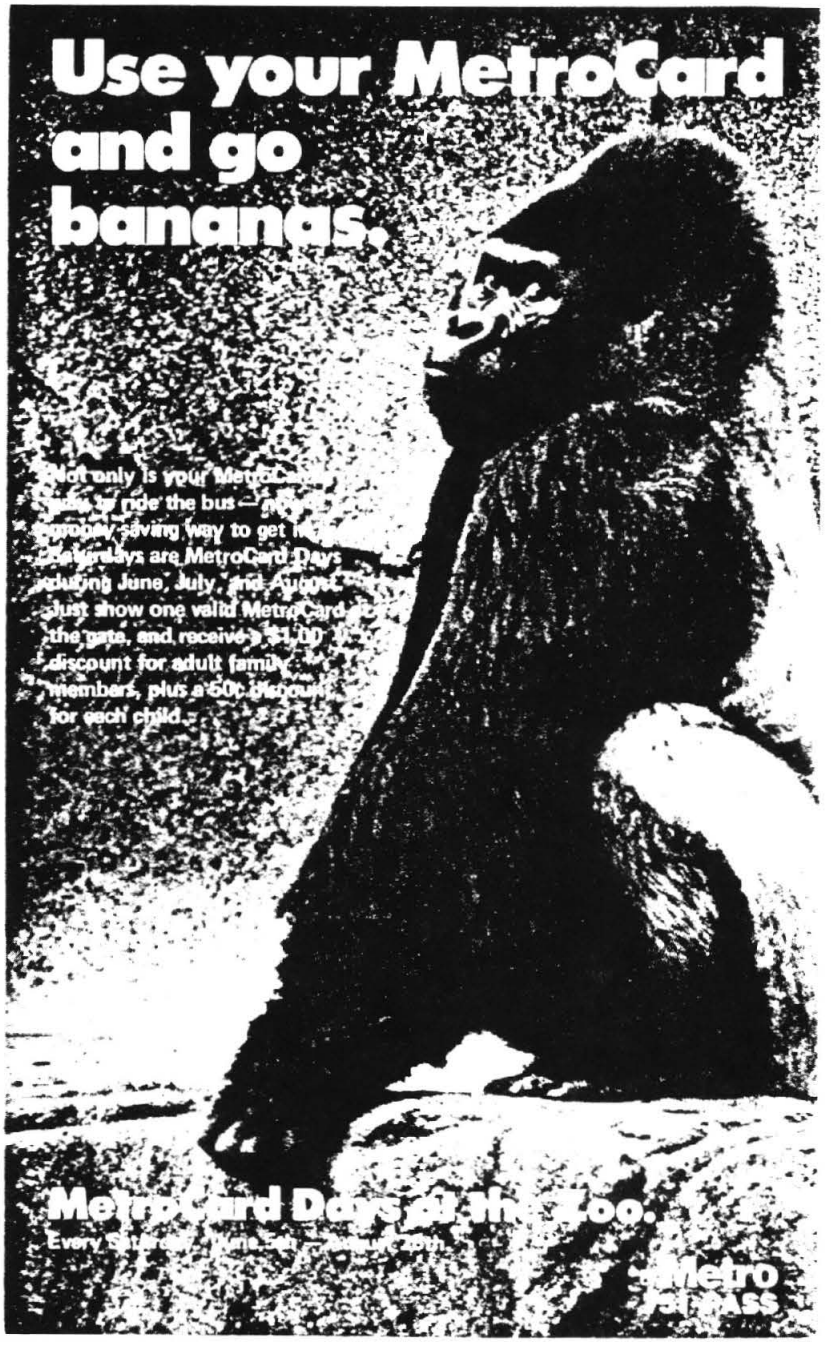


EXHIBIT 3-8. PROMOTIONAL FLYER

3-9. PROMOTIONAL FLYER

of additional passes. The promotion was advertised in six suburban newspapers for a two-week period in November 1982. In addition, promotional flyers (see Exhibit 3-9) were distributed at ride-guide locations and at MetroCard sales locations, and were also mailed to all MetroCard purchasers and to persons who had participated in other (i.e., non MetroCard-related) Queen City Metro promotional activities. This promotion was unsuccessful, however; as of the end of December 1982, only eight gift certificates (thus eight discounted passes) had been sold.

3.3.3 Marketing Results

Besides the obvious impacts of the marketing strategies -- i.e., the pass sales trends -- the effectiveness of the various strategies were assessed through surveys of both passbuyers and non-passbuyers. Two separate survey efforts were carried out. The first of these -- the Fall Greater Cincinnati Survey -- was conducted by the University of Cincinnati in November 1981* and included questions directed toward regular transit users concerning MetroCard advertising. A total of 50 percent of those persons responding to the survey had seen MetroCard advertising and could correctly define MetroCard and its benefits.** Another 22 percent indicated that they had seen advertising, but did not really know what MetroCard was. A total of 28 percent of the respondents had not seen any MetroCard advertising. Among those respondents claiming to have seen MetroCard advertising, 61 percent indicated that they had seen the ads on television. A total of 17 percent had heard about MetroCard from their friends.

The second survey effort was that conducted as part of the demonstration. Surveys of passbuyers in May and July 1982 (those and the other project surveys are discussed in Section 3.5) asked how they found about MetroCard; the results of the two surveys are summarized in Table 3-1. As shown, the most common source of information was transit advertising; television was cited second. This order corresponds to the priority given these marketing approaches. It is interesting to note that the third most common source -- "from family or a friend" -- was an indirect marketing approach; the only other direct strategy cited by an appreciable number of survey respondents was "newspaper."

---

* This general survey is undertaken on an annual basis by the University; Queen City Metro typically provides a few questions for its own use.

** These results were reported by Northlich Stolley, Inc. (Queen City Metro's marketing contractor) in a memorandum to the MetroCard project manager (1/11/82).

TABLE 3-1. HOW PEOPLE FOUND OUT ABOUT METROCARD

Category	Percentage
Newspaper ad	10.0%
Radio ad	2.2%*
Television ad	27.7%
From family or friend	15.0%
Transit ad	42.6%
Other	2.5%

* This was an interesting response considering that MetroCard was never advertised on radio.

Source: combined results May and July Passbuyer Surveys

3.4 ADMINISTRATION OF THE METROCARD PROGRAM

3.4.1 Demonstration Management

Queen City Metro's manager of marketing served as the demonstration project manager. Although she devoted more time to the project at the beginning, over the course of the demonstration she spent an average of approximately one-quarter of her time administering the MetroCard program; this included the time necessary to perform demonstration-related (i.e., reporting and monitoring) activities. The project manager was assisted by a full-time project supervisor, and the project also employed two full-time clerical people. (The labor costs of the demonstration are discussed in Chapter 5.)

3.4.2 Selection of Subcontractors

As part of the demonstration agreement, Queen City Metro was responsible for all data collection activities, and also for undertaking an analysis of the pass price structure, so as to develop pricing recommendations and guidelines. In order to carry out these activities, Queen City Metro sought to obtain the services of two subcontractors: one with experience in survey work, the other with expertise in transportation demand and behavior analysis. Requests for proposals (RFP's) were issued in early 1982, and, following the receipt and subsequent review of proposals, two firms were hired: Goddell-Grivas, Inc. was selected as the data collection sub-contractor; SG

Associates was chosen to be the pricing sub-contractor. The sizes of these sub-contracts were approximately $25,000 (data collection) and $45,000 (pricing). The results of these subcontractors' efforts are discussed in the following two sections.

3.5 DATA COLLECTION ACTIVITIES

The data collection subcontractor's effort involved six surveys* and a series of three on-board measurements; these activities are discussed below (the data collection instruments are included in Appendix A.**)

3.5.1 Surveys

Three "waves" of surveys were undertaken: "before" (September 1981), Phase I (May and July 1982), and Phase II (November 1982). The before wave involved an on-board survey. Survey cards were distributed on a preselected sample of bus runs and respondents could either complete and hand in the cards on the bus, or else mail them in (no postage was needed); 1374 responses were received. Respondents were asked to provide names and telephone numbers so that they could be contacted for a follow-up survey. A total of 1042 respondents provided telephone numbers. These persons were subsequently called in the May 1982 telephone follow-up survey. The data collection subcontractor, using a team of eight interviewers, was able to reach and interview 734 of the target 1042 persons (70.4 percent response rate). The remaining 308 persons were not successfully interviewed for the following reasons: wrong number provided, phone disconnected, subject moved or not available, subject refused to participate, or subject could not be reached (at least four attempts were made). This survey was performed between May 17 and 26.

A second on-board survey was also undertaken in May 1982. Between May 20 and 26, a team of 21 trained workers distributed

---

* As mentioned earlier, a seventh survey was undertaken -- by Queen City Metro -- prior to the selection of subcontractors.

** The results of these activities are discussed throughout this report, where applicable. More extensive summaries of the results, as well as more complete descriptions of the individual procedures and problems encountered, are included in a series of reports prepared by Goodell-Grivas, Inc. Individual reports describe each of the survey and special measurement efforts.

13,600 survey cards on a preselected sample of bus runs.* All survey cards were precoded with the route number on which they were to be distributed. The cards were supposed to be handed out to all persons boarding the bus on the designated runs who paid their fares using cash and/or tokens (i.e., not using MetroCard, Fare Deal card, or a student card); however, anumber of pass users inadvertently received surveys -- a total of 147 respondents reported using MetroCard. Persons receiving surveys were urged to complete and return them on the bus, but they had the option of returning the surveys by mail (stamped, preaddressed envelopes were provided). A total of 3212 valid surveys were returned (23.6 percent response rate).

As in the first on-board survey, respondents were asked to provide their names and telephone numbers for use in a follow-up survey. A total of 2122 respondents gave telephone numbers; 1480 of these people were subsequently called in the November 1982 Telephone Followup Survey (of non-pass-buyers).** The data collection subcontractor, using a team of five trained interviewers, was able to reach and interview 858 people (67.2 percent response rate). The remaining people either could not be reached (wrong number, subject had moved or was not available, phone disconnected) or would not cooperate. The survey was undertaken between November 8 and 17.

The first passbuyer survey was conducted during late May and early June 1982. A survey was given to each person who came into Queen City Metro's Customer Service Department during that period to buy a pass, and sent to each person requesting a pass by mail; stamped pre-addressed envelopes were provided. The survey was thus distributed to approximately 2500 persons. Unfortunately, only 214 completed surveys were returned (8.6 percent response rate), and virtually all of these (all but 30) were from people who had purchased MetroCard by mail. The reason for this low response could not be ascertained. However, because the passbuyer survey was considered crucial to the evaluation, it was decided that a second passbuyer survey should be undertaken.

The second passbuyer survey was conducted through interviews of persons coming in to Queen City Metro's Customer Service Department to buy passes for August. Interviews were completed with 685 passbuyers on July 29 and 30 and August 2;

---

* Multisystems, in conjunction with TSC, devised the survey distribution plan so as to provide for systemwide coverage during all periods of the day.

** Due to budgetary constraints, the data collection subcontractor was unable to call every person who had provided a telephone number. Thus, a sample was randomly selected from the total list of names and numbers.

this represented 15 percent of all August passbuyers.*

Thus, a total of 899 passbuyers were surveyed. As in the on-board surveys, respondents (to both the May and July survey) were requested to provide names and telephone numbers for a follow-up survey. A total of 640 passbuyers gave telephone numbers; 517 of these people (80.8 percent response rate) were subsequently interviewed in the November 1982 Telephone Follow-up Survey. A team of three trained interviewers made the calls between November 8 and 17; those persons not interviewed either refused to cooperate or could not be reached for the same reasons as in the other telephone surveys.

The seven surveys undertaken as part of this demonstration provided a large amount of information which was essential in evaluating the MetroCard program and also in developing pass price recommendations and guidelines (see Section 3.6 below). However, several key problems became apparent in examining the responses to particular questions on all the surveys. The major problems, which related to both the design of the instruments and the nature of responses, can be summarized as follows (these all deal with trip frequency questions):

1) Trip frequency questions were not entirely consistent; for example, on the May and July passbuyer surveys, respondents were asked to present their current trip rates in terms of "number of trips," while they were asked to describe pre-MetroCard travel in terms of "number of days." Furthermore, both of the November surveys (i.e., passbuyer and non-passbuyer) requested trip frequency information in "number of days."

2) Some trip frequency responses on all the surveys were obviously in error (i.e., unreasonably high). There is often a tendency among transit users to over-report their travel frequency in surveys. However, based on examination of individual responses, specific reasons for inaccurate responses on the Cincinnati surveys appeared to include double counting of transfers as separate one-way trips, confusing monthly with

---

* Multisystems developed an interview sampling plan which made cost-effective use of the data collection subcontractor's efforts, while achieving a random sample of passbuyers during each time period covered. The desired completion rate was 20 percent, but the level of pass sales for August was higher than anticipated.

weekly trips, facetious responses, and keypunch errors. The data collection subcontractor performed a series of checks on the data obtained in each survey (e.g., to assure accuracy of keypunching), but certain errors were not caught. Thus, in analyzing data for this evaluation, range checks were used to eliminate exaggerated trip frequency responses: responses indicating more than 14 one-way work trips, as well as those indicating more than 28 one-way total trips, were excluded. While this did not eliminate all erroneous responses, it was decided that further editing of responses should be avoided.*

In summary, despite these inaccuracies, the overall results provided a good information base for assessing the travel behavior and revenue impacts of the MetroCard program, as well as changes in pass use and travel behavior over the course of the demonstration. However, the bias introduced by over-reporting of trips can significantly affect the economic impacts of pass use as computed in this evaluation (see Chapter 5). Therefore, the economic figures reported here should be considered rough estimates only.

3.5.2 Special On-Board Measurements

In an effort to measure the effect of pass use on transit boarding times, as well as the distribution of boardings by fare category, a series of special on-board measurements was undertaken (by the data collection subcontractor). These measurements were intended to 1) determine whether the use of

---

* As explained in Section 3.6 below, the pricing subcontractor subjected the data to significant manual editing in an effort to eliminate all unreasonable responses. Hence, the trip rates as determined through their analyses are generally somewhat lower than those cited in this report. The confidence intervals for the survey results included in this evaluation are summarized in Appendix B. In an effort to correct for another problem - the sampling bias associated with frequency of bus use inherent in on-board surveys, a weighting factor was applied to the on-board survey responses.The procedure involves using individual travel frequencies to develop weights for each observation: observations are weighted by the ratio of their relative frequency in the population to their relative frequency in the sample. This procedure is described in the following memorandum: Lawrence Doxsey, "Respondent Trip Frequency Bias in On-Board Surveys," Transportation Systems Center, December 1982; the procedure as applied here is described in Appendix C.

prepaid passes reduces boarding times, thereby reducing overall run times; 2) provide information on the distribution of methods of fare payment; and 3) identify the locations and times of greatest concentrations of pass usage.

These measurements were made during three different time periods: 1) June 24-28, 1982; 2) August 17-20, 1982; and 3) November 9-12, 1982. On each occasion, observations were made on the same nine routes; the run observation assignments were selected (by Multisystems) so as to provide a broad sample of distribution of fare payment methods for different routes and times of day. On each run, observations were made (by trained personnel) at predetermined time points and intermediate stops. At each stop, the observer noted the total boarding time (i.e., the time from which the first person stepped on the first step until the door was closed), the number of persons boarding by each method of fare payment, the number of people already on the bus, and any unusual factors affecting the boarding time (e.g., very old person, kids fooling around, etc.) The results of these observations are discussed in Chapter 4 and 5; the procedure followed in performing the measurements is described in Appendix D.

Thus, in administering the surveys and special measurements, the data collection subcontractor was responsible for a range of duties, including hiring and training field personnel, supervising actual data collection activities, collecting surveys, coding and keypunching data, performing quality checks on data, preparing reports on the activities, and delivering properly formatted data files to Queen City Metro for use by Multisystems and SG Associates.

3.5.3 Other Sources of Data

In addition to the surveys and special measurements, data used in this evaluation were obtained predominantly from Queen City Metro records. Pass sale totals, system ridership and revenue levels, program cost information, and other descriptive information were all supplied by the grantee - either from existing (or routinely collected) transit records (e.g., ridership and revenue summaries) or from project-specific records (e.g., pass sale logs, program cost details and marketing descriptions). Finally, the socio-demographic data included in Chapter 2 were obtained mainly from the local regional planning agency (the Ohio-Kentucky-Indiana Regional Council of Governments).

3.6 DEVELOPMENT OF PRICING RECOMMENDATIONS AND GUIDELINES

Besides documenting the full costs and benefits of a transit pass program, the major purposes of the Cincinnati

demonstration were: 1) to provide Queen City Metro with an optimal pass price structure aimed at reducing its operating deficit, and 2) to develop a practical methodology for setting monthly pass price structures for transit operators in general. As mentioned earlier, SG Associates was selected as the pricing subcontractor, and was thus assigned responsibility for assessing the sales and revenue impacts of alternative pricing structures and making pricing recommendations and developing guidelines accordingly.

SG Associates proposed pass price adjustments at two points in the project: at the time of the fare increase (July 1982), and again early in 1983, when Queen City Metro was considering instituting another fare increase (Queen City Metro subsequently decided against an increase at that time). Following each recommendation, Queen City Metro reviewed the findings and made its own decisions. SG submitted a series of Technical Memoranda and Technical Reports presenting their recommendations and the background analyses.* The basic methodology used and the major recommendations are reviewed in Appendix E of this report.

---

* The major technical reports describing pricing recommendations were as follows: Technical Report #1 - Phase I Pass Pricing Documentation (August 26, 1982); Technical Report #2 - Pass Pricing Evaluation and Pricing Recommendation (March 1, 1983); and Final Report - Pass Pricing Evaluation and Pricing Recommendation (May 27, 1983).

4. TRAVEL BEHAVIOR IMPACTS

This chapter examines the MetroCard program's impact on travel behavior. This assessment includes 1) the nature of demand for transit passes, and 2) the pass program's impact on transit usage.

4.1 NATURE OF DEMAND FOR PASSES

This section reviews the various factors contributing to the decision to buy a pass, as well as the tripmaking characteristics of passbuyers (compared with non-passbuyers). The section is divided into the following categories: demand for passes; travel behavior characteristics; socioeconomic characteristics; stated reasons for pass purchase; and pass retention rate.

4.1.1 Aggregate Demand for Passes

Queen City Metro began selling the MetroCard transit pass in September 1981 (for use in October). As shown in Table 4-1 and Figure 4-1, the sale of passes varied over the course of the demonstration. Demand rose substantially the second month (20 percent higher than the first month), declined (by 13 percent) the next month and then rose fairly steadily over the next five months. Another drop in demand (12 percent in June 1982) followed those increases, but then demand jumped in July (a 55 percent increase), spurred by the beginning of the three-month discount period. Demand rose over the remainder of the discount period, and then, surprisingly, dropped only very slightly in the two months following the pass price increase (beginning in October 1982). Pass demand suffered its largest drop in December 1982 (19 percent), but then rose (by 11 percent) in January 1983 to a level nearly equal to that obtained at the beginning of the discount period; demand stayed roughly at that level during the final four months of the demonstration.

Thus, by the end of the demonstration, the sale of passes had leveled off around the 3800-3900 mark, somewhat below the 4550-4650 range reached during and immediately after the three-month discount period, but approximately 35 percent higher than the prediscount peak demand. The increased demand which occurred during the special discount was thus retained once the discount period ended.

In terms of market penetration of pass sales, the percentage of adult passengers buying a pass rose significantly during the demonstration. In February 1982, for instance, passbuyers represented approximately 12 percent of peak adult riders (unduplicated), and four percent of total adult riders.

TABLE 4-1. METROCARD SALES

Month	Base Pass Price	Passes Sold: Zone 1	(% of Total)	Zones 2-8	Express	(% of Total)*	Total	% Change (from prior month)
Oct 1981	$20	1,546	(84%)	292	(374)	(20%)	1,838	-
Nov		1,947	(88%)	260	(296)	(13%)	2,207	20%
Dec		1,743	(90%)	188	(223)	(12%)	1,931	-13%
Jan 1982		1,813	(89%)	227	(246)	(12%)	2,040	6%
Feb		2,155	(90%)	238	(264)	(11%)	2,393	17%
Mar		2,312	(90%)	246	(308)	(12%)	2,558	7%
Apr		2,523	(90%)	283	(319)	(11%)	2,806	10%
May		2,601	(90%)	292	(323)	(11%)	2,893	3%
Jun		2,300	(90%)	253	(276)	(11%)	2,553	-12%
Jul**		3,557	(90%)	390	(464)	(12%)	3,947	55%
Aug**		4,091	(90%)	465	(592)	(13%)	4,556	15%
Sep**		4,172	(90%)	483	(657)	(14%)	4,655	2%
Oct	$24	4,171	(90%)	449	(530)	(11%)	4,620	-1%
Nov		3,860	(89%)	483	(457)	(11%)	4,343	-6%
Dec		3,233	(92%)	281	(348)	(10%)	3,514	-19%
Jan 1983		3,575	(92%)	327	(423)	(11%)	3,902	11%
Feb		3,645	(92%)	328	(387)	(10%)	3,973	2%
Mar		3,566	(91%)	359	(447)	(11%)	3,925	-1%
Apr		3,605	(92%)	329	(397)	(10%)	3,934	-
May		3,464	(92%)	315	(368)	(10%)	3,779	-4%
Total		59,879	(90%)	6,488	7,699	(12%)	66,367	

* Express passes are included in the figures for Zones 1-8.

** During these months, the base pass price remained at $20, but the base cash fare rose from $0.50 to $0.60.

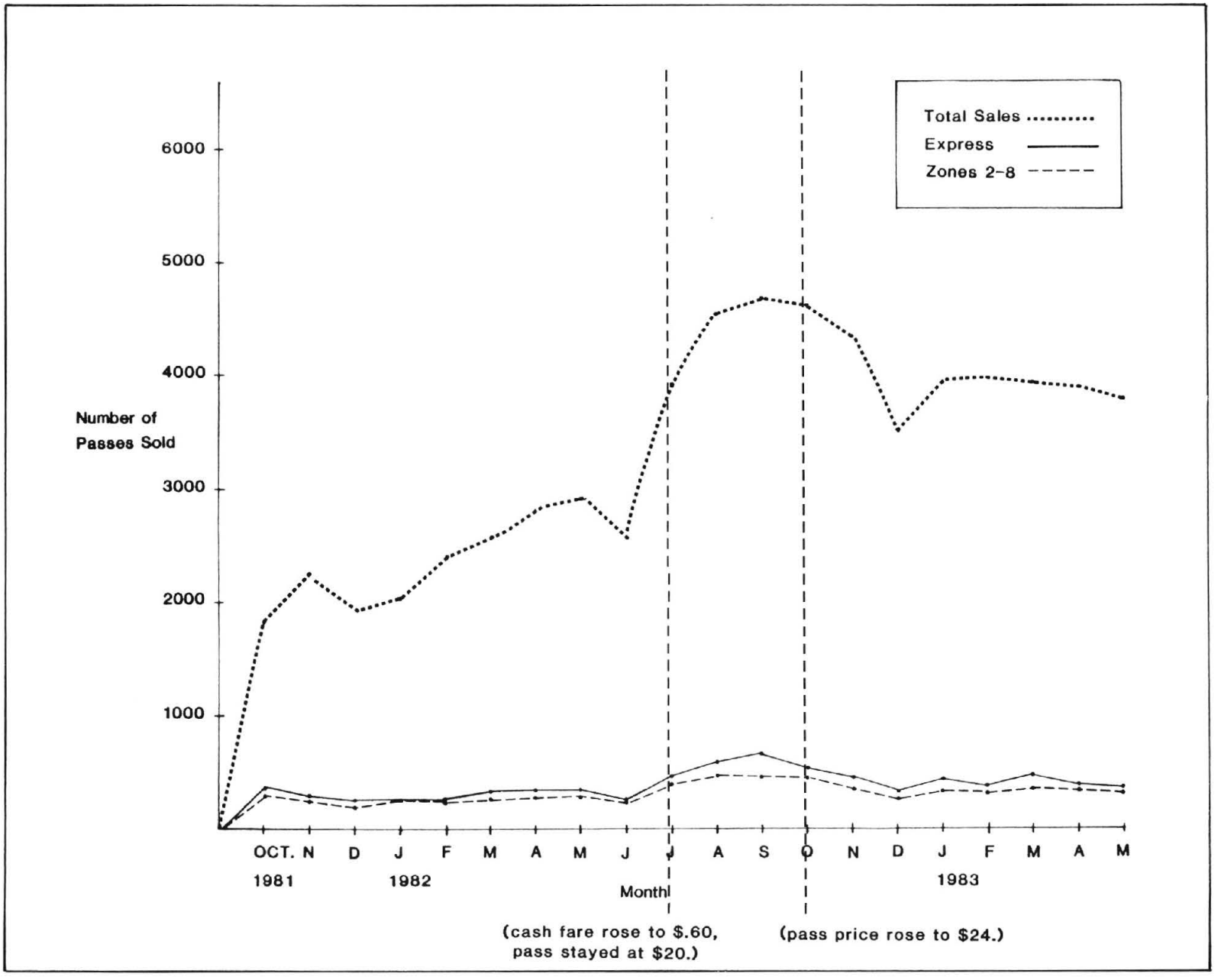


FIGURE 4-1. METROCARD SALES

In May 1982 (the month with the highest prediscount pass sales), passbuyers represented approximately 16 percent of peak adult riders (unduplicated), and six percent of total adult riders. In September 1982 (the month with the highest pass sales), these percentages rose to approximately 27 percent and nine percent, respectively; this increase was produced predominantly by the higher pass sales rate, but the fact that overall system ridership declined (see Section 4.2) was also a contributing factor. As of March 1983, the percentage of pass users had dropped slightly (24 percent of peak adult riders, 8 percent of all adult riders), as pass sales were somewhat lower than in September, while overall ridership was approximately the same as in September. Between September and March, these percentages varied considerably, as overall ridership was on a generally downward curve, while the demand for passes dropped and then rose to the level at which it stayed during the final several months.

In terms of the geographical distribution of demand for passes, Table 4-1 shows that MetroCards valid only in Zone 1 constituted the vast majority of all passes sold. In fact, the percentage of total passes sold for Zone 1 was extremely consistent throughout the demonstration.*

The pattern of demand for passes by route (i.e., the route predominantly used by each passbuyer) is shown in Figure 4-2 (for the routes on which passes are used most frequently). Three of these routes (17, 4 and 78) were among the six most heavily used routes (i.e., by all types of passengers) in the system, while the other two were not as heavily used by non-pass users. All of these routes experienced fairly steady growth in pass demand through January 1983, except for the major decline affecting the overall level of pass demand (i.e., December 1981, June 1982, and December 1982), and several decreases affecting individual routes. The growth in pass demand on all routes (from the first month of pass sales until a year later) is shown in Table 4-2.

Finally, the pattern of demand for MetroCard express service is shown on Table 4-1 and Figure 4-1. As shown on the table, the percentage of passbuyers purchasing express service was quite steady throughout the demonstration period. However, the percentage did increase somewhat during the special discount period; during these three months, passbuyers were able to get express service for the same equivalent price (as compared to the cash fares) as they previously paid for a pass without express service. Once the discount period ended, the percentage of passbuyers adding express service dropped slightly (to 11 percent) and remained roughly at that level for the rest of the demonstration period.

---

* The percentage of total trips beginning and ending in Zone 1 was not available from Queen City Metro.

TABLE 4-2. PERCENTAGE GROWTH IN PASS SALES BY ROUTE
(October 1981- September 1982)

Route #	Number of Passes Sold		% Change
	October 1981	September 1982	
1	24	270	1,025
4	117	321	174
5	14	52	271
6	71	193	172
8	33	164	397
10	56	149	166
11	73	190	160
16	9	24	167
17	209	380	82
18	33	74	124
19	27	45	67
20	34	73	115
21	91	180	98
22	3	10	233
24	42	80	90
25	0	6	-
26	61	53	-13
27	29	108	272
28	60	54	-10
31	33	58	76
32	46	123	167
33	94	185	97
39	17	10	-41
40	0	49	-
43	51	189	271
44	23	88	283
45	77	211	174
46	33	134	306
47	50	195	290
49	64	192	200
50	21	79	276
51	39	84	115
53	28	79	182
56	5	27	44
60	0	(Terminated)	-
61	53	83	57
64	33	60	82
69	64	136	113
70	2	16	700
77	5	11	120
78	95	166	75
80	4	32	700
81	15	22	47
Total	1,838	4,655	153

Source: Queen City Metro Pass Sale Receipts

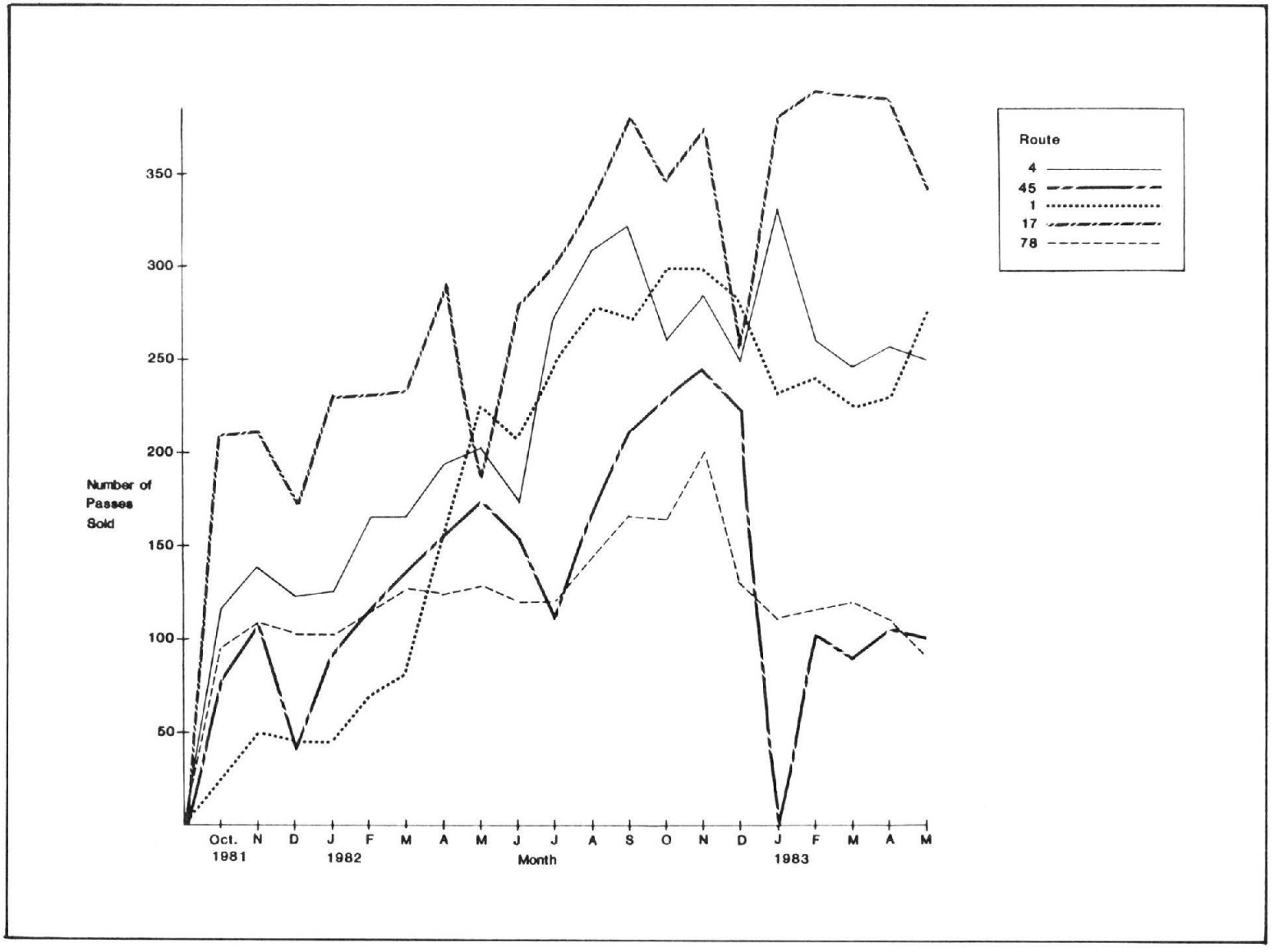


FIGURE 4-2. METROCARD SALES BY ROUTE (ROUTES WITH MOST PASSES)

4.1.2 Travel Behavior Characteristics

The analyses and results discussed in the remainder of this chapter are based primarily on the data collected through the various project surveys described in Chapter 3. The timing and nature of the surveys allow the examination of changes in travel behavior characteristics -- of both passbuyer and non-passbuyers -- over the course of the demonstration. In addition, the surveys provide a comparison of passbuyers' travel behavior before and after purchase of passes.

Table 4-3 summarizes the average trip rates reported in the project surveys.* For purposes of examining the relationship between tripmaking and passbuying, we have used the pre-pass rates reported in the May passbuyer survey and those reported in the July survey by persons who had begun buying MetroCard in June or earlier (i.e., before the discount went into effect). Because those persons who began buying the pass during the discount period did not have to make as many trips to break even on the price of the pass, the average trip frequency could be expected to be somewhat lower than that of "non-discount" passbuyers; indeed, Table 4-3 shows that both current and pre-pass total trip rates of the discount passbuyers were lower than the rates of non-discount passbuyer.

As shown on the table, there is a clear difference between the average trip rates of passbuyers and non-passbuyers -- both for work and non-work.** The difference between the pre-pass work trip rates of passbuyers and the rates of non-passbuyers is especially noteworthy, as it underscores the hypothesis that transit users will only purchase prepaid passes if they stand to benefit (i.e., if they will be making more than the "breakeven" number of trips, and would thus pay less for a pass than they would if paying cash).

Figure 4-3 shows the distribution of work trip (home to work only) frequencies among both passbuyers and non-passbuyers. There is clearly a strong relationship between work trip frequency and propensity to use a pass. The most common frequency among non-passbuyers was zero (35 percent, according to the weighted results), although 24 percent did report making five trips from home to work, and nine percent reported six or

---

* The confidence intervals associated with the trip rates are shown in Appendix B.

** The May telephone (non-passbuyers) work trip responses are considerably higher than those from the other two non-passbuyer surveys due to the sampling bias represented by these responses (i.e., in the original September 1981 survey); the other two surveys' responses have been weighted to account for this bias.

TABLE 4-3. AVERAGE TRIP RATES

Survey	No. of One-Way Trips Reported Per 7 Day Period									
	Home-to-Work		Work-to-Home		Total Work		Total Non-Work		Total	
	Current	Pre-Pass	Current	Pre-Pass	Current	Pre-Pass	Current	Pre-Pass	Current	Pre-Pass
Passbuyers										
May mail	5.0	4.9*	4.9	4.9	9.9	9.9	3.7	2.3	13.5	12.2
July on-site (total)	4.7	4.6	4.6	4.5	9.3	9.1	3.4	2.6	12.7	11.7
- purchased June or earlier	4.7	4.5	4.6	4.5	9.3	9.0	4.1	2.9	13.4	11.9
- purchased July or later	4.7	4.7	4.7	4.6	9.4	9.3	2.3	2.0	11.7	11.3
Nov Telephone**	4.7	-	4.7	-	9.4	-	3.4	-	12.8	-
Non-Passbuyers***										
May telephone+	4.2		4.1		8.3		1.9		10.2	
May on-board	2.7		2.5		5.3		2.8		8.0	
Nov. telephone+	3.5		3.4		6.9		2.0		8.9	

* Retrospective (i.e., before buying MetroCard...) questions for work trips requested number of days, rather than number of trips; it is assumed here that each day represents one trip (i.e., one trip home to work, one trip work to home, etc.).

** Both of the November telephone survyes requested work trips in number of days, rather than number of trips; it is assumed here that each day represents one trip.

*** The figures on the May on-board and Nov. telephone (non-passbuyer) surveys were weighted to account for sampling bias (see Appendix C).

\+ In the May and November telephone surveys some of the persons contacted had begun buying passes since they were originally surveyed.

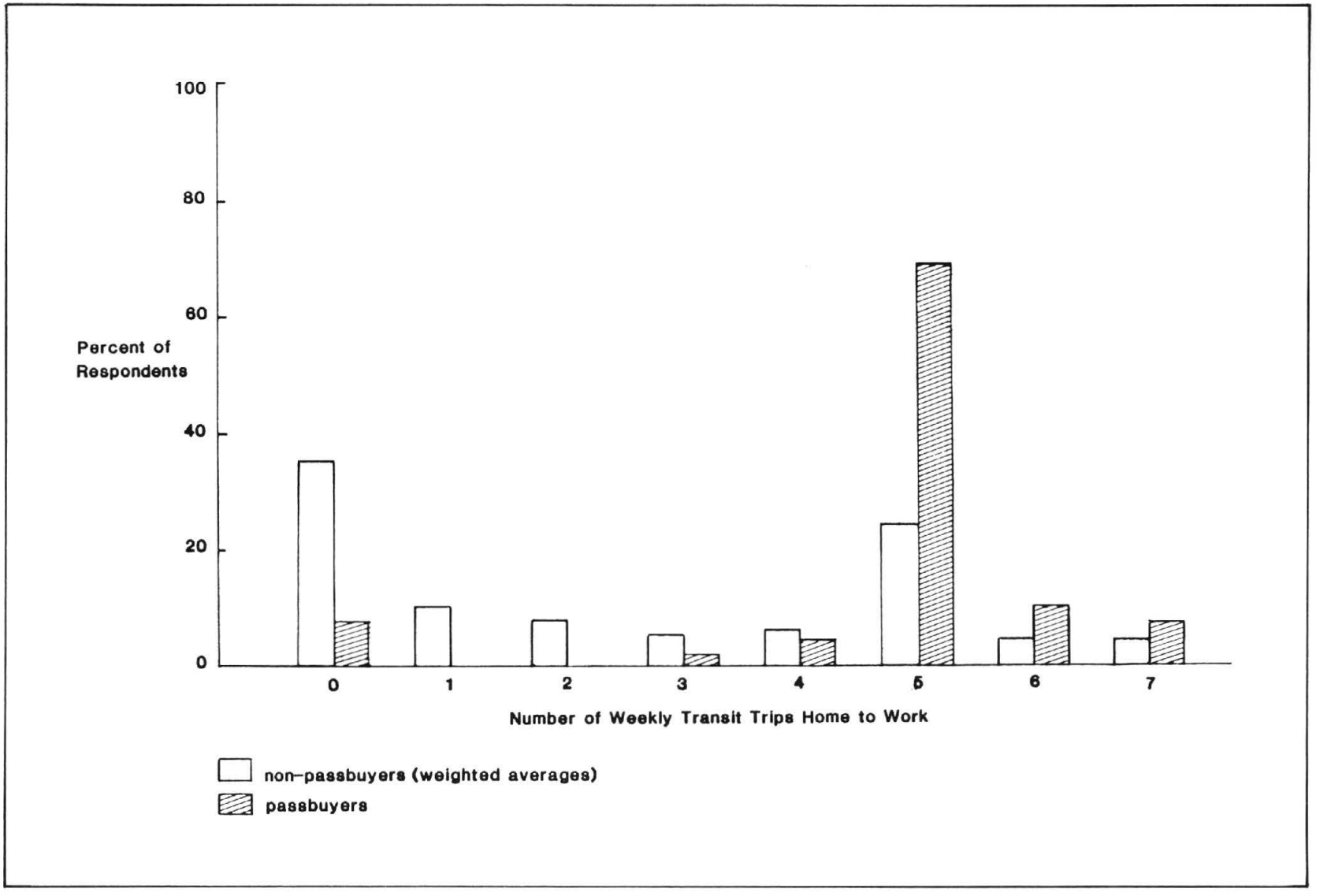


FIGURE 4-3. TRANSIT WORK TRIP FREQUENCY: PASSBUYERS VS. NON-PASSBUYERS

more. For passbuyers, on the other hand, approximately 15 percent of the survey respondents reported making fewer than five trips from home to work; nearly 70 percent reported making five trips.

The distribution of non-work trips (home to non-work) is shown in Figure 4-4. It is clear that passbuyers make more non-work trips than do non-passbuyers; however, the differences between the "current" and "prepass" non-work trip rates (see Table 4-3) suggest that a significant portion of at least some passbuyers' non-work trips are generated by the possession of a pass (see Section 4.2).* In fact, the pre-pass non-work trip rates are roughly the same as the non-passbuyer non-work rates.

Figure 4-5 shows the comparative distribution of total transit trip rates for the two groups of transit users. This figure shows that passes were used predominantly by individuals making at least ten transit trips per week (i.e., the breakeven rate), although not everyone making ten or more trips per week bought a pass. Approximately seven percent of passbuyers reported weekly trip rates below ten. On the other hand, approximately 42 percent of the non-passbuyers reported making at least the breakeven number of trips (and 33 percent reported work trip frequencies at or above the breakeven level; see Figure 4-3). While some of these individuals doubtless exceeded their normal tripmaking frequencies during the week in question, and the tendency to over-report tripmaking (see Chapter 3) introduced some bias, a sizeable number of transit users apparently would be saving money by purchasing MetroCard. (The reasons given by transit users for not buying a pass are discussed in Section 4.1.5.)

4.1.3 Socioeconomic Characteristics

The distribution of socioeconomic characteristics among passbuyers, non-passbuying transit users and the general population is summarized in Table 4-4; the comparisions of the individual characteristics between the former two groups are shown graphically in Figures 4-6 through 4-10.

As shown, females were more than twice as likely as males to be transit users in general; however, the percentage of males who bought passes was slightly higher than the percentage of males who were non-passbuyers. (As indicated in Table 4-4, the ratio of females to males in the general population is substantially lower than among transit users.)

Table 4-4 and Figure 4-7 show that the age groupings among passbuyers is more evenly distributed than among non-passbuyers

---

* Some people buy passes because their travel behavior changes (e.g., they begin making more non-work transit trips).

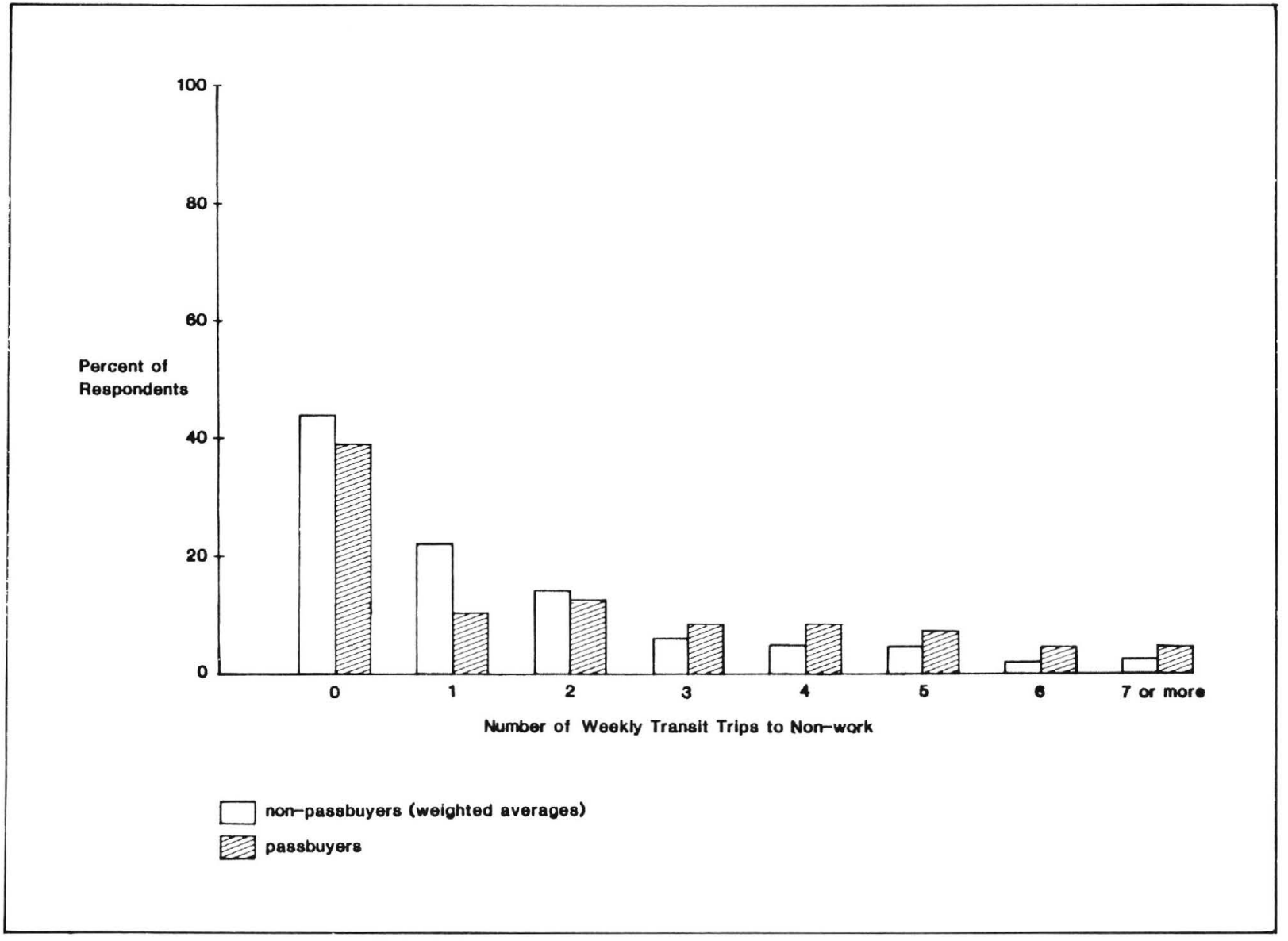


FIGURE 4-4. TRANSIT NON-WORK TRIP FREQUENCY: PASSBUYERS VS. NON-PASSBUYERS

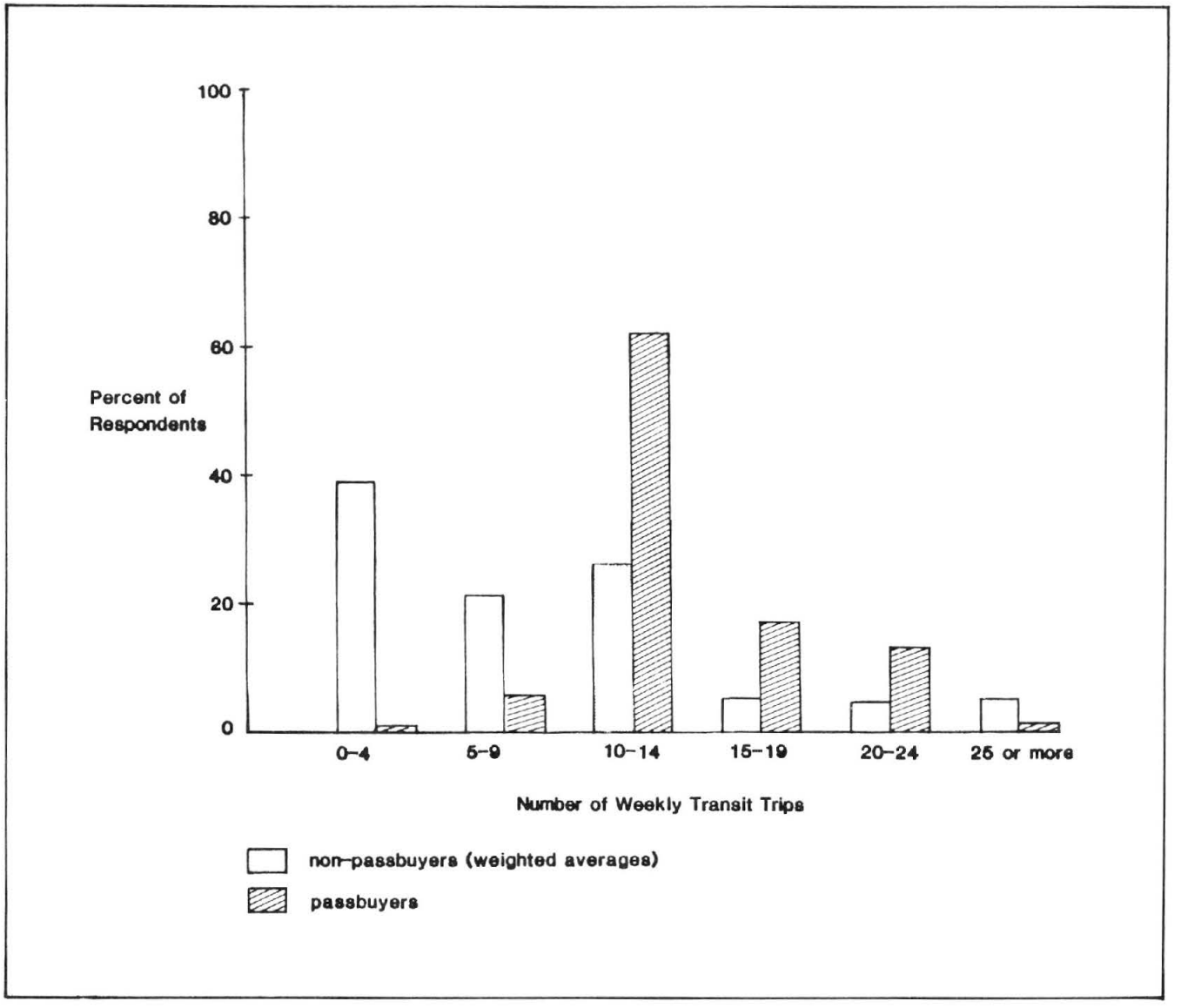


FIGURE 4-5. TRANSIT TOTAL TRIP FREQUENCY:
PASSBUYERS VS. NON-PASSBUYERS

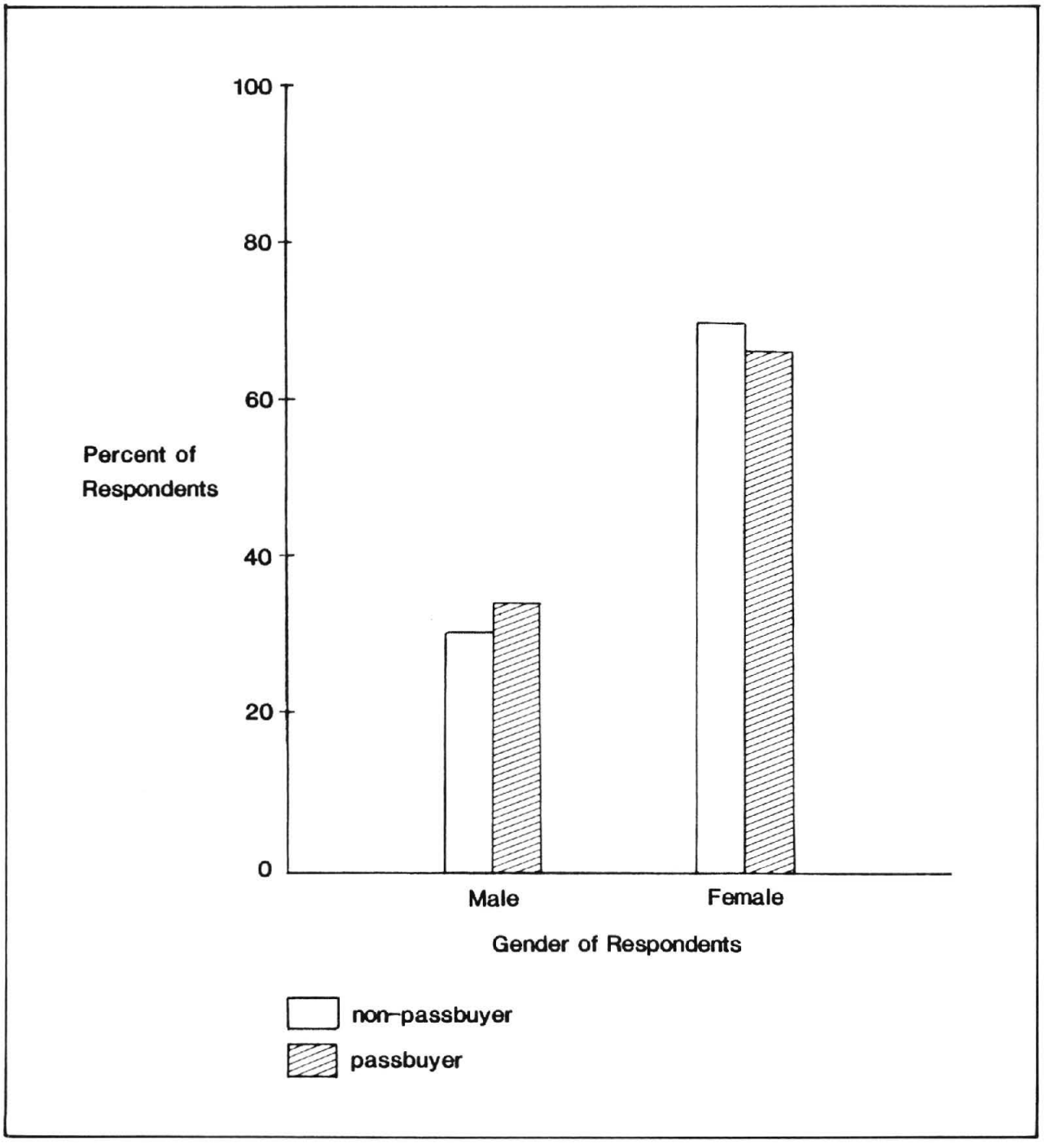


FIGURE 4-6. GENDER

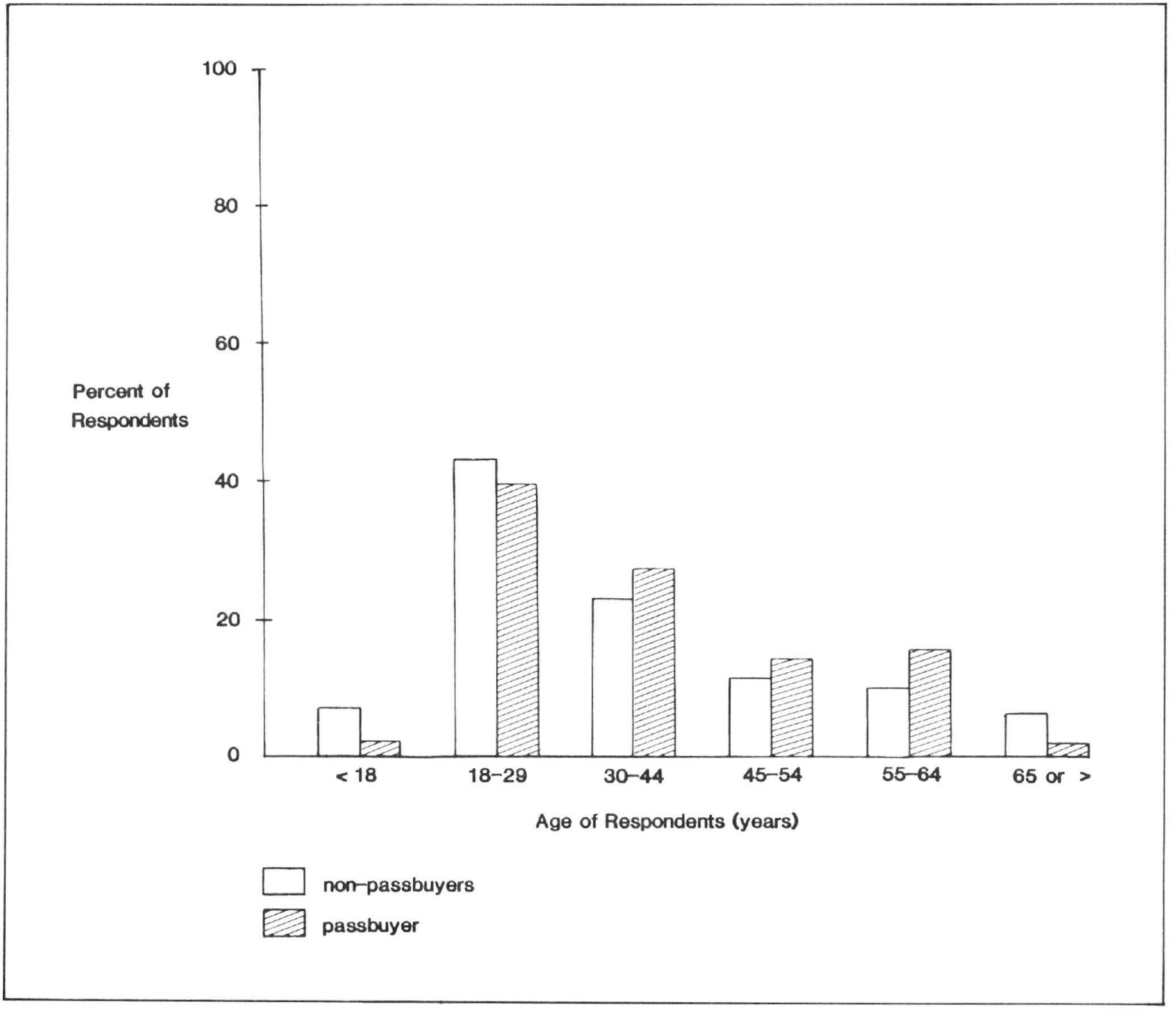


FIGURE 4-7. AGE

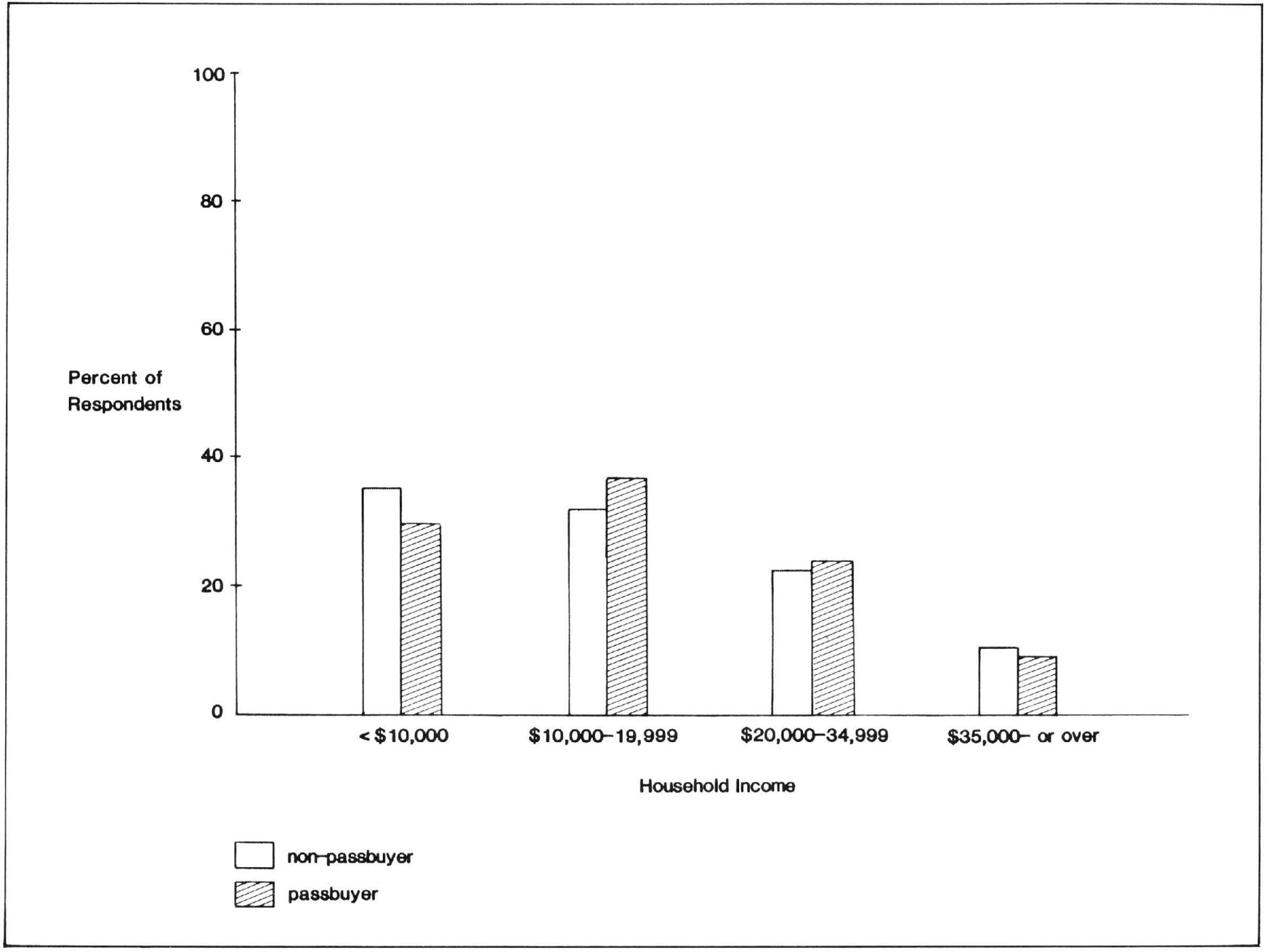


FIGURE 4-8. HOUSEHOLD INCOME

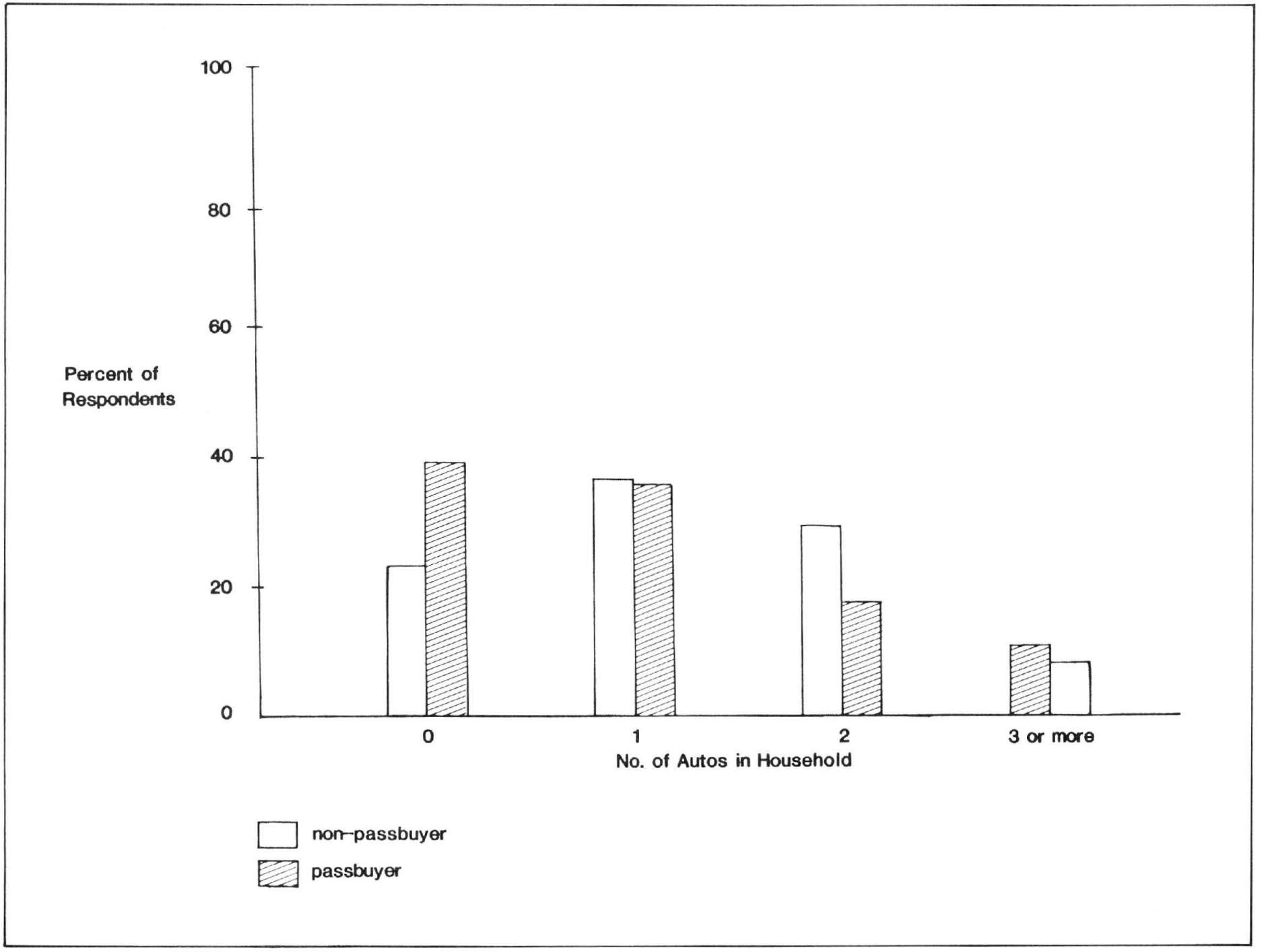


FIGURE 4-9. AUTO OWNERSHIP

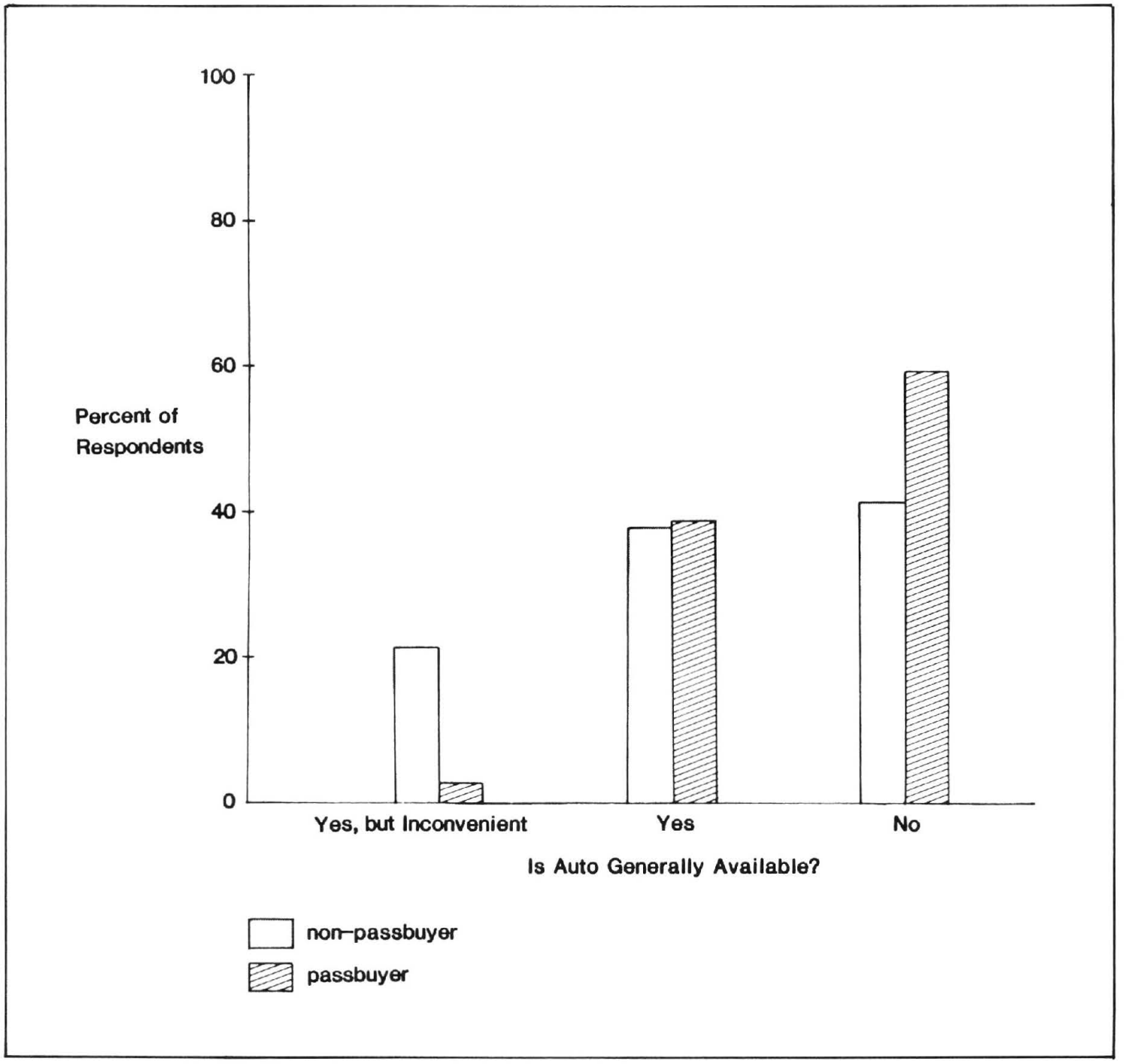


FIGURE 4-10. AUTO AVAILABILITY

TABLE 4-4. SUMMARY: SOCIOECONOMIC CHARACTERISTICS (PASSBUYERS VS. NON-PASSBUYERS)

Characteristic	Non-Pass Buyer	Pass Buyer	General Population
Gender:			
Male	30%	34%	46%
Female	70	66	54
Age:			
Under 18	8%	2%	27%
18-29	43	39	22
30-44	23	28	18
45-54	11	14	11
55-64	10	15	10
65 or Over	6	2	13
Household Income:			
Under $10,000	35%	30%	40%
$10,000-$19,999	32	37	31
$20,000-$34,999	22	24	21
$35,000 or Over	11	9	8
Autos in h.h.:			
0	23%	39%	17%
1	36	35	37
2	30	18	33
3 or More	11	8	13
Auto generally avail.:			
Yes but inconven.	21%	3%	N/A
Yes	38	38	
No	41	59	

Sources of data:

1) Non-passbuyer: May 1982 on-board survey (except for autos in h.h. - May 1982 telephone survey), weighted to account for selection bias.

2) Passbuyer: May and August 1982 passbuyer surveys (combined results).

3) General population: 1980 U.S. Census.

(between ages 18 and 65), although not as even as in the general population. However, it should be noted that the relative percentages of persons in the different age groupings within the two transit user categories are quite similar, with percentages generally dropping for both categories as age increases. Passbuyers apparently tend to be somewhat older than transit users in general.

In light of the fact that most transit users under 18 would use student passes, it is not surprising that only two percent of passbuyers are under 18. Since persons 65 or over are eligible to pay half the regular fare, those persons in this group who purchased a MetroCard may have done so because they make roughly twice the normal breakeven number of trips per week and thus benefit from having a pass, or perhaps because they turned 65 after purchasing MetroCard.

In terms of household income Table 4-4 and Figure 4-8 show that passbuyers tend to have somewhat higher incomes than do non-passbuyers in the general population; the largest group of passbuyers is in the $10,000 - $19,999 range, while the largest group of both non-passbuyers and the general population is in the under $10,000 range. However, it should be noted that a higher percentage of non-passbuyers reported household incomes of $35,000 or over than either of the other two groups; the percentage of respondents in the $20,000 - $34,999 range is quite similar for both passbuyers and non-passbuyers.

Regarding automobile ownership, Table 4-4 and Figure 4-9 show that the vast bulk (nearly 75 percent) of the passbuyers have one or fewer autos in their households, as opposed to less than 60 percent of non-passbuyers (and 56 percent of general public households). In terms of auto availability, however, approximately 40 percent of the passbuyers reported that they generally did have an auto available for their use. Since passbuyers tend to be "regular" transit users, this indicates that Queen City Metro has been somewhat successful in attracting "choice" riders - i.e., those persons who have an alternative means of travel available but choose to use transit for the bulk of their travel needs. Nearly 60 percent of the non-passbuyers reported having an auto available (including those who reported "yes, but inconvenient"), but many of these persons are infrequent transit users; hence, this figure would appear to be less significant than the corresponding figure for passbuyers.

In summary, then, the survey responses indicate that, compared to non-passbuyers, persons buying passes tend to be female (although more likely male than among transit users in general), tend to be somewhat older, tend to have a higher household income, and tend to own -- and have available for use -- fewer automobiles. (The following section examines the reasons cited for purchasing -- or not purchasing MetroCard, broken out by socioeconomic characteristics as well as by trip frequencies.)

4.1.4 Stated Reasons for Purchasing MetroCard

This section reviews the reasons cited by passbuyers (in the passbuyer surveys) for purchasing MetroCard. In addition to examining the reasons given, the section includes a discussion of how the reasons for purchasing MetroCard vary by different socioeconomic characteristics.

It is generally felt -- and has been supported in other studies -- that an individual buys a transit pass only if he/she saves money over paying cash (i.e., because he/she makes more than the breakeven number of trips each month). The convenience of not having to carry exact change is generally considered to be a secondary reason. However, as shown in Table 4-5, "convenience" was cited as the most important reason for purchasing MetroCard by over 65 percent of the respondents to the July survey, and 58 percent of the May respondents; "convenience" was also given by 77 percent of those contacted in the November survey as the most important reason for continuing to buy MetroCard. Just over 30 percent of the July respondents - and 35 percent of the May respondents - selected "cheaper than paying cash" as the most important reason (and 21 percent of the November respondents as the most important reason for continuing to buy). As shown on the table, other reasons, including the summer discount, received little support as the most important reason.*

Of course, in looking at the tripmaking rates discussed in Section 4.1.2, we see that roughly 90 percent of passbuyers reported making at least the breakeven number of trips. Hence, although the majority of respondents cited convenience as the chief reason for buying passes, it is doubtful that many of these people would buy passes if they did not at least break even financially. (It is also likely that some passbuyers cited "convenience" because of the emphasis placed on it in much of the MetroCard advertising.)

Nevertheless, while obviously not the primary reason for buying a transit pass, convenience is considered to be an important attribute of a pass. Indeed, the preponderance of respondents citing convenience on the November survey suggest that the convenience of not having to carry exact change is considered even more important when the regular fare requires several types of coins (i.e., Queen City Metro's fare rose from $.50 to $.60).

---

* Of course, the summer discount essentially made the pass cheaper than paying cash for a greater number of persons than before the discount; i.e., the breakeven number of monthly trips dropped from 40 to 33.3. Thus, for the July survey, the summer discount was a crucial, if unstated, reason.

TABLE 4-5. MOST IMPORTANT REASON FOR PURCHASING METROCARD

	Percentage				
		July			
	May	bought June or earlier	bought July or later	total	Nov.*
1. It's cheaper than paying cash because I ride the bus so frequently.	35%	28%	36%	31%	21%
2. It's more convenient because I don't have to carry exact change.	58%	69%	59%	65%	77%
3. It allows me to ride for free on evenings and weekends.	2%	1%	0%	1%	1%
4. Other	5%	1%	5%**	3%	1%

* The November follow-up survey asked for "the most important reason for continuing to by MetroCard."

** On the July survey, an additional choice was offered; "because of the summer discount"; 2 percent of the respondents selected that response.

Source: Results of May, July and November passbuyer surveys.

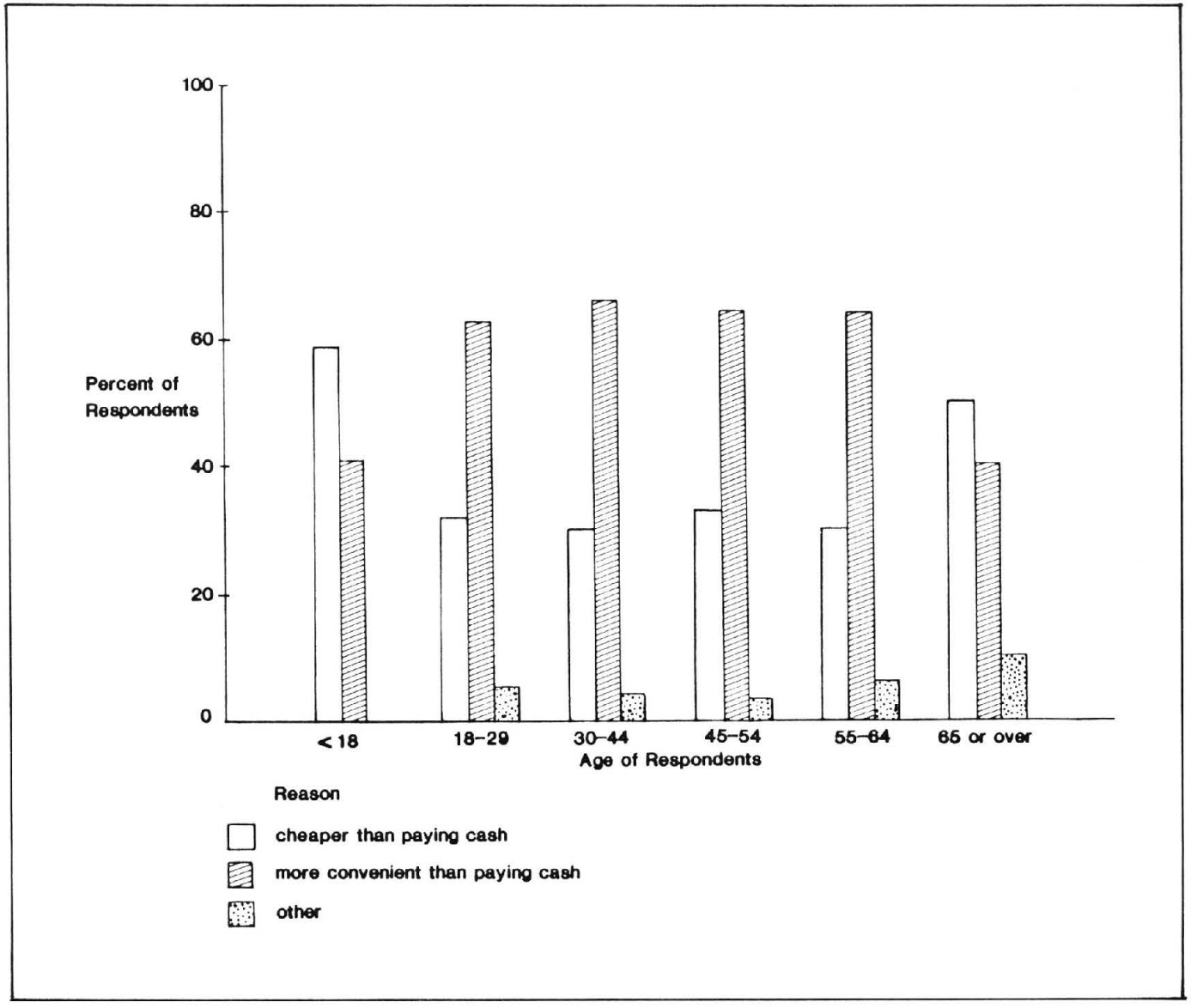


FIGURE 4-11. PRIMARY REASON FOR METROCARD PURCHASE BY AGE

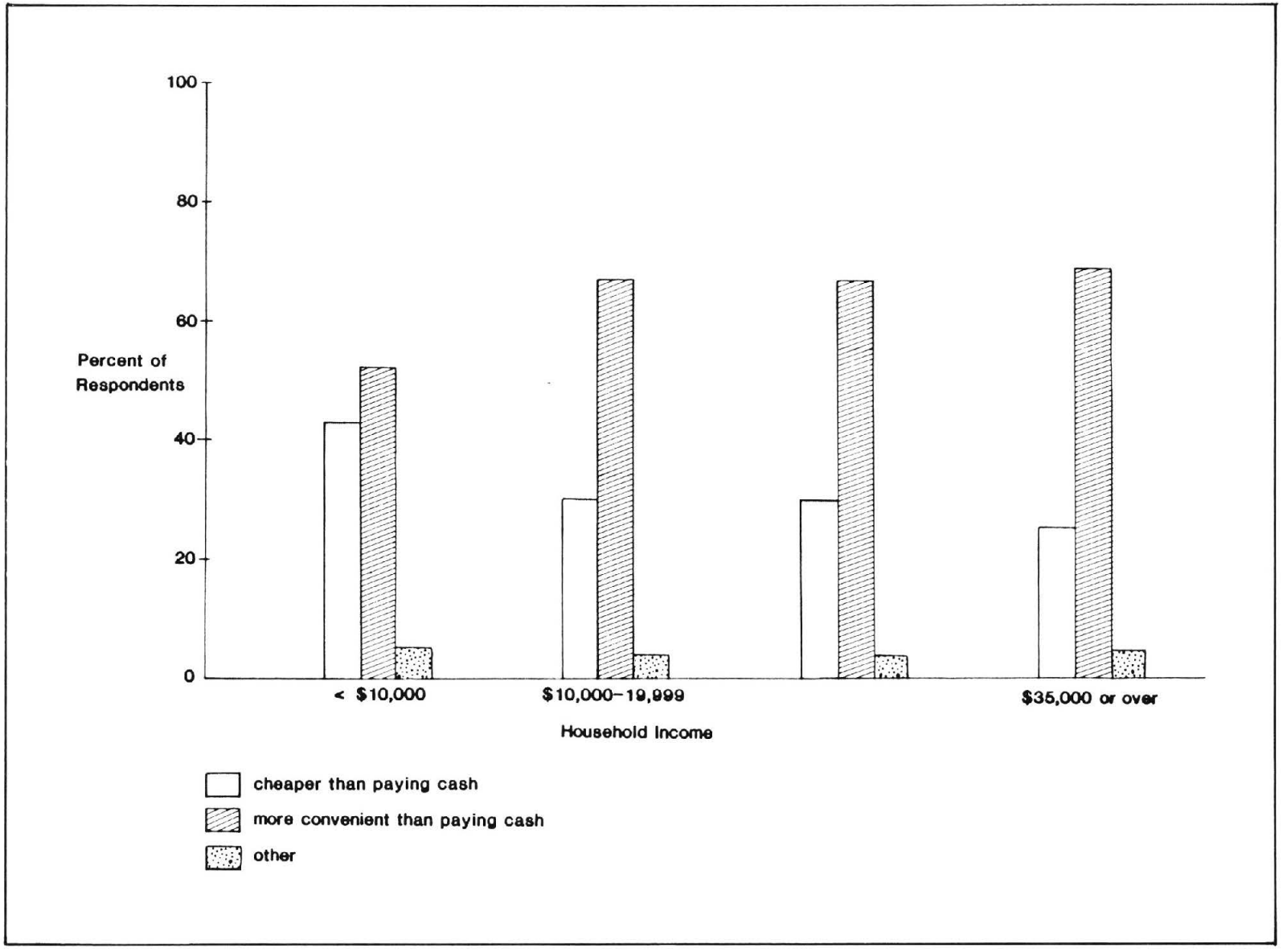


FIGURE 4-12. PRIMARY REASON FOR METROCARD PURCHASE BY INCOME CATEGORY

The primary reason for buying MetroCard (as reported in the surveys) broken out by different socioeconomic characteristics (age, household income, and auto availability) is shown in Figures 4-11, 4-12, and 4-13.* As shown, "convenience" ranks first in virtually every grouping; only for persons under 18 years old and 65 or over was "cheaper" cited as the most important reason for buying a pass. Among the other age groups, the breakdown among different reasons is quite consistent (63-66 percent convenience, 30-36 percent cheaper, 3-6 percent other).

Among the income categories, the ratio is closest for those in the under $10,000 range (52 percent convenient, 43 percent cheaper, five percent other). It is to be expected that persons in the lowest income level would be most concerned about saving money; conversely, it is not surprising that convenience was selected by the greatest percentage (69 percent, to 26 percent for cheaper) of persons in the $35,000 and over range. The ratios within the two middle groups are virtually identical (67 percent convenient, 30 percent cheaper).

Finally, in looking at the breakdown by auto availability, we see that a greater percentage of passbuyers without an auto available for use (35 percent) listed "cheaper" than among those who did have an auto available (27 percent); the percentage of passbuyers who gave convenience as the most important reason was very close in the other two categories (66 percent and 64 percent).

4.1.5 Stated Reasons for Not Purchasing MetroCard

From a marketing standpoint, it is perhaps more important to identify reasons for not purchasing MetroCard. As stated in Section 4.1.2, as many as one third of non-passbuyers made at least the breakeven number of monthly trips (based on their survey responses) and thus stood to benefit economically from purchasing passes. It is therefore of interest to examine the reasons non-passbuyers gave for not buying passes. In addition, since both of the November follow-up surveys included some people who had stopped buying MetroCard since the May survey, it is possible to examine these persons' reasons for stopping.

The reasons for not purchasing a pass given on the May 1982 on-board survey are summarized in Table 4-6.** As expected, the primary reason why transit users did not buy MetroCard was that they did not use the bus enough to make it worth the cost. The percentage of persons citing this as the

---

* The source of the information in these figures is the combined results of the May and July passbuyer surveys.

** Because some respondents gave more than one reason, the percentages in the table total more than 100 percent.

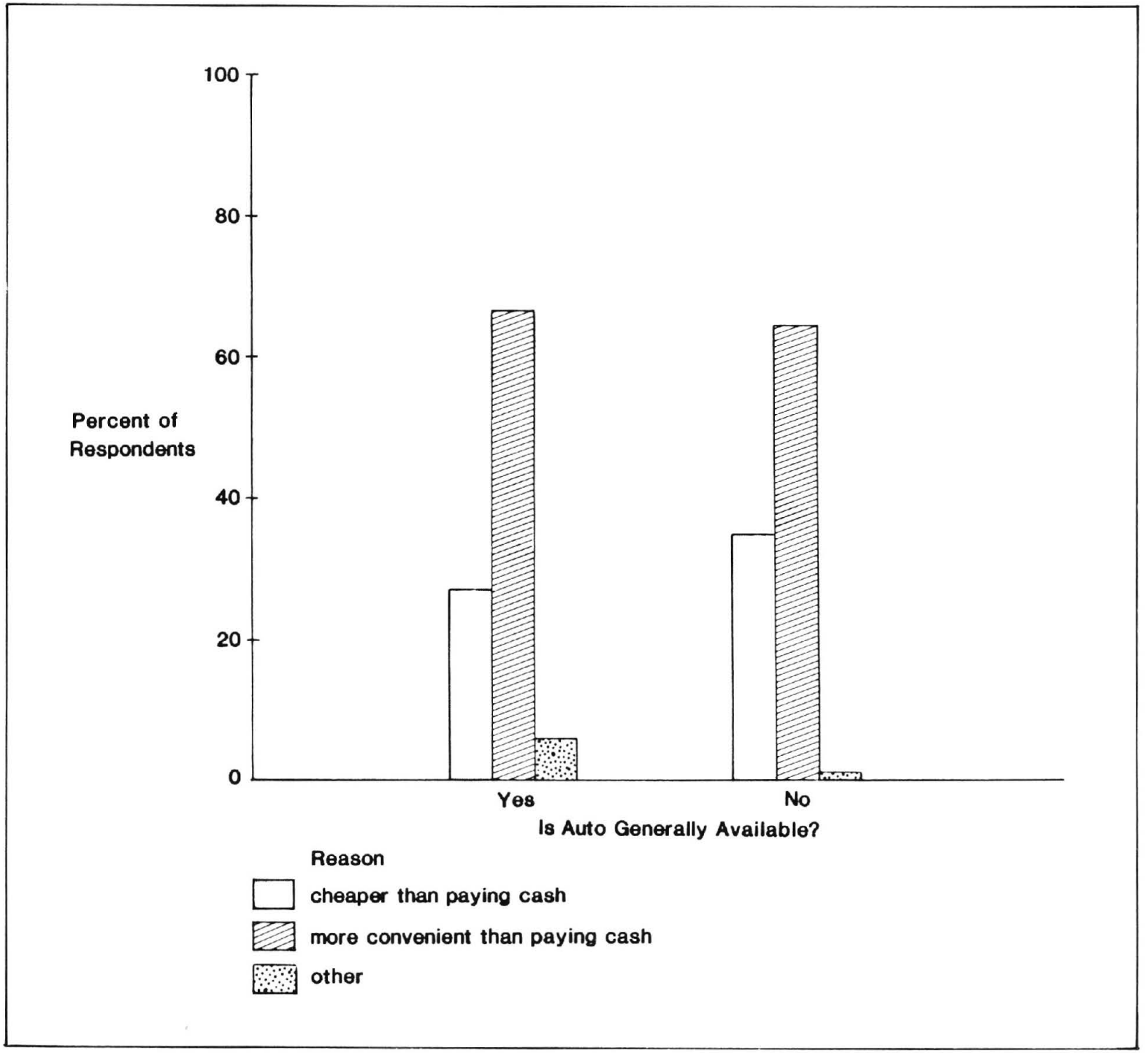


FIGURE 4-13. PRIMARY REASON FOR METROCARD PURCHASE BY AUTO AVAILABILITY

TABLE 4-6. REASONS FOR NOT PURCHASING METROCARD

	Response	Percentage of Surveys on Which Response Cited*
1.	I don't know anything about it.	14%
2.	I don't use the bus enough to make it worth the cost.	57%
3.	It's too much trouble to buy it.	7%
4.	It's too expensive to pay the full pass price at time of purchase.	11%
5.	It's inconvenient to carry a pass around.	1%
6.	I don't know where to get one.	8%
7.	I use Fare Deal Card or student pass.	9%
8.	Other.	13%

* Some respondents gave two or three reasons; thus, the total of the percentages is greater than 100 percent.

Source: May 1982 on-board survey.

primary reason is consistent with the distribution of trip frequencies discussed in Section 4.1.2 -- approximately 58 percent of the survey respondents reported trip frequencies below the pass breakeven level. The remaining reasons were fairly well-distributed, with approximately equal numbers of respondents citing "I don't know anything about it" and "it's too expensive to pay the full pass price at time of purchase." It is noteworthy that only seven percent of the responses claimed that "it's too much trouble to buy" the pass, since, at the time of the survey there was only a single major sales location.* However, in looking at the reasons why people stopped buying MetroCard (see Table 4-7) a higher percentage (14 percent, though only among respondents in the on-board follow up) claimed that it was too much trouble to buy; this suggests that some people found it more difficult to obtain the pass once they started using it than they had originally thought it would be.

In terms of discontinuing pass purchase, it should also be noted that only about seven percent and five percent, respectively, of the respondents in the two follow-up surveys cited the fact that "the pass price went up" as the major reason. Similarly, the percentages of the people who stopped buying MetroCard because "it was too expensive to pay the full pass price at time of purchase" remained roughly the same as the percentage citing that factor as a reason for not buying it in the first place. Thus, the October 1982 price increase (from $20 to $24 for the base pass) apparently had a minimal affect on pass sales and the pass retention rate. In fact, besides insufficient bus use, the reason most often cited (in the passbuyer follow-up survey) for discontinuing pass purchase was "going on vacation that month." It is likely that most of those individuals would resume pass purchase the following month.

4.1.6 Pass and Transit Use Retention Rate

An important objective in marketing transit passes is obviously to retain passbuyers on an ongoing basis -- first in continuing to use transit and second in continuing to buy passes. The November 1982 passbuyer follow-up survey revealed that seven percent of the respondents had stopped regularly using Queen City Metro since the time of the previous survey (either July or May 1982). This compared favorably to a 19

---

* As mentioned earlier in the report, passes were also available at the University of Cincinnati and at four employment sites -- as well as through the mail; however, very few were sold at any of the remote locations.

TABLE 4-7. REASONS FOR STOPPING PURCHASE OF METROCARD

	Category	Percentage Pass Survey (1)	Percentage Non-Pass Survey (2)
1.	I didn't use the bus enough to make it worth the cost.	41 (26%)	16 (32%)
2.	It was too much trouble to buy it.	0 (0%)	7 (14%)
3.	It was too expensive to pay the full pass price at time of purchase.	18 (12%)	4 (8%)
4.	I found it inconvenient to carry a pass around.	0 (0%)	0 (0%)
5.	I was afraid I would lose a pass.	0 (0%)	0 (0%)
6.	I was going on vacation that month.	35 (22%)	1 (1%)
7.	I started using the Fare Deal Card or a student pass.	6 (4%)	1 (2%)
8.	I prefer to use cash.	2 (1%)	0 (0%)
9.	The pass price went up.	11 (7%)	3 (5%)
10.	Other.	43 (28%)	19 (38%)
	Total	156	51

Source: November 1982 Telephone Follow Up Surveys: (1) Pass-buyer, (2) Non-Passbuyer (i.e., from on-board survey).

Note: These two sets of figures differ significantly at the .995 confidence level.

percent dropout rate among non-passbuyers.* The reasons for discontinuing use of Queen City Metro are shown in Table 4-8. As can be seen, the fare increase was not a significant factor in members of either group's decision to stop using transit; the major reasons given were "the bus was no longer convenient," "bought a car," and "no longer working." Obviously, Queen City Metro had no control over any of these factors.

In terms of pass retention, 33 percent of the passbuyer follow-up respondents did not buy a MetroCard for November. As mentioned above, 22 percent of these people, or seven percent of all the respondents, cited vacation as the reason, and at least some of these people began buying again the following month; therefore, 25 percent of the survey respondents had apparently stopped altogether. Of course, the rate of overall pass sales (see Table 4-1) reveals that there was only a six percent drop in sales from October to November; thus, the survey results apparently overstate the impact of pass retention on overall sales levels. Table 4-9 shows the number of months for which these program "dropouts" had purchased passes (i.e., as of November). As can be seen, the vast majority (87 percent) of those individuals who had stopped buying passes had been buying for four months or less (the reasons given by these people were discussed in the previous section). This suggests that many of those people had purchased MetroCard only during the discount period -- indeed, nearly 30 percent of these people had each purchased a pass for three months (the length of the discount period).

In looking at the overall pass retention rate (including dropouts), it was found that 68 percent of those persons responding to the passbuyer follow-up survey were still purchasing MetroCard as of November 1982 and had thus been buying passes for at least four months (i.e., since July -- the month of the previous survey). From the results of the July survey (see Table 4-10), we see that 38 percent of the respondents began purchasing MetroCard in July or August (i.e., during the discount period). In fact, only 25 percent of the survey respondents had been buying MetroCard for more than six months, and ten percent since the beginning of the program (the passes were first available for November 1981). On the other hand, when we look at the results of the May passbuyer survey (see Table 4-10), we see that approximately 45 percent of the respondents had been buying MetroCard the entire length of the

---

* The fact that the majority of the passbuyers had been surveyed more recently than the non-passbuyers likely accounts for some of this difference.

TABLE 4-8. REASONS FOR DISCONTINUING TRANSIT USE

	Category	Percentage Pass Survey	Percentage Non-Pass Survey
1.	Because the fare went up.	1 (3%)	20 (0%)
2.	No longer working.	11 (29%)	22 (13%)
3.	Bought a car.	10 (26%)	44 (27%)
4.	Bus was no longer convenient (e.g., moved or changed jobs).	8 (21%)	55 (34%)
5.	Bus service wasn't very good.	2 (5%)	2 (1%)
6.	Other	6 (16%)	41 (25%)
	Total	38	164

Source: November 1982 telephone follow up surveys.

Note: These two sets of figures differ significantly at the .995 confidence level.

TABLE 4-9. DURATION OF PASS PURCHASE - PROGRAM DROPOUTS

Number of Months of Pass Purchase	Percentage Discontinuing Purchase
1	11%
2	19%
3	29%
4	17%
5	4%
6	5%
7	1%
8	2%
9	1%
10	3%
11	4%
12	3%

Source: November 1982 passbuyer follow-up telephone survey.

TABLE 4-10. DURATION OF PASS PURCHASE (AUGUST 1982)

Number of Months	Percentage	
	July Survey	May Survey
1	26%	10%
2	12%	7%
3	14%	8%
4	10%	7%
5	34%	6%
6	26%	10%
7	6%	8%
8	2%	45%
9	7%	N/A
10 or more	10%	N/A

Source: July 1982 and May 1982 passbuyer surveys.

program; of course, the May respondents represented a much smaller (214) -- and more biased* -- sample than the July respondents (685). These results thus document above all else the success of the discount period in promoting pass sales.

Although a number of individuals purchased passes only during the discount period, the majority of passbuyers continued buying them at least in the two months immediately after the close of that period.

4.2 IMPACT ON TRANSIT USAGE

This section assesses the impact of the MetroCard program on Queen City Metro usage patterns. Included are discussions of temporal and geographic distribution of pass usage and level of new trips generated by pass use.

* Nearly all the May respondents purchased their passes via the mail; among the overall passbuying population, only about 15 percent typically purchased their passes in this manner.

4.2.1 Temporal and Geographical Distribution of Pass Usage

In order to determine the impact of a pass program on overall transit usage patterns, it is useful to examine the times and routes having greatest concentration of pass usage. If the level of demand induced by pass use (see Section 4.2.2) on heavily used routes is great enough, it may produce increased operating costs (i.e., through the addition of vehicle hours to serve the increased demand).

As discussed below (Section 4.2.2), the number of new trips generated by the MetroCard program (i.e., new trip-making by pass holders and trips made by persons accompanying pass holders who would not otherwise have used transit) was small compared to the overall Queen City Metro ridership. The evaluation did not break out induced trips by route or time; however, in looking at the distribution of all trips in which passes were used, it was found that pass usage was widely dispersed -- and minimal on any given run. Based on the special on-board measurements* undertaken as part of the evaluation, it was found that the maximum number of MetroCard holders boarding at any one stop was four. In terms of percentage of persons boarding, Table 4-11 shows the average percentage using MetroCard per stop. As shown, the vast majority of stops had no MetroCard users; more than 20 percent of the boarders used MetroCard at only 22 percent of the stops observed.

Analysis of the measurements revealed that the runs with the highest average number of MetroCard holders per stop were all during the peak period -- predominantly between four and six p.m.; in fact, except for the run with the highest average (route 43, six p.m. run -- three pass holders per stop), the runs with the highest percentage use by pass holders were express runs. It must be kept in mind, however, that these average boardings were all quite low; on only two runs was there an average of more than one pass holder per stop -- these figures were 3.0 and 1.8.

This analysis has indicated that the use of MetroCard was relatively evenly distributed throughout the system. No particular runs (for all the routes observed) featured significantly higher concentrations of pass use than the others.

---

* These are discussed in greater detail in Section 5.2.3.

TABLE 4-11. AVERAGE PERCENTAGE OF BOARDERS USING METROCARD (PER STOP)

% Using MetroCard	% of Stops
0%	69%
1-20%	9%
21-40%	10%
41-60%	6%
Over 60%	6%

Source: special on-board measurements (June, August, November 1982)

4.2.2 New Trips Generated by Pass Use

In other transit pass programs, it has been found that new trips generated by the program come predominantly from existing transit users, rather than through attraction of new users. What often happens is that, after purchasing a pass, a regular transit rider begins to make trips he/she did not previously make because the cost of these additional trips is now effectively zero. As suggested in Section 4.2.1, these "new" trips may impact the transit system's operating cost -- or at least productivity measures.

In addition, some persons who formerly did not use transit buy passes and then begin using transit This constitutes a second source of new trips. A third source is trips made by persons (accompanying passholders) who would not otherwise use transit.

In Cincinnati, analysis of the passbuyer survey respondents' tripmaking frequencies (see Section 4.1.2) reveals that the average frequency among July respondents* increased from 11.9 per week before purchase of MetroCard to 13.4 per week after buying MetroCard; for the May respondents, these figures were 12.2 and 13.5, respectively. The difference between prepass and current rate represents the average number

* This includes only those persons who had begun purchasing MetroCard before the beginning of the discount period.

of new trips generated by increased use of transit.* At an average of 3,318 passes sold per month, the number of new trips can be estimated at between 17,500 and 20,500 per month.**

The other source of pass program-induced trips -- non-transit users acompanying pass holders - produced a smaller number of new trips than the above figure. Based on the combined results of the May and July passbuyer surveys, it was determined that persons "who would not otherwise have used transit" accompanied the average pass user on 2.6 trips per month. Using the average monthly pass sale figure of 3,318, the monthly average of new trips generated in this manner was approximately 8,600. The total induced ridership was thus on the order of 26,000-29,000 per month. This represented approximately 1.3 percent of the total regular monthly Queen City Metro ridership. Of course, considering that the bulk of these induced trips were presumably made during off-peak periods, it is perhaps more useful to compare this figure to the total system off-peak ridership level. The monthly average of new trips represented approximately 2.5 percent of the regular monthly off-peak ridership.

Finally, in assessing the net impact of these induced trips on Queen City Metro's overall ridership, however, it is instructive to look at the overall ridership patterns over the course of the demonstration. As shown in Figure 4-14, the regular adult ridership (i.e., excluding school trips) dropped fairly steadily during the demonstration period. From the first month of MetroCard sales (October 1981) until the last month of the demonstration (May 1983), regular adult ridership declined by 19 percent (2.1 million to 1.7 million).*** Any rides generated by the MetroCard program therefore helped to reduce the general decline in system ridership -- and thus reduce the overall cost per passenger (the cost and revenue implications of the program are addressed in the next chapter).

---

* This covers all new trips made by pass holders -- i.e., those who previously made the breakeven number of trips, as well as those who made fewer trips; according to the survey results, roughly seven percent of the passbuyers made fewer than ten one-way trips per week before buying MetroCard.

** It should be kept in mind that this must be regarded as a very rough estimate in light of the uncertainties associated with the survey results on which it is based (see p. 32).

*** It is interesting to note the impact of the July 1982 fare increase: ridership dropped by approximately four percent from June to July, but then leveled off over the next three months -- and even rose slightly in October. Thus, although ridership continued its generally downward slope following the fare increase, the increase does not appear to have accelerated this trend.

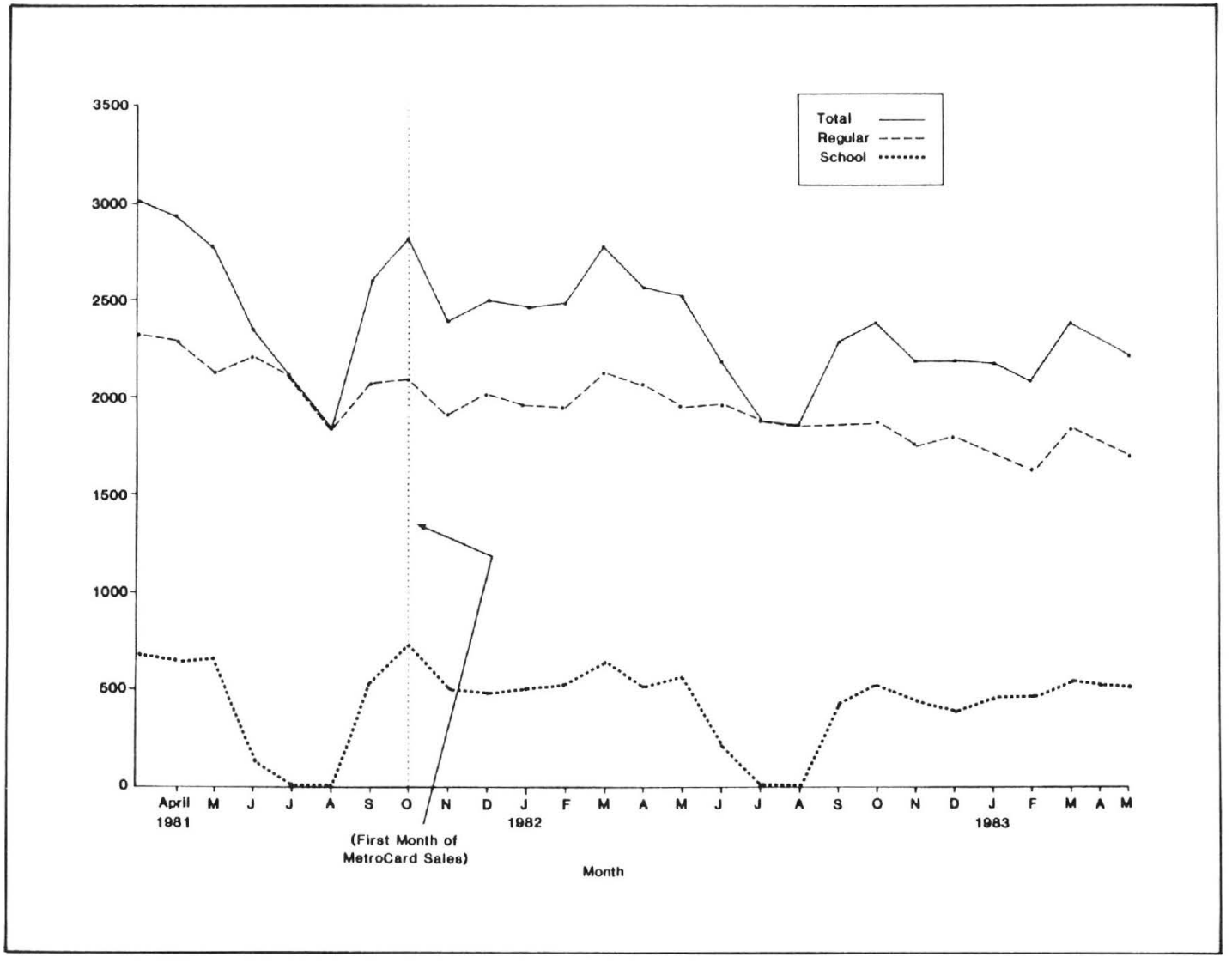


FIGURE 4-14. QUEEN CITY METRO RIDERSHIP BY MONTH

5. LEVEL OF SERVICE AND ECONOMIC IMPACTS

This chapter assesses the financial and productivity impacts of the demonstration. The chapter examines the effects of the various factors influencing the net cost of the pass program.

5.1 PROGRAM COSTS

The costs associated with the Cincinnati Pass Pricing Demonstration can be categorized as follows:

1) program administrative and marketing costs

2) one-time program development expenditures

3) demonstration-related costs (i.e., for research and data collection)

4) revenue lost through cash fare diversion

The costs are discussed below; the first three categories are addressed in Section 5.1.1, while the fourth category is addressed in Section 5.1.2.

5.1.1 Direct Program Costs

The breakdown of program administrative and marketing costs is shown in Table 5-1. As shown in the table, salaries and benefits represented the single largest component (48 percent) of program expenses. For most of the demonstration period (all but January-March 1982)* the project staff included two full-time clerical people who handled pass sales and a full-time supervisor. In addition, the project manager devoted an average of approximately 50 hours per month to the project; roughly 60 percent of her time was spent on activities related solely to the demonstration, rather than administration of the pass program itself (this time is not included in Table 5-1). Advertising represented the second largest component (38 percent) of program costs. Television commercials accounted for approximately 36 percent of the total cost, with the remainder spent on newspaper ads, special flyers, and on-bus

---

* During this period, two additional clerical people provided part-time assistance.

TABLE 5-1. METROCARD PROGRAM COSTS

Month	Passes Sold	Salaries & Benefits	Printing & Supplies	Postage & Credit Card	Advertising	Total	Per Pass
Oct.	1,838	$5,003	$1,603	$250	$ 0*	$6,856	$3.73
Nov.	2,207	5,003	912	250	0	6,165	8.79
Dec.	1,931	5,003	1,243	250	0	6,496	3.36
Jan. '82	2,040	5,755	4,781	250	122	10,908	5.38
Feb.	2,393	5,755	481	250	4,977	11,463	4.79
March	2,558	5,755	489	250	8,023	14,517	5.68
April	2,806	4,036	14	300	13,840	18,190	6.48
May	2,893	4,036	2968	300	9,813	17,117	5.92
June	2,553	4,036	1318	300	11,569	17,223	6.75
July	3,947	4,036	0	400	11,650	16,086	4.08
August	4,556	4,036	1475	400	9,127	15,038	3.30
Sept.	4,655	4,036	0	400	4,108	8,544	1.84
Oct.	4,620	4,036	4742	400	-	9,178	1.99
Nov.	4,343	4,036	244	300	-	4,580	1.05
Dec.	3,514	4,036	0	300	169**	4,505	1.28
Jan. '83	3,902	4,637	-	300	-	4,937	1.27
Feb.	3,973	4,637	-	300	-	4,937	1.24
March	3,925	4,637	-	300	-	4,937	1.26
April	3,934	4,637	-	300	-	4,937	1.25
May	3,779	4,637	799**	300	500***	6,236	1.65
Total	66,355	$91,783	$21,069	$6,100	$73,898	$192,850	$2.91
Monthly Avg.	3,318	$4,589	$1,053	$ 305	$ 3,695	$ 9,643	-

*Initial advertising expenses are included under development/start-up costs.

**For three-month period

***Covers final five months

ads (see Chapter 3 for a description of the MetroCard marketing program).

Over the course of the demonstration, the average monthly cost of administering the MetroCard program (labor plus production and postage expenses) amounted to $5948. The average monthly advertising cost was an additional $3695. In terms of passes, the average administrative cost per pass sold was $1.80, while the average advertising cost per pass was $1.11. It should be pointed out, however, that the administrative costs are only marginally related to the number of passes sold; once the program's administrative and sales mechanisms have been established, most of the costs will be incurred regardless of the level of pass sales. Since 6000 passes were printed each month, the printing costs would not have risen unless pass sales grew to a point at which the monthly volume had to be increased. On the other hand, postage and credit card fees were related to pass sale volume, since passes could be purchased via the mail or by phone (using credit cards). Labor costs are somewhat sensitive to the level of pass sales, in that clerical labor requirements include handling mail and telephone pass requests, as well as over-the-counter sales; however, there is a minimum level of clerical (and supervisory) support needed for any such program, and Queen City Metro could have processed a substantially greater number of passes without adding to its staff.* Thus, over the coming years, Queen City Metro's per pass administrative cost can be reduced significantly if a higher volume of pass sales is achieved without adding substantial expenditures. For instance, at the 3800-pass level achieved at the end of the demonstration, the per pass administrative cost would be roughly $1.50, as opposed to the $1.80 average for the whole demonstration.

Furthermore, the marketing costs will also be reduced greatly in the future. As indicated above, television advertising accounted for over 90 percent of the total marketing expenditures. However, Queen City Metro decided during the demonstration to greatly scale down the use of television in the future--because of the high cost and because on-bus advertising was found to be the most effective means of reaching potential buyers. Most transit properties do not use television at all in marketing pass programs (or transit service in general). These points should be kept in mind in examining the costs reported here; i.e., Queen City Metro's per pass marketing cost (during the demonstration) should be viewed

---

* Supervising labor requirements are essentially independent of the number of passes sold. In fact, Queen City Metro intends to significantly reduce the supervisory staff effort for fiscal year 1984.

as an exception rather than the rule in estimating the cost of operating a pass program. Without the television expense, the per pass marketing cost (at the 3800-pass level) would be less than $0.10 as opposed to the $1.11 average for the demonstration.

The total cost of the MetroCard program during the demonstration period (i.e., excluding pre-demonstration development costs) was $277,208.* Of this total $84,358 can be directly attributed to the fact that this was a demonstration project, and therefore should not otherwise be necessary in a transit property-sponsored pass program. These funds included $73,630 for Queen City Metro's two subcontractors, SG Associates (pricing evaluation and recommendations) and Goodell-Grivas, Inc. (data collection), $728 for demonstration-related telephone and travel expenses, and approximately $10,000 worth of the project director's time which was expended on demonstration-related reporting and monitoring requirements. Thus, the total cost of administering and marketing the pass program amounted to $192,850.

The estimated program development and start-up costs are summarized in Table 5-2. As shown, these costs are fairly evenly distributed among the various categories, with staff time and initial production of passes representing the largest expenditures.

5.1.2 Revenue Lost Through Cash Fare Diversion

In addition to the program costs discussed above, a major "cost" of any pass program is represented by revenue lost through the "diversion" of cash fares. In other words, the transit system experiences a net loss in revenue for each pass user who previously (i.e., before buying a pass) made more than the breakeven number of trips factored into the pass price. The amount of this loss is based on the average pre-pass trip rate for passbuyers (determined from retrospective questions on surveys) and the difference between that rate and the breakeven trip rate, and is computed using the difference between the average amount passusers paid in cash fares before buying passes and the average pass price paid.**

Based on the responses to the May passbuyer survey and the July responses from persons who bought passes prior to the beginning of the discount period, it is estimated that, before

---

* The total SMD Demonstration budget was $148,276, of which UMTA provided $133,448.

** The procedure for calculating this figure is summarized in Appendix F.

TABLE 5-2. METROCARD DEVELOPMENT/START-UP COSTS*

Item or Activity	Cost
artwork - flash pass	$ 4,000
production of passes (3 month supply)	4,800
production of sales brochure	3,720
production of order form	2,860
literature racks for buses	1,450
other fixed assets	3,500
advertising	
- television	3,530
- interior transit cards	550
staff time (development and implementation)	5,000
Total	$29,410

* These costs are estimated based on information provided by Queen City Metro; the actual cost figures provided did not separate out pre-demonstration costs.

buying a pass, the average pass user paid approximately $3.83* more (in cash) than the cost of a pass. Applying this figure to the total number of passes purchased during the demonstration, we get a total revenue loss of approximately $254,000, which is equivalent to roughly 1.0 percent of the total system operating revenue for the same time period (or 0.4 percent of the total system operating expenses). The average monthly revenue loss is thus approximately $12,700.

Of course, in calculating total foregone revenue, we must also include the additional loss produced by the special summer discount. The July 1982 fare increase and the resulting $4 "discount" on all passes cost the transit system an average of approximately $7.87 per passbuyer during the three-month discount period. The total loss attributable to the discount is thus $103,553 or $1.56 per passbuyer for the whole demonstration.

5.1.3 Impact of New Passenger Trips on Operating Cost

Another potential source of increased cost associated with operation of a pass program is that related to serving induced passenger trips. However, determining the extent of this cost presents certain conceptual and empirical difficulties. There are at least two ways of looking at this issue.

From an operational perspective, service will be increased (or a reduction prevented, in a situation of significant excess capacity) only if the ridership changes are large enough to be detected and significant enough to warrant a change. In a situation such as that in Cincinnati, with only a 1.3 percent increase in ridership, it is extremely unlikely that ridership changes would be detected on any route because of the wide error range typically associated with transit data collection and monitoring programs. Furthermore, even if such a change were to be detected, it would be very unlikely to result in any service increase (or to prevent a service reduction) because of the discrete nature of transit scheduling decisions, i.e., either a bus is added to/subtracted from a route or service is not changed - it is impossible to add or subtract small increments of capacity. From an operational perspective, therefore, the short run marginal cost of adding a small number of passenger trips (i.e., less than the number required to make a service change) is zero.

---

* It must be kept in mind that calculating lost revenue in this fashion is, at best, an inexact task, because it relies on individuals' recalling how often they traveled at some point in the past (i.e., before buying a pass); for the Cincinnati respondents, the lapse of time was as long as ten months. For this reason, the revenue loss figures reported here should be considered rough estimates only -- it is very difficult to ascertain the true loss.

From a broader economic perspective,* on the other hand, each new passenger trip imposes a marginal cost on the transit system. The extent of this cost depends not only on the volume of induced trips, but, where peak and off-peak marginal costs differ, also on their distribution between these periods. In general, the greater the share of induced trips made in the off-peak, the smaller will be the operating cost impact of a given volume of induced trips. Since passes are purchased primarily by people who would in any event regularly commute on transit, the trips induced by a pass program are probably largely off-peak trips. Induced peak trips are attributable to people for whom the pass makes the difference between three or four day a week transit commutation and five day a week commutation, to those whose commute trips are outside the peak and so whose non-commute trips may be within the peak, and to induced peak travel by non-commuting pass buyers.

Within the context of this economic perspective, the relationship between additional patronage and additional costs is confounded by institutional and operational rigidities in the management of transit systems. For example, while it may be intuitively appealing that over the long term an increase in ridership will be associated with an increase in cost, for changes in ridership so small that the burden of schedule adjustment is not undertaken, it is easy to conclude that the ridership change had no impact on operating cost. Rigidities take many forms, including development of schedules, location of routes, and policies such as minimum headways and hours of service. But rigidity of these things is not absolute. Clearly even when not actually adjusted in response to a ridership change, all are indeed adjustable, so that it is generally appropriate to attribute cost consequences to even modest changes in ridership.

Empirical evidence on the relationship between cost and ridership comes from studies of scale economies in the provision of transit service. Much of this work relates cost to vehicle miles or vehicle hours, rather than to passengers. However, one recent and carefully conducted study examined the relationship between the number of passengers and cost.** For its subject

---

* The economic viewpoint of this issue was prepared by Lawrence Doxsey of the TSC.

** Berechman, Joseph and Genevieve Giuliano, "Analysis of the Cost Structure of an Urban Bus Transit Property," Institute of Transportation Studies, University of California - Irvine, June 1982.

city it concluded that a one percent increase in ridership would be associated with a .8 percent increase in cost. This is an estimate of the cost change corresponding to a ridership change in which the peak/off-peak ridership split does not vary. A ridership increase disproportionately in the off-peak would result in a smaller cost increase. Because no similar analysis is available for Cincinnati, the .8 estimate will be accepted here as the best available.

In Cincinnati, survey results suggest that 93 percent of the induced trips occurred during off-peak periods (including weekends). Because of the predominance of off-peak trips, and because marginal costs are lower in the off-peak than in the peak, the cost increase was almost certainly less than 80 percent of the ridership increase. As a largely arbitrary number but one chosen to reflect significantly lower costs for off-peak service, we will here assume that the cost increase was 30 percent of the ridership increase. With Queen City Metro's $37.3 million annual operating cost, this would imply that the annual cost of serving trips induced by the pass program was approximately $145,000. (This is calculated in two steps. The percentage change in cost is 30 percent as large as the 1.3 percent ridership change, and the total change in cost is the percentage change in cost times the $37.3 million total annual cost.) The monthly cost can be seen to be about $12,000, or in the neighborhood of $3.45 for each of the approximately 3500 passes sold. In terms of impact on the transit deficit this is in addition to the estimate of $3.83 per pass revenue loss discussed above. However, because of the manner in which it was derived, the significance of the $3.45 cost estimate does not rely on whether the true value is $3.35 or $3.55, but on the fact that a pass program's impact on a system's operating deficit may not be limited to the revenue loss discussed above. The result is very sensitive to what is assumed about the relationship between ridership and cost. For example, if cost increased only 20 percent as much as ridership, the impact of induced trips would be about $2.30 per pass sold. If the cost increase was 40 percent as great as the ridership increase, the impact would be approximately $4.60 per pass. What is important is to recognize that the impact on operating deficit due to the cost of serving induced trips may well be of the same general magnitude as the revenue loss from diverting cash trips to the pass.

5.2 REVENUE AND COST SAVINGS

The net economic impact of a transit pass program depends, ultimately, on the program's impact on system revenue, as well as cost savings. The most basic element of this category is the overall revenue from pass sales. However, several other components may come into play as well; these include: 1) revenue generated through the purchase of passes by persons who

formerly used transit infrequently (or not at all); 2) revenue generated through improvements in cash flow; and 3) reductions in coin handling costs. These issues are addressed below.

5.2.1 Pass Sale Revenue

As shown in Table 5-3, revenue from MetroCard sales amounted to roughly eight percent of total passenger revenue (or six percent of total operating revenue--i.e., including school contract, charter revenue, state elderly and handicapped assistance, and other revenue) for Queen City Metro during the first 18 months of the demonstration period (through March 1983).* However, the percentage -- and the amount -- of revenue grew fairly steadily over the course of the demonstration (see Figure 5-1). The largest increase occurred in July 1982, which marked the first month of the special summer discount period; however, it is noteworthy that the month with the greatest amount of pass revenue and the second highest percentage of overall revenue was October 1982, which was the first month of the new, higher, pass price structure. As shown in Table 5-4 (and discussed in Chapter 4), the number of passes sold in October represented the second highest total of the entire demonstration period, only slightly below the peak total of the previous month.

Table 5-3 shows the average revenue per pass sold. As discussed in Chapter 4, the vast bulk of all passes sold were for Zone 1 (i.e., at the base pass price); thus, the average revenue per pass sold remained quite close to the base price ($20 until October 1982, $24 after that) for most months. However, the fact that the average per pass revenue for each of the months January, February, and March 1983 was higher than in any previous month** indicates that more sales were being made to persons living in the outer zones (2-8) and/or for express service than had been previously. This suggests that Queen City Metro was achieving greater success in penetrating the suburban commuter market than it had previously.

5.2.2 New Revenue Generated and Cost Savings

The revenue lost through cash fare diversion (discussed above) amounted to approximately 19 percent of the total revenue from the sale of MetroCard. However, in assessing the

---

* System revenue totals for April and May were not available as of this writing.

** July 1982 was the only month in which the average revenue was approximately as high as these (relative to the base price).

TABLE 5-3. PASS SALE REVENUE AS PERCENTAGE OF TOTAL PASSENGER REVENUE*

Month	Total Passenger Revenue	Pass Sale Revenue	% of Total
October 1981	$990,394	$ 40,576	4%
Nov.	885,649	47,344	5
Dec.	937,366	41,000	4
Jan. 1982	892,410	43,859	5
Feb.	892,847	50,648	6
March	983,791	54,400	6
April	942,469	59,552	6
May	889,974	61,360	7
June	875,295	53,924	6
July	991,893	88,807**	9
Aug.	983,727	97,570**	10
Sept.	1,024,271	100,089**	10
Oct.	1,054,143	116,128***	11
Nov.	985,916	107,010	11
Dec.	1,001,692	88,295	9
Jan. 1983	976,985	103,585	11
Feb.	924,102	105,570	11
March	1,047,535	103,931	10
Total	$17,280,459	$1,363,648	8%

* Revenue figures for April and May 1983 not available as of this writing

** Discount in effect

*** Pass price increased by $4

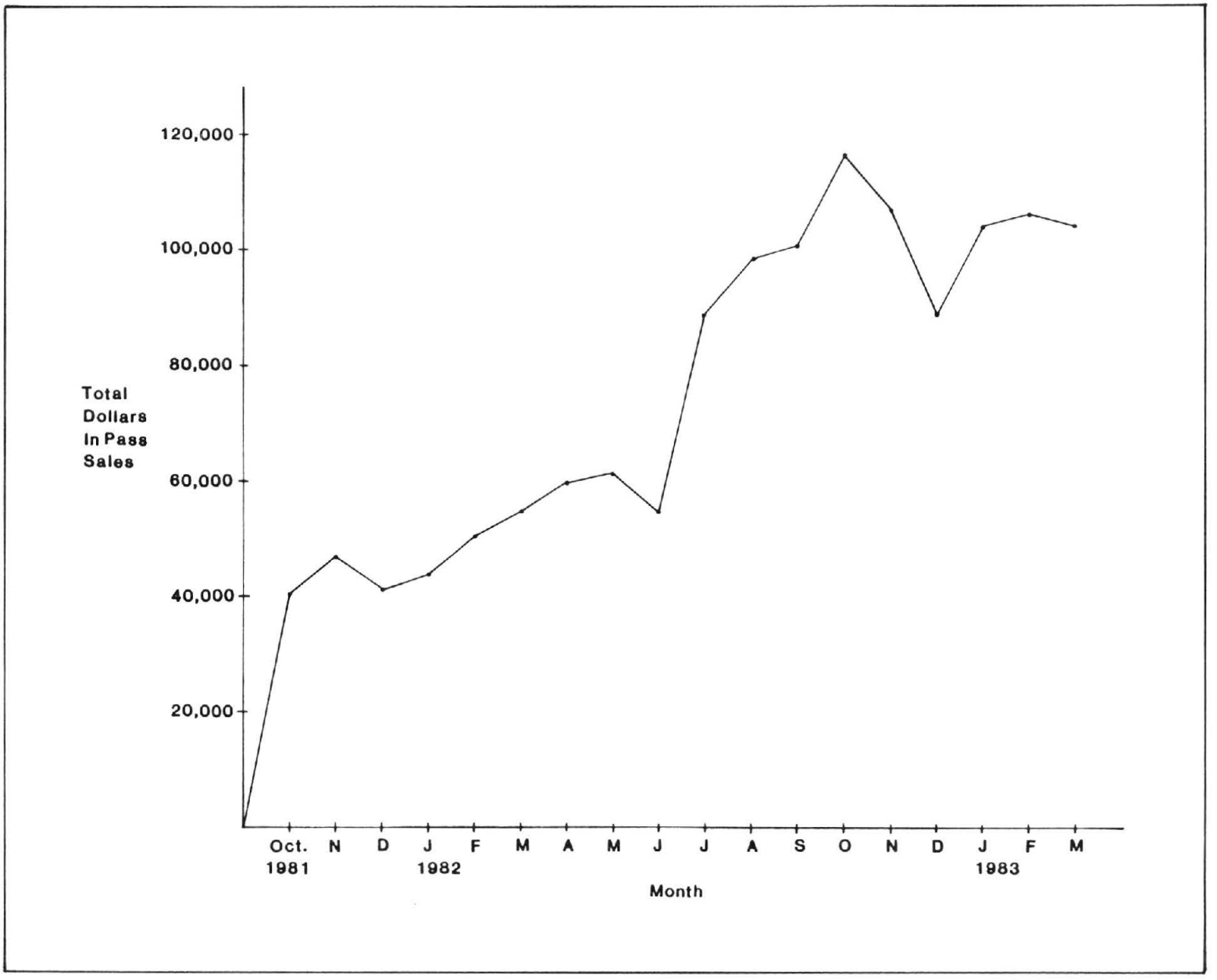


FIGURE 5-1. METROCARD SALES (DOLLARS)

TABLE 5-4. AVERAGE REVENUE PER PASSBUYER

Month	No. Passes Sold	Pass Sale Revenue	Avg. Revenue per Passbuyer
Oct. 1981	1,838	$ 40,576	$22.08
Nov.	2,207	47,344	21.45
Dec.	1,931	41,000	21.23
Jan. 1982	2,040	43,859	21.50
Feb.	2,382	50,648	21.26
March	2,558	54,400	21.27
April	2,806	59,552	21.22
May	2,893	61,360	21.21
June	2,553	53,924	21.12
July	3,947*	88,807	22.50
Aug.	4,556*	97,570	21.42
Sept.	4,655*	100,089	21.50
Oct.	4,620	116,128	25.14**
Nov.	4,343	107,010	24.64
Dec.	3,513	88,295	25.13
Jan. 1983	3,902	103,585	26.55
Feb.	3,973	105,570	26.57
March	3,925	103,931	26.48
Total	58,642	$1,363,648	$23.25

* Discount in effect

** Pass price increased by $4

impact of the pass program on system revenues, it is important to determine the amount of new revenue generated by the program -- i.e., from the purchase of passes by persons who formerly used transit infrequently (or not at all), riders who would otherwise not have used transit accompanying passholders, and interest gained on bank accounts through improved cash flow. In addition, we must examine the extent of cost savings produced through the pass program (see Section 5.2.3).

As discussed in Chapter 4, new trips generated by the pass program came predominantly from persons making at least 9.75 trips per week who increased their tripmaking once they bought passes. These new trips do not directly generate new revenue. However, as explained in Chapter 4, the surveys revealed that some passbuyers, prior to purchasing MetroCard, made less than the breakeven number of trips; the difference between their pre-MetroCard expenditures and their expenditures for MetroCard represent new transit revenue. The percentage of such persons among all of the survey respondents was relatively small (ten percent of all passbuyers); hence, the resulting revenue was modest. Based on the breakdown of pre-MetroCard tripmaking frequencies reported by the passbuyer survey respondents (May and those in July who began buying MetroCard before the discount), the estimated revenue generated in this fashion was approximately $15,400 for the entire demonstration period, or $770 per month.*

A more significant amount of new revenue was generated through the fares paid by riders (who would not otherwise use transit) accompanying passholders. Based on an overall average number of "accompanied trips" from the May and July passbuyer surveys (see Chapter 4), it is estimated that an average of $3798 per month was generated before the price increase, and $6417 per month after the increase.** The total for the demonstration period was thus $96,908, equivalent to approximately six percent of the total pass sale revenue.

The final source of new revenue associated with Queen City Metro's pass program was the increased interest generated through improved cash flow. The collection of revenues in

---

* See Appendix G for a description of the procedures used in calculating these figures.

** The passbuyer surveys requested only "number of trips" on which passbuyers were accompanied by such persons, and not the numbers of persons accompanying them on these trips; thus, the increased revenue figures may be somewhat understated (they were calculated based on an assumption of a single companion for each trip). See Appendix G for a description of the procedure used in calculating the figures.

advance of the actual use of transit enables a transit operator to accrue greater interest than is possible with cash fares alone. During the demonstration, MetroCard was sold beginning on the 15th of the month before the card was valid. Because the vast majority of passes were sold directly by Queen City Metro (as opposed to through employers or other outlets), and all pass receipts were deposited in the bank the same day they were received, Queen City Metro was able to maximize potential cash flow benefit. In contrast, in employer-based pass programs, there is often a sizeable delay between the time the employers collect pass revenues and when the transit property receives that revenue.

Using a breakdown of daily pass sales for June 1982, we calculated the average amounts of interest gained per pass based on when each pass was purchased. Using a simple annual interest rate of ten percent (selected as a roughly average figure to cover the entire demonstration period), individual interest rates were computed based on the date of deposit relative to the 15th of the month in which the passes were actually used. Then, using an average price per pass of $23.25 (for the entire 20-month period) and an average monthly pass sales figure of 3318, we determined the relative number of passes sold in each time period (e.g., between the 20th and the 25th of the month) and calculated the interest gained in each time period. This procedure* produced an average monthly gain in interest of $332, for a total gain of $6640.

5.2.3 Cost Savings and Other Benefits

In addition to the generation of revenue discussed above, pass programs have been found to produce cost savings in several areas, as well as certain non-quantifiable benefits. The major areas in which cost savings can theoretically be effected are in operating costs, due to reductions in dwell time, and in coin handling costs, due to a shift from use of cash to prepayment. The chief non-quantifiable benefits are in the areas of public image and customer convenience.

In terms of impact on operating cost, our assessment of boarding times (see Section 5.2.4) has revealed that there was no apparent reduction in boarding time produced by use of MetroCard; in fact, our analyses suggest that there may have been an increase in boarding time associated with pass use. Therefore, the savings reported in studies of other pass programs were not realized in the Cincinnati program.

---

* The procedure for computing these figures is described further in Appendix H.

It has been postulated that a pass program will lower the cost of sorting and counting coins, and could also reduce the cost of repairing and replacing fare boxes. While this is true in theory, it was not possible to identify any such impact in Cincinnati. Queen City Metro reported no change over the course of the project in either the overall amount of time spent collecting and counting fares* or the cost of maintaining and replacing fareboxes. Of course, the cost of coin handling could well have increased due to the increase in the number of coins generated by the fare change in July 1982 (from $0.50 to $0.60), and the use of passes doubtless helped offset that change. However it was not possible to isolate the pass program's impact, and in fact, the level of pass usage on Queen City Metro was probably insufficient to produce any substantial savings.**

Finally, in assessing the costs and benefits of a transit pass program, it is necessary to examine non-quantifiable impacts in addition to costs and revenues. Among Queen City Metro's original objectives for the MetroCard program were the following:

- improvement of Queen City Metro's public image due to customer convenience
- improving convenience to riders by eliminating the need to carry exact change.

As discussed in Chapter 4, the majority of passbuyers cited the convenience of not having to carry exact change as their most important reason for purchasing a pass. Although it is apparent that economics played the most important role in most passbuyers' decision processes, the fact that convenience was so highly regarded indicates that Queen City Metro certainly achieved the latter objective stated above. While this primarily represents a benefit to pass users rather than to Queen City Metro, the growth in pass sales over the course of the demonstration -- and the high level of retention of pass purchasers following the increase in prices -- points to the fact that the transit property's public image was enhanced as well.

---

* During the demonstration period Queen City Metro's four fare system employees spent approximately 30 hours per week emptying fare boxes into bags; these bags are picked up by Federal Armored, a private contractor acting as an agent of the bank. Federal Armored spent approximately 28 hours per week counting the fare revenue.

** Another potential benefit attributable to a pass program is the reduction of the possibility of theft of cash fares (i.e., by fare system employees). However, pass revenue would have to constitute a significant portion of the total system revenue for this to constitute an appreciable benefit.

5.2.4 Boarding Time Impacts

Some fare prepayment programs have been shown to reduce boarding and dwell times, due to time savings resulting from use of passes instead of depositing coins on boarding. For example, the Ottawa-Carleton Regional Transit Commission (OC Transpo) found a 25 percent decrease in boarding and dwell times following the introduction of its monthly pass program.* Wilbur Smith Associates found, in a study of bus use,** that there is a possible savings of approximately 1.5 seconds for every passenger using a pass rather than coins (for a multiple coin fare); for single-coin fares, though, the saving was only on the order of 0.5 second for each boarding.

Reductions in boarding and dwell times can produce shorter run times, although the extent of the decrease obviously depends on whether or not the use of passes actually does speed boarding, an if so, the level of pass usage. If, for example, the typical peak-hour boarding includes a small percentage of pass holders, the potential reduction in dwell time (i.e., as compared to the dwell time if pass-holders paid cash fares) will be miniscule, and the total run time will be minimally affected.

In an effort to ascertain the boarding time impacts of Queen City Metro's MetroCard program, a series of special measurements was undertaken as part of the evaluation. In these measurements, observations were made -- by on-board observers -- of the total boarding times*** at each stop on a series of selected runs.**** The measurements, which also served to collect data on the distribution of boardings by fare category (see Chapter 4), were conducted during three different periods: June, August, and November 1982. The data were then

---

* Ecosometrics, op. cit.

** Wilbur Smith Associates. Bus Use of Highways: Planning and Design Guidelines. NCHRP Report No. 155, Washington, D.C., 1975, p. 4.

*** "Boarding time" was defined as beginning when the first passenger steps onto the first step and ending when the driver closes the door. Boarding time was measured rather than dwell time because of the nature of exogenous factors affecting dwell time (i.e., a bus may be unable to start moving from a stop because of a traffic signal or heavy traffic); boarding time was judged less likely to be affected by such factors.

**** The measurement procedures used are described in Appendix D.

analyzed to determine the relationship between type of fare payment and boarding time - to assess what impact (if any) the use of passes has on boarding time and total route running time. In order to examine whether MetroCard users board more quickly than passengers using other forms of fare payment, a multiple linear regression model was tested.* This model investigated the total boarding time at a stop as a function of the following variables:

- number of MetroCard users boarding
- number of cash or cash/token combination users boarding
- number of token or transfer ticket users boarding
- number of student pass users boarding
- number of Fare Deal card users boarding
- number of riders requesting a transfer when boarding
- whether the bus had persons standing when it arrived at the stop (i.e., a "crowded" condition)

The resulting coefficients of each of the above fare payment categories indicate the average number of seconds for a member of that group to board (under non-crowded conditions and assuming that the person boarding does not request a transfer). As such, the results of this exercise ran counter to the aforementioned findings in other studies (i.e., that pass users typically take less time to board than do cash payers); in this model, the coefficient for MetroCard users was greater than that for cash-payers. The model was tested first using all stops (for all three observation periods),** and then using only those stops at which at least one MetroCard user boarded (31 percent of the stops). The results were similar: in the former case, the coefficient for MetroCard users was 2.35 and 1.78 for cash payers; in the latter case, the coefficients were 2.76 and 1.92, respectively.

---

* A more complete description of the model, its results, and statistical tests is included in Appendix I.

** Those stops at which no one boarded were deleted, as were those for which the observer noted an unusual activity, such as "person dropped packages while boarding" or "kids were fooling around."

However, in both cases, when the coefficients for these two fare payment methods were compared, the differences were not found to be significant at the 95 percent confidence level.* Thus, we cannot conclude with confidence that MetroCard users do in fact take longer to board than those riders who pay cash.

The inability to determine a definite relationship between type of fare payment and boarding time is probably due largely to the substantial stop to stop variation in average boarding times. Although the overall per person average boarding times for the three periods were reasonably similar (3.73, 4.06, and 3.30 seconds for June, August, and November, respectively), a comparison of the average boarding times as a function of total boardings per stop (Table 5-5 and Figure 5-2) reveals little similarity among the three month's observations.

Some variation is to be expected in any such measurement -- drivers exhibit differing patterns of checking passes and/or checking whether passengers have deposited the correct change, and passengers take differing amounts of time to board and pay the fare or show a pass. Because of the relatively low percentage of MetroCard users observed in these measurements (see Table 5-6 for a summary of the percentage of stops on which no MetroCard users boarded), the impact of these variations on average figures becomes magnified.

Because of these variations (and the relatively low level of confidence associated with the results of our analysis), the best conclusion we can draw from these measurements and analyses is that there is no clear relationship between type of fare payment and boarding time. Hence, we must conclude that the pass program has had no clear impact on Queen City Metro's level of service during this demonstration. However, it should be kept in mind that these results in no way corroborate the findings of earlier studies that the use of passes reduces boarding time and can thereby reduce route running times.

5.3 SUMMARY: COSTS VS. BENEFITS

Following the examination of individual economic issues, it is instructive to summarize the overall costs and revenues associated with Queen City Metro's pass program. The various costs and benefits are presented in Table 5-7.

---

* In the first test, the two coefficients were found to be different at a confidence level of 92.5 percent, while in the second test, the confidence level was 74.5 percent.

TABLE 5-5. AVERAGE BOARDING TIME BY TOTAL BOARDINGS
(Seconds)

Total Boardings	June Time	June SD*	June %	Aug. Time	Aug. SD	Aug. %	Nov. Time	Nov. SD	Nov. %	Overall Time	Overall SD	Overall %
0	0	0	0	0	0	0	0	0	0	0	0	0
1	4.49	2.71	32	5.20	2.46	35	3.76	1.17	30	4.50	2.26	32
2	4.22	1.97	18	3.91	1.82	23	3.35	1.39	22	3.76	1.73	21
3	4.64	3.32	13	3.45	1.71	15	3.17	1.18	16	3.62	2.12	15
4	2.80	1.30	7	3.38	1.42	10	3.11	1.34	11	3.15	1.36	10
5	3.19	1.60	6	2.82	1.05	4	2.75	1.30	8	2.88	1.33	6
6	2.62	1.42	4	3.04	1.14	4	2.48	1.16	4	2.72	1.23	4
7	3.07	1.89	4	2.81	1.07	3	3.32	1.58	3	3.08	1.50	3
8	2.74	1.61	2	2.69	0.65	1	2.79	1.31	2	2.75	1.24	2
9	1.69	1.14	2	3.02	1.28	1	2.85	1.61	1	2.37	1.35	1
10	2.48	2.21	3	4.00	0	0	2.96	1.51	2	2.77	1.86	2
11	2.77	0.58	1	2.27	0	0	3.41	0.32	1	2.93	0.59	0
12	1.99	0.66	2	0	0	0	3.00	0.90	1	2.39	0.88	1
13	2.25	1.06	2	2.54	0	0	0	0	0	2.29	0.99	1
14	2.02	1.28	1	0	0	0	0	0	0	2.02	1.28	0
15	2.80	0	0	2.47	0	0	0	0	0	2.63	0.24	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	3.06	0	0	3.62	1.54	1	4.71	0	0	3.75	1.12	0
18	1.67	1.81	1	2.97	0	0	0.67	0	0	1.74	1.41	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	2.50	0	0	0.65	0	0	1.58	1.31	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	2.09	0	0	2.09	0	0
23	0.78	0	0	0	0	0	0	0	0	0.78	0	0
24	1.15	0	0	0	0	0	0	0	0	1.15	0	0
25	2.60	0	0	0	0	0	0	0	0	2.60	0	0
26	1.31	0	0	0	0	0	0	0	0	1.31	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	1.61	0	0	0	0	0	1.61	0	0
Overall	3.73	2.46		4.06	2.12		3.30	1.32		3.69	1.99	

* SD = standard deviation

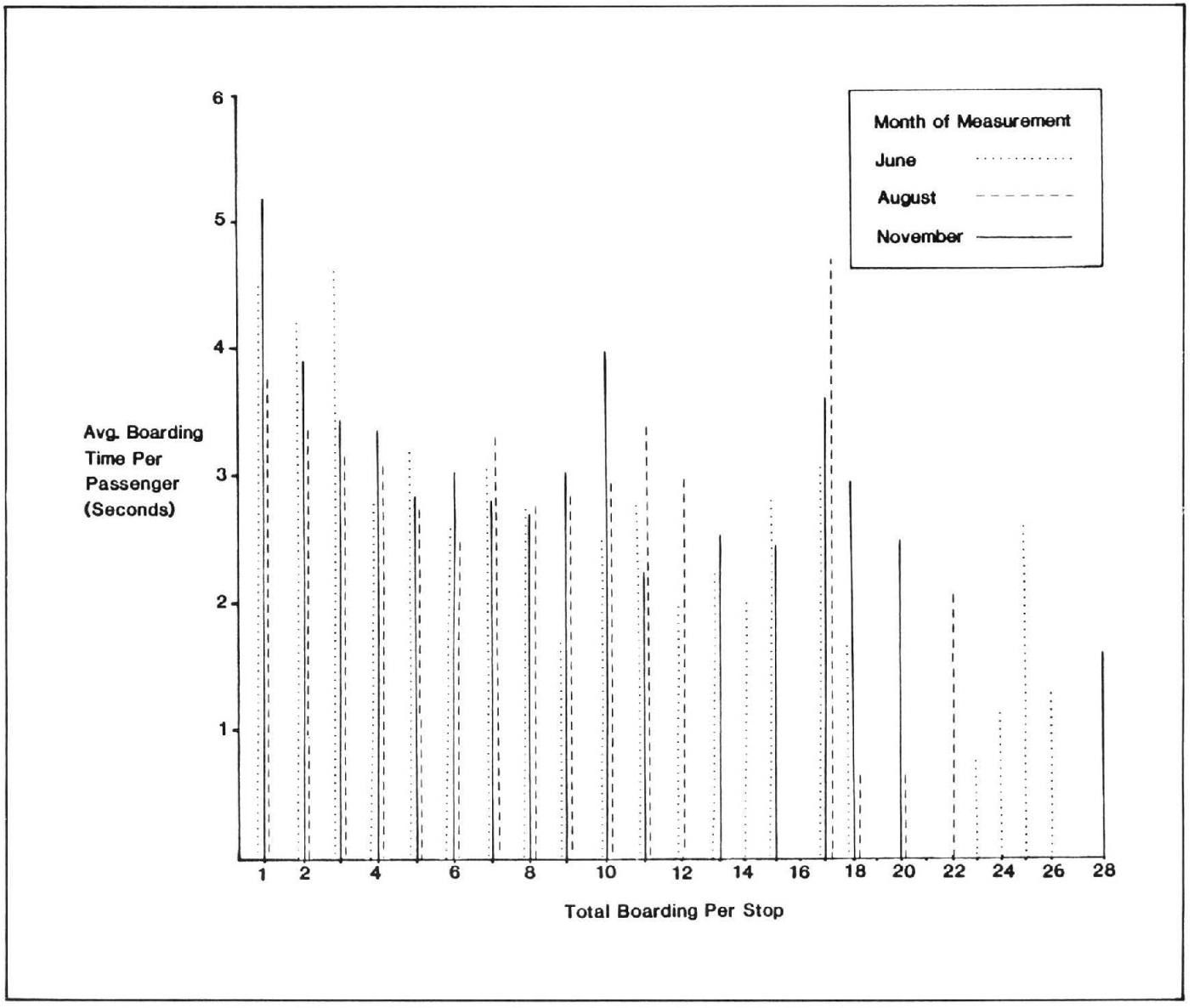


FIGURE 5-2. AVERAGE BOARDING TIME
(BY TOTAL BOARDINGS)

TABLE 5-6. PERCENTAGE OF STOPS WITH NO METROCARD USERS

Route	June	August	November
1	61%	63%	63%
4	65	63	60
17	74	62	47
26	93	97	66
33	76	59	69
39/40	75	25	0
43	69	62	30
44	82	63	76
49	73	71	73
78	86	77	80
Overall Percentage	76	67	65

TABLE 5-7. SUMMARY OF COSTS AND BENEFITS

Category	Total Amount (20 months)	Avg. Monthly Amount	Avg. Amount per Pass Sold
Program Costs			
start-up costs	$ 29,410	$1,471	$0.44
administrative costs	118,952	$5,948	$1.80
advertising costs	73,893	3,695	1.11
demonstration costs	84,358	4,218	1.27
Total	$306,613	$15,331	$4.62
Revenue Loss			
cash fare diversion	254,000	$12,700	$3.83
loss from discount	103,533	5,178	1.56
Total	$357,353	$17,878	$5.39
Increased Revenue			
new riders	$ 15,400	$ 770	$0.23
accompanying riders	96,908	4,845	1.46
interest (cash flow)	6,640	332	0.10
Total	$118,948	$5,947	$1.69
Other Benefits			
improved public image		-	
increased convenience to users		-	
increased ridership		-	
Net Cost			
net total cost of program	$552,115	$27,606	$8.22
net on-going cost	254,822	12,741	3.84
net on-going cost (including advertising)	328,482	16,424	4.95

First it should be pointed out that the MetroCard program resulted in a net revenue loss to Queen City Metro during the demonstration period. Although some new revenue was generated through the program, this revenue was more than offset by the amount of revenue lost through the diversion of cash fares. Based on the survey results, the estimated net revenue loss through regular pass use (i.e., excluding the loss from the summer discount) amounted to just over $2 per pass sold (i.e., $3.83 minus $1.79). On a monthly basis, this equals approximately $6,700. While this loss is significant, it must be placed in perspective: it represents only 0.5 percent of total monthly system operating revenues (and 0.2 percent of the total monthly system operating expenses). Of course, the revenue loss is over and above the program costs -- the administrative cost during the demonstration amounted to $1.80 per pass sold. The total cost (i.e., administration plus revenue loss) of the MetroCard program on an ongoing basis was thus $3.84 per pass sold; this represents roughly 1.0 percent of monthly operating revenues (and 0.4 percent of the monthly expenses).

The bulk of the remaining costs -- for advertising, program development, administration of the SMD demonstration, and revenue loss from the special discount -- are not associated with the day-to-day operation of the pass program and need not be incurred in the future. Advertising includes some on-going activities, but, as explained earlier, the vast bulk of the advertising costs involved in the MetroCard program were for television time; these expenditures will be greatly reduced in the future, as Queen City Metro has decided to eliminate most of the television advertising for the MetroCard program. When the advertising expenditures are added to the on-going program cost cited above, the total becomes $4.95 per pass sold. The total cost of the program (including developmental and demonstration expenditures) amounts to $8.22 per pass sold (during the demonstration period).

However, the initial program development expenditures will obviously not be a factor in future years, now that the program is in place. In addition, those expenditures attributable directly to the fact that this was a demonstration project will no longer be incurred now that the demonstration has been completed. Finally, the revenue loss associated with the summer discount can be avoided in the future by not repeating such a promotion. Of course, the discount proved to be very effective in boosting pass sales; Queen City Metro's management will have to carefully weigh its major objectives to determine which objective it values higher -- minimizing revenue losses or boosting pass sales.

With these changes, the on-going program costs should be much lower than during the demonstration. And, since the number of passes sold at the end of the demonstration was at a

substantially higher level than during much of the demonstration period, the average cost per pass sold over the coming years should be lower than the average figure reported for the demonstration period. For instance, assuming a pass sale level of 3800 (the level at the end of the demonstration), the on-going cost (including revenue loss, administration at the current level and marketing, but without television)* per passenger would be $3.41, rather than the $4.95 for the demonstration period.

Finally, it must be kept in mind that the MetroCard program was still rather new as of the end of the demonstration. The benefits of any prepaid pass program should increase over time, as the program becomes more established and the market penetration grows. Although there will continue to be some revenue loss from cash fare diversion, the non-quantifiable benefits (as shown on Table 5-7) could eventually become important factors in maintaining system ridership.

5.4 IMPACT ON PRODUCTIVITY MEASURES

Beyond cost and revenue issues, a pass program may also have an impact on transit productivity issues. The nature of new trips induced by the use of passes may have an impact on service efficiency measures (e.g., passenger trips per vehicle-hour, passenger trips per vehicle-mile). These measures do not in themselves represent cost savings (or increases), but they do provide an indication of the program's impact on resource utilization.

Queen City Metro's productivity measures during the demonstration period are shown in Figures 5-3 and 5-4. As shown, both passengers per service hour and passengers per vehicle-mile generally declined over the course of the demonstration. This reflects the general decrease in system ridership, as discussed in Chapter 4. The severe productivity drop in June 1982 -- and continuing through July and August -- was attributable mainly to the absence of student trips (i.e., for summer vacation) with no concomitant reduction in service; during the school year, student trips represented 17-22 percent of the total system ridership. However, service was reduced - by approximately five percent of total service hours - in September 1982. As shown on the figures, the productivity measures rose slightly in October, but then fell over the following two months, as ridership dropped to its lowest level in several years.

---

* As explained in Section 5.5.1, television accounted for over $1.00 of the $1.11 per pass advertising expenditure.

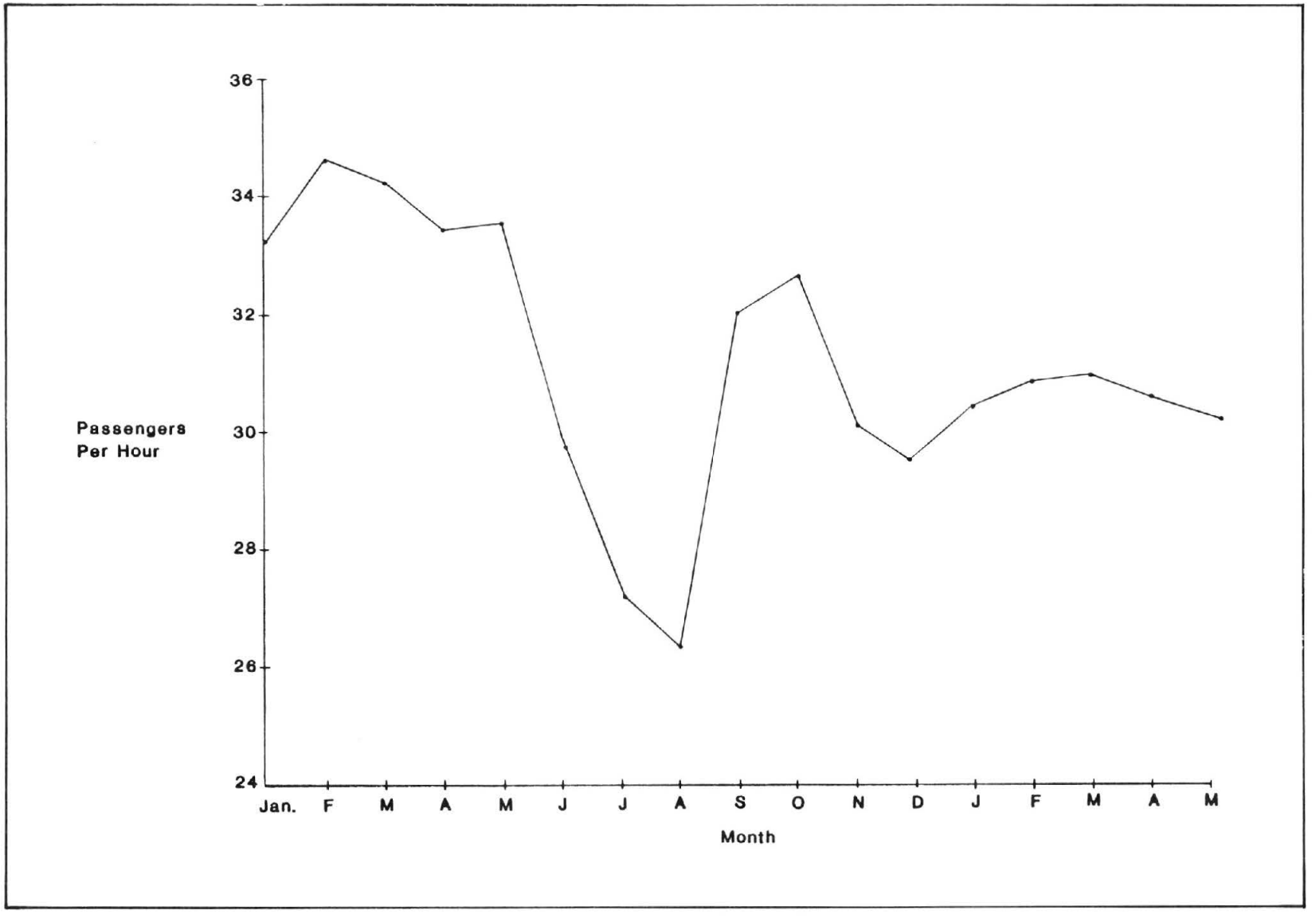


FIGURE 5-3. QUEEN CITY METRO PASSENGERS PER SERVICE HOUR

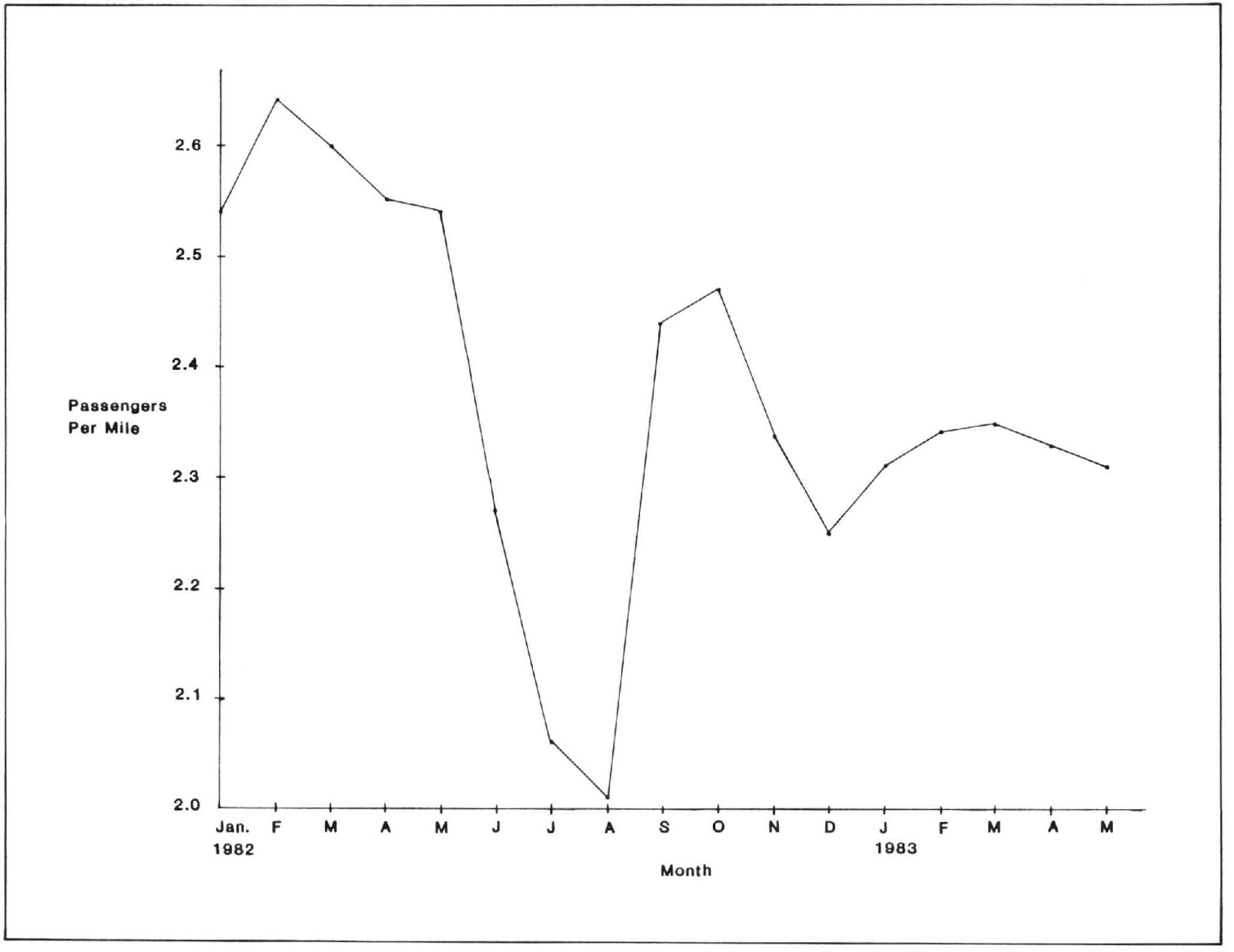


FIGURE 5-4. QUEEN CITY METRO PASSENGERS PER VEHICLE-MILE

In light of the small number of new transit trips induced by MetroCard program -- roughly 1.3 percent of all Queen City Metro trips (see Chapter 4) -- it is apparent that the program had a negligible impact on overall system productivity.

6. SUMMARY AND CONCLUSIONS

6.1 INTRODUCTION

The Cincinnati Transit Pass Pricing Demonstration involved the marketing and sale of prepaid monthly transit passes (called MetroCard)--initially at a base price of $20, and then, following an overall transit fare increase, at $24. The pass program (and the demonstration) began in October 1981; the demonstration ran through May 1983, for a total duration of 20 months, while the pass program continued past that point.

The MetroCard could be purchased through any of the following means: 1) in-person at Queen City Metro's (the demonstration grantee) Customer Service desk or at one of several remote locations; 2) through the mail; 3) over the telephone, using a major credit card or the "cash card" of a Cincinnati bank; or 4) via that bank's automated teller machine. The passes were available beginning on the 15th of each month (for the following month), and some passes were purchased as late as the second week of the month for which they were valid.

During the demonstration period, Queen City Metro sold an average of 3,318 passes per month, with a single month high of 4,655. Sales rose sharply during the summer of 1982 as a result of a special three-month discount. During the discount period, the base pass price was kept at $20 per month, despite the fact that the cash fare was raised from $0.50 to $0.60 (during peak periods). However, the sales level remained high following the end of the discount, suggesting that a substantial number of new passbuyers may have been attracted by the discount and then remained in the program.

The overall goals of the demonstration were as follows: 1) to provide the transit industry with a comprehensive analysis of the full benefits (and full costs) of providing monthly passes; 2) to provide the transit industry with a useful methodology for setting the prices of monthly passes; and 3) to provide Queen City Metro with an optimal pass price structure aimed at meeting the transit authority's stated objectives. The latter two goals were fulfilled through the efforts of a special pricing contractor. This contractor analyzed the data collected through the project surveys and developed a set of general guidelines for use in establishing pass price structures, as well as specific pricing recommendations for Queen City Metro. The benefits and costs associated with Queen City Metro's pass program have been documented in the preceding chapters of this evaluation report. These results, as well as the key findings of the other aspects of the evaluation, are summarized in this chapter. In addition, the chapter presents general findings which are transferable to other locations considering implementation or modification of prepaid pass programs.

6.2 KEY FINDINGS

6.2.1 Sales and Marketing Strategies and Results

- Throughout the demonstration period, the most popular mode of pass purchase was in-person at Queen City Metro's Customer Service counter, as opposed to purchase through the mail, at a remote sales location, or at an automated bank teller.

- In marketing MetroCard, Queen City Metro's primary target was transit users in general; however, particular emphasis was placed on marketing to regularly commuting adult riders. The initial marketing objective was to sell MetroCard to 25 percent of transit commuters. Queen City Metro's pass sales eventually reached approximately 27 percent of peak adult riders. Thus, Queen City Metro was quite successful in achieving its original marketing objective.

- The primary marketing approach was on-bus advertising, although television commercials were used heavily at several times during the project. Project surveys revealed that 43 percent of passbuyers found out about MetroCard through on-bus advertising, while 28 percent found out via television; the third most common source of information was an indirect marketing approach -- "from family or a friend."

- In addition to regular advertising, an important marketing tool was the three-month relative price reduction, during which time MetroCard was effectively discounted by $4 over the full cash fare equivalent price. The discount proved to be very successful in increasing pass sales: the sales in the first month of the discount were 55 percent higher than in the prior month. Furthermore, the sales level dropped relatively little following the end of the discount period.

6.2.2 Travel Behavior Impacts

- The demand for passes grew from 1,838 for the first month (October 1981) to a peak of 4,655 (September 1982), and finally leveled off in the 3,800-3,900 range over the final five months of the demonstration. It should be noted that the demand for passes increased despite a steady decline in overall ridership.

- MetroCard's market penetration (i.e., percentage of unduplicated adult passengers represented by passbuyers) rose significantly during the demonstration--from four percent of total adult riders (12 percent of peak adult riders) to a high of nine percent (and 27 percent).

- There was a clear difference between the average transit trip rates of passbuyers (before buying a pass) and non-passbuyers -- for both work and non-work trips. Passbuyers reported making an average of 12 transit trips per week before buying MetroCard; non-passbuyers made an average of just over eight transit trips per week. Furthermore, approximately 11 percent of passbuyers reported pre-pass weekly trip rates below ten, indicating that transit users will generally purchase pre-paid passes only if they stand to benefit financially (i.e., if they will be making more than the "breakeven" number of trips, and thus pay less for a pass than they would if paying cash).

- On the other hand, over 40 percent of non-passbuyers reported making at least the breakeven number of trips (i.e., ten or more), and 33 percent of non-passbuyers had work trip frequencies at or above the breakeven level. Thus, not everyone who would benefit from purchasing a pass did so. (Of course, it must be kept in mind that this result may be somewhat biased by a tendency among transit users to overreport their usage.)

- Compared to non-passbuyers, persons buying MetroCard were more likely to be male than among transit users in general, tended to be somewhat older, tended to have a higher household income, and tended to own -- and have available for use -- fewer automobiles. Regarding the latter characteristic, 40 percent of passbuyers reported generally having an automobile available for their use, which suggests that Queen City Metro was somewhat successful in attracting "choice riders" as regular transit users.

- The "convenience of not having to carry exact change" was cited as "the most important reason for buying MetroCard" by 60 percent of the passbuyer survey respondents, and by 77 percent of the follow-up survey respondents as "the most important reason for continuing to buy" MetroCard. Although analysis revealed trip frequency to be crucial in the passbuying decision, it is clear that convenience is considered to be a very important attribute of a transit pass, especially when the cash fare involves multiple coins.

- The primary reason cited (in the on-board survey) for not purchasing MetroCard was "not using the bus enough" (57 percent); approximately equal numbers of respondents "were not aware of MetroCard" or "found it too expensive to pay the full price at the time of purchase" (14 percent for each response). The fact that 86 percent of non-passbuyers were at least aware of the pass program suggests that Queen City Metro was

fairly successful in at least one aspect of its marketing campaign -- to inform transit users about the program. Furthermore, only seven percent of the survey respondents felt that it was "too much trouble to buy" MetroCard, and eight percent "did not know where to get" MetroCard. The former suggests that the limited number of pass sale outlets was not a major deterrent to pass sales -- at least initially.

- As for reasons for discontinuing pass purchase, "I don't use the bus enough" was cited most often, although by a much smaller percentage (less than 30 percent) than had cited that as the most important reason for not purchasing the pass in the first place. Among the respondents to the passbuyer follow-up survey, 22 percent of those who had stopped buying MetroCard had done so because of vacation -- and thus presumably would resume pass purchase the following month. Less than seven percent of those respondents who had stopped buying MetroCard did so because the "pass price went up."

- Regarding pass retention rates, approximately 68 percent of the passbuyer follow-up respondents had purchased MetroCard for at least four months. Over 45 percent of the May passbuyer respondents had been purchasing MetroCard since the beginning of the program (i.e., 8 months). However, only ten percent of the July survey respondents had been buying the pass since the beginning (i.e., ten months); in fact, 38 percent of the July respondents began purchasing MetroCard in July or August. Of course, while a number of individuals purchased passes only during the discount period, the majority of passbuyers continued buying them at least in the two months immediately following the close of that period.

- The use of MetroCard was relatively evenly distributed throughout the transit system and no specific run exhibited more than minimal MetroCard usage. In fact, the vast majority of stops observed (in a series of special on-board measurements) had no passholders boarding; at only 22 percent of the stops observed did more than 20 percent of the persons boarding use MetroCard.

- The number of new transit trips generated by the MetroCard program was relatively small, representing roughly 1.3 percent of the total monthly transit ridership (or 2.5 percent of the regular monthly off-peak ridership). Most of these new trips (approximately 70 percent) were made by pass users who increased their tripmaking frequencies after purchasing

a pass; the remainder were made by riders (who would not otherwise have used transit) who accompanied pass holders. Although minimal, these new trips helped to offset the decline in overall system ridership during the demonstration; regular adult ridership (i.e. excluding students and those using the Fare Deal card) declined by 19 percent during this period.

6.2.3 Level of Service and Economic Impacts

- Analysis of the special on-board observations did not support the findings from other studies that passholders take less time to board buses than do passengers paying cash. The stop-to-stop variation in average boarding times was sufficient to prevent the determination of a definite relationship between type of fare payment and boarding time; hence, the use of passes had no clear impact on Queen City Metro's level of service.

- The total cost of the MetroCard program (during the demonstration period -- i.e., excluding pre-demonstration development costs) was $277,208. The SMD demonstration budget was $148,276, of which UMTA provided $133,448.

- Excluding the costs attributable solely to the fact that this was a demonstration project, the total cost of administering and marketing the MetroCard program was $192,850 or $2.91 per pass sold. The largest component of this cost was salaries and benefits (49 percent), followed by advertising (38 percent); television commercials accounted for over 90 percent of the advertising expenditures. The average administrative cost (i.e. labor plus production and postage expenses) was approximately $6,000 per month, or $1.80 per pass sold, while the average advertising cost was roughly $3,700 per month or $1.11 per pass sold (although nearly $3500 and over $1.00 of this could be eliminated if use of television were phased out).

- The program development and start-up costs totaled approximately $29,410. The average development cost per pass sold was $0.44.

- Another major financial impact of the MetroCard program involved revenue lost through the "diversion" of cash fares (i.e., from pass users who, before buying a pass, made more than the breakeven number of trips). It is estimated that the average pass user made trips worth approximately $3.83 more than the value of the pass

prior to purchasing a pass. The total revenue loss for the demonstration period was thus $254,000 or $12,700 per month; this was equivalent to one percent of the total system operating revenue during the demonstration.

- The revenue loss resulting from the summer discount was estimated to be $7.87 per passbuyer (during the discount period). The loss per pass sold due to the discount when spread over the full course of the demonstration was $1.56.

- Another source of potential financial impact was the cost related to serving induced passenger trips. Because of the relatively small number of new trips and the nature of Queen City Metro's service monitoring and scheduling procedures, there may have been no impact on operating expenses. However, from a broader economic perspective, there was a definite cost attributable to serving any induced trips. Based on marginal cost estimates developed in other transit studies, the impact on Queen City Metro's operating deficit may have been of the same general magnitude as the revenue loss through cash fare diversion.

- Total pass sale revenue represented approximately eight percent of the total system passenger revenue. The average revenue per pass was $23.25.

- The total amount of new revenue generated by the MetroCard program was approximately $119,000. The amount generated by persons who formerly (before buying a pass) made less than the breakeven number of trips was $15,400. The amount generated by riders (who would not otherwise have used transit) accompanying passholders was approximately $97,000. The amount produced in increased interest (from improved cash flow) on deposited revenue was about $6,700.

- The MetroCard program produced no identifiable cost savings due to reduced boarding times or to reduced coin handling and sorting costs; the extent of pass use was insufficient to produce any noticeable impact on the latter.

- Considering all costs and revenues, the MetroCard program resulted in a net cost to Queen City Metro. The total cost (including program administration and revenue loss from cash fare diversion) amounted to 1.0 percent of total monthly system operating revenue, or 0.4 percent of total monthly system operating expenses. Program costs should be considerably lower in future years, however, for several reasons: 1)

demonstration-related costs will not be necessary; 2) development and start-up costs will not have to be repeated; 3) the administrative costs should be lower now that the sales mechanisms are in place; and 4) advertising expenses will be greatly reduced when television advertising is largely eliminated and marketing efforts in general are targeted toward more specific segments of the population. In addition, if there are no more special discount periods, the revenue losses will be smaller. Finally, because the number of passes being sold at the end of the demonstration was higher than during much of the demonstration period, the average cost per pass sold could be quite low.

- The major non-quantifiable benefits associated with the MetroCard program were related to improved convenience for riders and improved public image for Queen City Metro (indicated by the growth in pass sales and the high level of retention of pass users despite a price increase).

- The MetroCard program had a negligible impact on system productivity. Because the bulk of the new trips generated were made during off-peak hours, the program did contribute to slight improvements in off-peak productivity measures; however, the decline in overall system usage effectively neutralized any gain generated by MetroCard.

6.3 TRANSFERABLE FINDINGS

The actual numbers of passes sold, the program costs, and pass revenues in other transit properties' prepaid pass programs will be quite different from those experienced in Cincinnati. Furthermore, the program structure -- in terms of pass sales methods, marketing approaches, and price structure -- will vary somewhat from site to site. In particular, many other prepaid pass programs include considerable employer involvement -- in distribution of passes to employees (and making payroll deductions for pass payment) and sometimes in subsidizing pass purchase. Nevertheless, certain findings from the Cincinnati demonstration should be of general applicability in developing or modifying other types of prepaid pass programs. The major transferable findings are as follows:

- The most cost-effective approach to advertising transit passes is through on-bus advertising. Television is also an effective strategy, but is much more expensive and is not targeted directly toward the primary market for prepared passes -- the transit user.

- A special discount period can be an effective marketing tool in attracting -- and retaining -- new passbuyers. On the other hand, such a discount can also prove costly to a transit operator in terms of "lost" revenue. Therefore, an operator's objectives must be clearly defined in considering such a discount.

- Individuals generally will not purchase a transit pass unless they already make at least the breakeven number of transit trips. On the other hand many regular transit riders who report trip frequencies high enough to warrant purchase of a pass apparently do not feel that the economic benefit is great enought to warrant the positive action required to purchase a pass.

- While economic considerations represent a crucial factor dictating decisions whether or not to buy a pass, the convenience of not having to carry exact change is highly valued by passbuyers (especially where the fare involves multiple coins).

- A limited number of pass sale outlets is not necessarily a deterrent to pass sales, although it is useful to offer a variety of purchase and payment mechansims (e.g., through the mail, through automated bank tellers, over the telephone, using credit cards, etc.) However, market penetration in Cincinnati did not reach the levels attained in other cities (e.g., Boston, where an active employer payroll deduction and subsidy program is used to market passes).

- There is no definite relationship between type of fare payment and boarding time; there is likely to be significant variation in average boarding times from one run to the next (and between stops as well), due to different behavioral patterns of persons boarding as well as drivers. Furthermore, even if there were a clear relationship, the distribution of pass use in a program which has achieved only moderate market penetration may be such that few stops have sufficient passholders boarding to affect overall route running times.

- The revenue lost through "cash fare diversion" represents a real cost to a transit property, although it can be partially offset by new revenue gained through the program (i.e., from new trips made by passbuyers, from the fares of new riders accompanying passbuyers, and from increased interest gained through improved cash flow). However, the net loss should represent a very small percentage of overall system revenue. (It should be kept in mind that estimating

the revenue lost to cash fare diversion is, at best, a difficult and inexact task; a property attempting to measure lost revenue should use a detailed before-after survey effort.)

- There may be an impact on a transit system's operating deficit related to serving passenger trips induced by a pass program. The extent of this impact depends on the relative increase in trips, but may be influenced by the operator's service monitoring and scheduling procedures.

6.4 CONCLUDING REMARKS

This evaluation has examined the costs and benefits associated with a monthly prepaid transit pass program. The fact that MetroCard was a new program (it began with the demonstration) afforded the opportunity to assess the costs and impacts of a pass program from the beginning. As indicated in this report, ongoing pass program costs are related primarily to the type of pass distribution network, the type and level of marketing/advertising strategies, the level of administrative support, and the financial impacts related to pass use and travel behavior.

In terms of pass distribution, however, it must be kept in mind that this demonstration involved a very limited distribution network - many pass programs include extensive employer involvement. Therefore, some of the findings reported here may not apply to a program with considerable employer participation. Furthermore, while the evaluation provided useful documentation of development, implementation, and initial program costs and benefits, the fact that the demonstration covered only the program's first 20 months represents a limitation in terms of ability to evaluate a pass program's long term costs and benefits. Once a pass program has been in place for a number of years, various cost elements and benefits may change appreciably. The nature of these changes will depend on the interaction of the factors assessed in this evalution (e.g., market penetration, pass use patterns, marketing strategies, distribution methods, etc.); their impact on net program costs will vary from one program to the next.

Survey Questionnaire

1. During the past week (seven days) how many bus trips have you made to travel from home to work? _____

2. During the past week how many bus trips have you made to travel from work to home? _____

3. During the past week how many METRO bus trips have you made going to and from places other than work?

   Number of buses going to _____
   Number of buses coming from _____

4. How many trips do you usually take on the bus on the weekend (Saturday and Sunday)? _____

5. Do you need to transfer to complete the trip you most often make by bus?

   ☐ Yes ☐ No

6. How do you pay the fare for most of the METRO bus trips you make?
   - ☐ Cash How much? _____ Cents
   - ☐ Token ☐ Cash/token combination
   - ☐ Fare Deal Card ☐ School Pass

7. Do you generally have an automobile available for you to use instead of the bus?
   - ☐ Yes, but at inconvenience to other household members.
   - ☐ Yes
   - ☐ No

8. Including yourself, how many persons are in your household? _____

(over)

Queen City Metro

9. You are male ☐ or female ☐

10. What is your current age?

1. ☐ Under 18	4. ☐ 45 - 54
2. ☐ 18 - 29	5. ☐ 55 - 64
3. ☐ 30 - 44	6. ☐ 65 or over

11. What is your total combined yearly family income?
    - ☐ Under $10,000
    - ☐ $10,000 to $19,999
    - ☐ $20,000 to $34,999
    - ☐ Over $35,000

We are planning a follow-up to this survey in the spring. We would like to contact you at that time. So that we may do so, please fill in the following. This information will be kept in confidence and used only for the spring METRO survey.

Telephone number where you can be reached:

_____

For whom should we ask?

_____

Best time to call:
☐ Morning ☐ Afternoon ☐ Evening

If you have any questions about this survey, please contact us at 632-7521 weekdays between 8:30 a.m. and 5:00 p.m.

№ 00601

Queen City Metro

September 1981 On-Board Survey

Survey Questionaire

1. During the past seven days, how many METRO bus trips have you made to travel from home to work? _____

2. During the past seven days, how many METRO bus trips have you made to travel from work to home? _____

3. During the past seven days, how many METRO bus trips have you made to and from places other than work?

   Number of trips going to _____

   Number of trips coming from _____

4. Do you need to transfer to complete the trip you most often make by bus?

   ☐ Yes ☐ No

5. How do you pay the fare for most of the METRO bus trips you make?

   ☐ Cash (how much? _____ cents)

   ☐ Token

   ☐ Cash/Token combination

   ☐ Fare Deal card

   ☐ School pass

   ☐ MetroCard

6. Have you ever purchased a MetroCard?

   ☐ No

   ☐ Yes (for how many months? _____)

7. What are your reasons for not purchasing a MetroCard?

   ☐ I don't know anything about it;

   ☐ I don't use the bus enough to make it worth the cost;

   ☐ It's too much trouble to buy it;

(Continued on other side)

Metro

R+11

☐ It's too expensive to pay the full pass price at time of purchase;

☐ It's inconvenient to carry pass around;

☐ I don't know where to get one;

☐ Other:

8. Do you generally have an automobile available for you to use instead of the bus?

   ☐ Yes, but it inconveniences other household members

   ☐ Yes

   ☐ No

9. Including yourself, how many persons are in your household? _____

10. You are male ☐ or female ☐

11. What is your current age?

1. ☐ Under 18	4. ☐ 45 - 54
2. ☐ 18 - 29	5. ☐ 55 - 64
3. ☐ 30 - 44	6. ☐ 65 or over

12. What is your total combined yearly family income?

    ☐ Under $10,000
    ☐ $10,000 to $19,999
    ☐ $20,000 to $34,999
    ☐ Over $35,000

We are planning a follow-up to this survey in the spring. We would like to contact you at that time. So that we may do so, please fill in the following. This information will be kept in confidence and used only for the Fall METRO survey.

Telephone number where you can be reached:

_____

For whom should we ask?

_____

Best time to call:
☐ Morning ☐ Afternoon ☐ Evening

If you have any questions about this survey, please contact us at 632-7520 weekdays between 8:30 a.m. and 5:00 p.m.

№ 5512

Metro

May 1982 On-Board Survey

QUEEN CITY METRO
"FOLLOW-UP" SURVEY
(May 1982)

Hello, my name is _____ and I'm an interviewer for Queen City Metro. We're conducting a follow-up survey of Queen City Metro rider(s), and I would like to speak to _____. (If designated person is not home, determine call-back time. Time: _____)

About eight months ago, you filled out a survey concerning your use of Queen City Metro. At that time you indicated that you would be willing to be contacted for a follow-up survey. We would appreciate your help in answering some questions about your current means of travel. This will only take a few minutes.

1. During the past seven days, how many Metro bus trips have you made to commute from home to work?

   1) 0 2) 1 3) 2

   4) 3 5) 4 6) 5 7) 6

2. During the past seven days, how many Metro bus trips have you made to commute from work to home?

   1) 0 2) 1 3) 2

   4) 3 5) 4 6) 5 7) 6

3. What Metro bus route (if any) do you take to get to work? _____

4. During the past seven days, did you use any any types of transportation other than the bus to get to or from work?

   1) yes 2) no (GO TO Q. 6)

5. How did you get to (and from) work on those days when you didn't take the bus?

   1) drove by myself 2) got a ride

   3) carpooled or vanpooled 4) walked

   5) rode a bicycle 6) other_____

6. During the past seven days, how many Metro bus trips have you made for purposes other than for commuting to and from work (going from one place to another is one trip; returning is another trip)?

   Number of trips _____

7. How do you pay the fare for the METRO bus trips you make?

   1) MetroCard transit pass (GO TO Q. 12)

   2) cash (_____¢) (for your most frequent trip)

   3) token

   4) token/cash combination

   5) Fare Deal card

   6) student pass

8. Have you ever purchased a MetroCard?

   1) yes 2) no (GO TO Q. 11)

9. For how many months did you buy the MetroCard?

   1) 1 month 2) 2 months 3) 3 months

   4) 4 months 5) 5 months 6) 6 months

   7) 7 months

10. Why did you stop buying the MetroCard?

   1) I didn't use the bus enough to make it worth the cost;

   2) It was too much trouble to buy it;

   3) It was too expensive to pay the full pass price at time of purchase;

   4) I found it inconvenient to carry a pass around;

   5) I occasionally lost or misplaced the pass;

6) I was afraid I would lose a pass;

7) I didn't buy it for this month because I'm going on vacation this month;

8) Other: _____.

GO TO Q. 22.

11. What are your reasons for not purchasing a MetroCard?

1) I don't use the bus enough to make it worth the cost;

2) It's too much trouble to buy it;

3) It's too expensive to pay the full pass price at time of purchase;

4) It would be inconvenient to carry a pass around;

5) I'm afraid I would lose a pass;

6) I don't know anything about it;

7) I don't know where to get one;

8) Other: _____.

GO TO Q. 22.

12. Where did you buy your May MetroCard?

1) by mail;

2) at Queen City Metro's Customer Service Department;

3) at work;

4) at the University of Cincinnati.

13. Do you find it convenient to purchase a pass this way?

1) yes 2) no

14. What price pass did you buy for June?

1) $20 2) $24 3) $28 4) $32

5) $36 6) $40 7) $48 8) $52

15. Did you pay the extra $4 for express service?

1) yes 2) no

16. For how many months have you bought the MetroCard?

1) this is the first month 2) 2 months

3) 3 months 4) 4 months 5) 5 months

6) 6 months 7) 7 months 8) 8 months

9) 9 months

17. Do you plan to continue buying the MetroCard each month?

1) yes

2) yes, (if/but/except/unless):_____

3) probably not:_____

↓

why not?: _____

18. What is your most important reason for buying a MetroCard?

1) It's cheaper than paying cash;

2) It's more convenient;

3) It allows me to take additional trips for free;

4) Other
(specify):_____

19. How did you find out about MetroCard?

1) METRO advertisements in the newspaper;

2) Radio;

3) TV;

4) From a friend, family member, or fellow worker;

5) On the bus;

6) Other (specify):_____.

20. Did you buy a pass during the month you had your last vacation?

1) yes 2) no

21. Do you intend to buy a pass during the months in which you will be taking vacations?

1) yes 2) no

22. How many automobiles does your household own?

1) 1 2) 2 3) 3 or more

23. Do you generally have an automobile available for you to use instead of the bus?

1) _____ Yes, but at inconvenience to other household members

2) _____ Yes

3) _____ No

Thank you very much for your assistance. Your responses to these questions will be used in attempting to improve public transportation in the Cincinnati area.

QUEEN CITY METRO
PASS-BUYER SURVEY
(May 1982)

METRO would like to improve transportation in Cincinnati. To help us do this, please take a few minutes to fill out this survey. Once you have completed the survey, please fold and staple and drop in a mailbox; no postage is necessary. If you participated in our recent telephone survey, please disregard this request.

---

1. Where did you buy your June MetroCard?

   1) by mail
   2) at Queen City Metro's Customer Service Dept.
   3) at work
   4) at the University of Cincinnati

2. Do you find it convenient to buy MetroCard this way?

   1) yes 2) no

3. What price pass did you buy for June?

   1) $20 2) $24 3) $28 4) $32

   5) $36 6) $40 7) $48 8) $52

4. Did you pay the extra $4 for express service?

   1) yes 2) no

5. What Metro bus route do you most often take? _____

6. Do you need to transfer to complete the trip you most often make by bus?

   1) yes 2) no

7. For how many months have you bought the MetroCard?

   1) this is the first month 2) 2 months

   3) 3 months 4) 4 months 5) 5 months

   6) 6 months 7) 7 months 8) 8 months

8. Do you plan to continue buying the MetroCard each month?

   1) yes

   2) yes, except _____

   3) probably not (why not): _____

9. What is your most important reason for buying a MetroCard? (check one)

   1) It's cheaper than paying cash because I ride the bus so frequently.

   2) It's more convenient because I don't have to carry exact change.

   3) It allows me to ride for free on evenings and weekends.

   4) Other (specify): _____

10. How did you find out about MetroCard? (check all that apply)

   1) METRO advertisements in the newspaper

   2) Radio

   3) TV

   4) From a friend, family member, or fellow worker

   5) On the bus

   6) Other (specify): _____

11. During the past seven days, how many bus trips have you made from <u>home</u> to <u>work</u>? _____

12. During the past seven days, how many bus trips have you made from <u>work</u> to <u>home</u>? _____

13. During the past seven days did you use any type of transportation other than the bus to get to and from work?

   1) yes 2) no <u>GO TO QUESTION 15</u>

14. How did you get to (and from) work on those days when you didn't take the bus?

    1) drove, by myself 2) got a ride

    3) carpooled or vanpooled 4) walked

    5) rode a bicycle 6) other_____

15. During the past week, how many Metro bus trips have you made other than for commuting to and from work (going from one place to another is one trip; returning is another trip)?

    Number of trips going to places _____

    Number of trips coming from places _____

16. On the Metro trips you have made during the past seven days, were you ever accompanied by other persons (family, friends or co-workers) who would not otherwise have used Metro?

    1) no

    2) yes; on how many trips? _____

17. Before you began buying MetroCard, how many days per week did you use METRO to get to (and from) work?

    To work _____

    From work _____

18. Before you began buying MetroCard, how many one-way trips other than for commuting to and from work did you make on METRO, on average, each week?_____

19. How many automobiles does your household own?

    1) 1 2) 2 3) 3 or more

20. Do you generally have an automobile available for you to use instead of the bus?

1) _____ Yes, but at inconvenience to other household members

2) _____ Yes

3) _____ No

21. Including yourself, how many persons are in you household? _____

22. Are you 1) male _____ 2) female ____?

23. What is your age? _____

1) Under 18
2) 18-29
3) 30-44
4) 45-54
5) 55-64
6) 65 or over

24. Which of the following categories includes the total annual income of your household?

1) ___ Under $10,000

2) ___ $10,000 to $19,999

3) ___ $20,000 to $34,999

4) ___ Over $35,000

We are planning a follow-up to this survey in the Fall. We would like to contact you at that time. So that we may do so, please fill in the following. This information will be used only for the Fall METRO survey.

Telephone number where you can be reached: _____-_____

For whom should we ask? _____

Best time to call ___ Morning
____Afternoon ____Evening

If you have any questions about this survey, please contact us at 632-7521, weekdays between 8:30 AM and 5:00 PM. Thank you for your cooperation.

Queen City Metro - Pass Buyer Survey (August, 1982)

Serial Number:_____ Location:_____ Interviewer:_____

Hello, my name is _____ and I'm an interviewer for Queen City Metro. We are conducting a survey of METROcard buyers. We would appreciate your help in answering some questions about your use of Queen City Metro. This will only take a few minutes. (Ask if person has been surveyed about Queen City Metro in the last two months; if so, thank him/her and go on to next person).

1. What price pass are you buying for August?

   (1) $20 (2) $24 (3) $28 (4) $32

   (5) $36 (6) $40 (7) $48 (8) $52

2. Are you going to pay the extra $4 for express service?

   (1) Yes (2) No

3. What Metro bus routes do you most often take?

   _____ _____

   _____ _____

   _____ _____

   Number Name

4. Do you need to transfer to complete the trip you most often make by bus?

   (1) Yes (2) No

5. Did you purchase a METROcard for June or earlier?

   (1) No GO TO QUESTION #7 (2) Yes

6. For how many months (before now) have you purchased a METROcard?

   (1) 2 (2) 3 (3) 4 (4) 5

   (5) 6 (6) 7 (7) 8 (8) 9

   (9) 10 or more GO TO QUESTION #8

7. Is this your first time purchasing a METROcard?

   (1) Yes (2) No

8. Do you plan to continue buying the METROcard each month?

   (1) Yes

   (2) Yes, except _____

   (3) Probably not (why not): _____

9. What is your most important reason for buying a METROcard?

   (1) It's cheaper than paying cash;

   (2) It's more convenient;

   (3) It allows me to ride for free on evenings on weekends;

   (4) The special summer discount;

   (5) Other (specify): _____

10. How did you find out about METROcard? (check all that apply)

   (1) Advertisements in the Cincinnati newspaper

   (2) Advertisement in a suburban newspaper

   (3) Radio

   (4) TV

   (5) From a friend, family member, or fellow worker

   (6) Flyer handed out on the bus

   (7) Advertisement on bus

   (8) Other (specify): _____

11. During the past seven days, how many bus trips (not including transfers) have you made from home to work? _____

12. During the past seven days, how many bus trips (not including transfers) have you made from work to home? _____

13. During the past seven days did you use any type of transportation other than the bus to get to and from work?

   (1) Yes (2) No GO TO QUESTION #15

14. How did you get to (and from) work on those days when you didn't take the bus?

(1) drove, by myself (2) got a ride

(3) carpooled or vanpooled (4) walked

(5) rode a bicycle (6) other _____

15. Now I'd like to ask you about non-work trips. During the past week, how many Metro bus trips have you made other than for commuting to work (going from one place to another is one trip; returning is another trip)?

Number of bus trips going to non-work places _____

Number of bus trips coming from non-work places _____

16. On the Metro trips you have made during the past seven days, were you ever accompanied by other persons (family, friends or co-workers) who would not otherwise have used Metro?

(1) No (2) Yes; on how many trips?_____

17. Before you began buying METROcard, how many days per week did you use METRO to get to (and from) work?

To Work _____ From Work_____

18. Before you began buying METROcard, how many one-way trips other than for commuting to and from work (non-work) did you make on METRO, on average, each week? _____

19. Interviewee - Circle One

(1) Male (2) Female

HOUSEHOLD DATA

(Ask interviewee to circle appropriate answer)

20. How many automobiles or other vehicles does your household have available for personal use?

    (1) 0 cars (2) 1 car (3) 2 cars (4) 3 or more cars

21. Do you generally have an automobile available for you to use instead of the bus?

    (1) Yes (2) No

22. Including yourself, how many persons are in your household? _____

23. What is your age?

    (1) Under 18 (3) 30-44 (5) 55-64

    (2) 18-29 (4) 45-54 (6) 65 or over

24. Which of the following categories includes the total annual income of your household?

    (1) Under $10,000 (2) $10,000 to $19,999

    (3) $20,000 to 34,999 (3) Over $35,000

OPTIONAL

We are planning a follow-up to this survey in the Fall. We would like to contact you at that time. So that we may do so, we would appreciate knowing the following information. This information will be used only for the Fall METRO survey.

Telephone number where you can be reached _____ - _____

For whom should we ask? _____

Best time to call:

(1) Morning (2) Afternoon (3) Evening (4) Any Time

QUEEN CITY METRO - TELEPHONE SURVEY (ON-BOARD)
(November 1982)

	Contact Record		
	Date	Time	Notes
AFIX LABEL WITH CONTACT			
o Name _____	1. _____	_____	_____
o Phone # _____	2. _____	_____	_____
o Serial #_____	3. _____	_____	_____
	4. _____	_____	_____
	Status_____		

Hello, my name is _____ and I'm an interviewer for Queen City Metro. We are conducting a follow-up survey of Queen City Metro riders, and I would like to speak to _____ (If designated person is not home, determine call-back time.Time:

In May, you filled out a survey concerning your use of Queen City Metro. At that time you indicated that you would be willing to be contacted for a follow-up survey. We would appreciate your help in answering some questions about your current use of Queen City Metro. This will only take a few minutes.

---

1. First of all, do you use Queen City Metro at least once a week?

   1) no 2) yes (GO TO QUESTION 4)

2. In what month did you stop using Queen City Metro at least once a week?

   1) October 2) September 3) August 4) July
   5) June 6) doesn't remember

3. Why did you stop using Queen City Metro?

   1) because the fare went up 2) no longer working
   3) bought a car
   4) bus was no longer convenient (e.g., moved or changed jobs)
   5) bus service wasn't very good
   6) other (specify:_____)
   (GO TO QUESTION 12)

4. On how many of the past seven days have you used Queen City Metro to commute from home to work?

   1) zero 2) one 3) two 4) three 5) four
   6) five 7) six 8) seven
   9) not working (GO TO QUESTION 8)

5. On how many of the past seven days have you used Queen City Metro to commute from work to home?

   1) zero 2) one 3) two 4) three 5) four
   6) five 7) six 8) seven 9) not working

6. Do you need to transfer to complete the trip from home to work?

   1) yes 2) no

7. On how many of the past seven days, did you use any types of transportation other than the bus to get to or from work?

   1) zero 2) one 3) two 4) three 5) four
   6) five 7) six 8) seven

8. Now I'd like to ask you about non-work trips. (Going from one place to another is <u>one</u> trip; returning is another trip. Thus the round trip of going some place and returning counts as two trips.) During the past week, how many Metro bus trips have you made other than for commuting to or from work?

   Number of trips: _____

9. Compared to the time before the fare increase (July), are you now making <u>more</u>, <u>fewer</u>, or <u>the same number</u> of trips on Queen City Metro buses?

   1) more 2) fewer 3) same 4) doesn't know

10. What is the cash fare for your most frequent Metro trip?

    1) 50¢ 2) 60¢ 3) 70¢ or more 4) doesn't know

11. How do you pay the fare for the METRO bus trips you make?

    1) MetroCard transit pass (GO TO QUESTION 17)
    2) cash
    3) token
    4) token/cash combination
    5) Fare Deal Card
    6) student pass

12. Have you ever purchased a MetroCard?

    1) yes 2) no (<u>GO TO QUESTION 16</u>)

13. For how many months did you buy the MetroCard?

    1) 1 month 2) 2 months 3) 3 months 4) 4 months
    5) 5 months 6) 6 months 7) 7 months
    8) 8 or more months 9) doesn't know

14. Did you buy the MetroCard in the following months? (circle each that applies)

    1) July 2) August 3) September 4) October
    5) None of these months

15. Why did you stop buying the MetroCard?

1) I didn't use the bus enough to make it worth the cost;
2) It was too much trouble to buy it;
3) It was too expensive to pay the full pass price at time of purchase;
4) I found it invonvenient to carry a pass around;
5) I occasionally lost or misplaced the pass;
6) I was afraid I would lose a pass
7) I was going on vacation that month;
8) Started using Fare Deal Card or student pass;
9) I prefer to use cash;
10) The pass price went up;
11) Other: (Specify) _____.

(GO TO QUESTION 27)

16. What are your reasons for not purchasing a MetroCard?

1) I don't use the bus enough to make it worth the cost;
2) It is too much trouble to buy it;
3) It is too expensive to pay the full pass price at time of purchase;
4) I find it inconvenient to carry a pass around;
5) I am afraid I would lose a pass;
6) I don't know anything about it;
7) I don't know where to get one;
8) I use the Fare Deal Card or a student pass;
9) I prefer to use cash.
10) Other: (Specify) _____.

(GO TO QUESTION 27)

17. Where did you buy your MetroCard for the month of November?

1) by mail;
2) at Queen City Metro's Customer Service Department;
3) at work;
4) at the University of Cincinnati;
5) at Fountain Square ticket office

18. Do you find it convenient to purchase a pass this way?

1) yes 2) no

19. What price pass did you buy for November?

1) $24 2) $28 3) $32 4) $36 5) $40
6) $44 7) $52 8) $56 9) Doesn't Remember

20. Did you pay the extra $4 for express service?

1) yes 2) no

21. For how many months have you bought the MetroCard?

1) this is the first month 2) 2 months 3) 3 months
4) 4 months 5) 5 months 6) 6 months 7) 7 months
8) months 9) 9 months 10) 10 months or longer.

22. Did you buy the MetroCard in the following months? (circle each that applies)

1) July 2) August 3) September 4) October
5) None of these months

23. Do you plan to continue buying the MetroCard each month?

1) yes
2) yes, (if/but/except/unless):_____
3) probably not: (why?)_____
4) definitely not: (why?)_____

24. When you first bought a MetroCard, what was your most important reason?

1) cheaper than paying cash;_____
2) more convenient;_____
3) allows me to ride for free on evenings and weekends;_____
4) special summer discount;_____
5) other (specify): _____

25. What is your most important reason for continuing to buy MetroCard?

1) cheaper than paying cash;_____
2) more convenient;_____
3) allows me to ride for free on evenings and weekends;_____
4) other (specify): _____

26. How did you find out about MetroCard?

1) METRO advertisements in the newspaper;
2) Radio;
3) TV;
4) From a friend, family member, or fellow worker;
5) On the bus;
6) Other (specify):_____.

27. How many automobiles does your household own?

1) zero 2) one 3) two 4) three or more

28. Do you generally have an automobile available for you to use instead of the bus?

1) Yes, but at inconvenience to other household members
2) Yes
3) No

Thank you very much for your assistance. Your responses to these questions will be used in attempting to improve public transportation in the Cincinnati area.

QUEEN CITY METRO - TELEPHONE SURVEY (PASS BUYER)
(November 1982)

Contact Record

	Date	Time	Notes
1.			
2.			
3.			
4.			

Name _____
Phone # _____
Serial # _____
Mail _____ Office _____
Status _____

Hello, my name is _____ and I'm an interviewer for Queen City Metro. We are conducting a follow-up survey of MetroCard buyers, and I would like to speak to _____ (If designated person is not home, determine call-back time. Time: _____)

In May or July, you completed a survey concerning your use of Queen City Metro. At that time you indicated that you would be willing to be contacted for a follow-up survey. We would appreciate your help in answering some questions about your current use of Queen City Metro. This will only take a few minutes.

---

1. First of all, do you still use Queen City Metro at least once a week?

   1) no 2) yes (GO TO QUESTION 5)

2. In what month did you stop using Queen City Metro at least once a week?

   1) October 2) September 3) August 4) July
   5) June 6) doesn't remember

3. Why did you stop using Queen City Metro?

   1) because the fare went up
   2) no longer working
   3) bought a car
   4) bus was no longer convenient (e.g., moved or changed jobs)
   5) bus service wasn't very good
   6) other (specify: _____)

4. Did you continue using a Metro Card up until the time you stopped using the bus?

   1) yes 2) no

Thank you for your assistance. (Skip remainder of survey.)

---

5. Did you buy a MetroCard for November?

   1) no 2) yes (GO TO QUESTION 9)

6. For how many months did you buy the MetroCard?

   1) 1 2) 2 3) 3 4) 4 5) 5 6) 6 7) 7 8) 8 9) 9
   10) 10 11) 11 12) 12

7. What was the last month for which you bought a MetroCard?

   1) October 2) September 3) August 4) July 5) June

8. Why did you stop buying the MetroCard?
   1) I didn't use the bus enough to make it worth the cost;
   2) It was too much trouble to buy it;
   3) It was too expensive to pay the full pass price at time of purchase;
   4) I found it inconvenient to carry a pass around;
   5) I occasionally lost or misplaced the pass;
   6) I was afraid I would lose a pass;
   7) I didn't buy it for this month because I'm going on vacation this month;
   8) I now use Fare Deal Card or student pass;
   9) I prefer to use cash;
   10) The pass price went up;
   11) Other: (Specify) _____.

   (GO TO QUESTION 17)

9. Where did you buy your November MetroCard?

   1) by mail
   2) at Queen City Metro's Customer Service Dept.
   3) at the Fountain Square ticket office
   4) at work
   5) at the University of Cincinnati

10. Do you find it convenient to buy MetroCard at this location?

    1) yes 2) no

11. How did you pay for your November MetroCard?

    1) cash (or check)
    2) credit card
    3) Jeanie bank machine

12. What price pass did you buy for November?

    1) $24 2) $28 3) $32 4) $36 5) $40 6) $44
    7) $42 8) $56

13. Did you pay the extra $4 for express service?

    1) yes 2) no

14. Do you need to transfer to complete the trip you most often make by bus?

    1) yes 2) no

15. Do you plan to continue buying the MetroCard each month?

    1) yes
    2) yes, except _____
    3) probably not (why not): _____

16. What is your most important reason for continuing to buy MetroCard?

1) cheaper than paying cash;
2) more convenient;
3) allows me to ride for free on evenings and weekends;
4) other (specify): _____

17. On how many of the past seven days have you used Queen City Metro to commute from home to work?

1) zero 2) one 3) two 4) three 5) four 6) five
7) six 8) more than 6
9) not working (GO TO QUESTION 20)

18. On how many of the past seven days have you used Queen City Metro to commute from work to home?

1) zero 2) one 3) two 4) three 5) four 6) five
7) six 8) more than 6 9) NOT WORKING

19. On how many of the past seven days did you use any type of transportation other than the bus to get to and from work?

1) zero 2) one 3) two 4) three 5) four 6) five
7) six

20. Now I'd like to ask you about non-work trips. (Going from one place to another is one trip; returning is another trip. Thus the round trip of going some place and returning counts as two trips.) During the past week, how many Metro bus trips have you made other than for commuting to or from work?

Number of trips: _____

21. On the Metro trips you made during the past seven days, were you ever accompanied by other persons (family, friends or co-workers) who would not otherwise have used Metro?

1) no
2) yes; on how many trips? _____

22. How many automobiles does your household own?

1) zero 2) one 3) two 4) three or more

23. Do you generally have an automobile available for you to use instead of the bus?

1) Yes, but at inconvenience to other household members
2) Yes
3) No

Thank you very much for your assistance. Your responses to these questions will be used in attempting to improve public transportation in the Cincinnati area.

APPENDIX B - Confidence Intervals of Survey Data

	Mean	Std. Error	Conf. Int. (90%)
May Passbuyer			
home to work (current)	4.95	0.09	0.15
work to home	4.88	0.09	0.15
to non-work	1.88	0.15	0.25
from non-work	1.79	0.14	0.23
total	13.50	0.31	0.51
home to work (pre-pass)	4.94	0.07	0.12
work to home	4.93	0.07	0.12
non-work	2.34	0.19	0.31
total	12.21	0.22	0.36
July Passbuyer			
home to work (current)	4.70	0.06	0.10
work to home	4.63	0.06	0.10
to non-work	1.72	0.08	0.13
from non-work	1.69	0.18	0.13
total	12.74	0.18	0.30
home to work (pre-pass)	4.58	0.06	0.10
work to home	4.52	0.07	0.12
non-work	2.58	0.13	0.21
total	11.68	0.16	0.26
May On-board			
home to work	2.72	0.05	0.08
work to home	2.54	0.05	0.08
to non-work	1.44	0.03	0.05
from non-work	1.40	0.03	0.03
total	8.10	0.12	0.20

APPENDIX C - WEIGHTING PROCEDURE TO CORRECT FOR TRIP FREQUENCY BIAS

In order to correct for a sampling bias (related to respondent trip frequencies) inherent in on-board surveys, a statistical weighting procedure was applied to the results of the May on-board and November telephone follow-up surveys in the Cincinnati evaluation. The weighting factor, as discussed by Larry Doxsey ("Trip Frequency Bias in On-Board Surveys", TSC, January 1983), has the following form:

$$w_i = \frac{n}{f_i \sum_{i=1}^{n} 1/f_i}$$

This factor was applied as follows. The term $1/f_i$ is called the inverse transit travel frequency, or ITTF. The weight w_i can thus be expressed as the ITTF for individuals i divided by the average ITTF for the sample, or:

$$w_i = \frac{1/f_i}{1/n \sum 1/f_i} = \frac{ITTF_i}{\overline{ITTF}}$$

The variable ITTF was then defined (in an SAS run), the mean value for the sample was calculated, and then, in a second pass, a weighting variable was computed and applied by dividing the ITTF variable for each respondent by the constant (sample mean).

Appendix D - On-Board Operational Measurement Procedure

Special on-board measurements were undertaken on three occasions (all in 1982): June 24-28, August 17-20, and November 9-12. In each case, observations were made at predetermined stops on ten routes (the same routes were used each time). The routes were selected (by Multisystems, in consultation with Queen City Metro) so as to provide a wide distribution of geographical orientations, overall usage levels, and percentages of pass use. Run assignments on each route were assigned so as to provide good temporal distribution; between six and ten runs were selected for each route (except for the lone express route, on which two runs were selected).

On each occasion trained observers were given run assignments and instructed to complete one line of the data sheet (see Exhibit D-1) for each stop indicated on the sheet. The observers were provided stopwatches to measure the total boarding time at each stop (i.e., the time from which the first person stepped onto the bus, until the door was closed behind the last boarder). In addition to the boarding time, the observer recorded the approximate number of passengers already on the bus, the number of boarders within each fare payment category, and a code indicating any "unusual" boarding activity (e.g., "passenger fumbles with packages to get fare" or "elderly, slow-moving passenger"). The three measurement periods produced the following numbers of completed observations (i.e., stops): June - 284, August - 444, November - 523. The differences in the numbers are attributable to incomplete observations due to the bus breakdowns, missed observer assignments, or other problems.

QUEEN CITY METRO BOARDING MEASUREMENTS

ROUTE NO._____ DESTINATION_____ DAY_____ DATE_____

SCHEDULED RUN TIME: Begin_____ End_____ ACTUAL RUN TIME: Begin_____ End___

WEATHER: Rain___ Cold___ Hot___ Overcast___ OBSERVER_____

Bus Stop	Number on Bus (Est.)	Boarding Time	Number Boarding According to Method of Payment								Unusual Boarding Code
			Cash	Metro Card	Fare Deal Card	Token	Token Cash Comb.	X-Fer	Student	Request Transfer	

Number on Bus Estimate:
- A. More than 20 standees
- B. 10-20 standees and all seats filled
- C. 0-10 standees and all seats filled
- D. 0-10 standees and seats available
- E. More than a third of the seats available

Unusual Boarding Code
- A. Passenger chats with driver
- B. Passenger asks driver question then does not board
- C. Passenger fumbles with packages to get fare
- D. Elderly, slow moving passanger
- E. Passenger with small children
- F. Passenger asks for route/fare info
- G. Other

APPENDIX E - PRICING RECOMMENDATIONS AND GUIDELINES

The methodology used by SG Associates to develop recommendations was based on the theory (discussed in Chapter 4) that individual passbuying decisions are based primarily on economic factors associated with savings over paying cash fares.

Basically, pre-pass purchase and current travel frequencies, as derived from the surveys,* were translated into individual benefit/cost ratios (based on the breakeven level of transit use at the existing pass price) to determine the extent of individuals' economic gain from buying a pass and hence their propensity to buy a pass. Using these figures and the relationship between trip frequency ranges and propensity to buy a pass, pass sale levels were estimated and revenue impact determined for each alternative price structure studied. The steps in this procedure are summarized in Exhibit E-1 (see SG's reports for a complete description). In July SG analyzed the implications of base pass prices between $19.40 and $24.00 (see Table E-1 for a summary of these alternatives). Their first recommendation was to set the base price at $22 (i.e., setting the breakeven level for transit use at 18.33 round trips per month), retaining the existing $4 increment for zone charges and express service; the alternative recommendation was a base price of $24 (i.e., retaining the same 20 round trip breakeven level as in the $20 pass). In either case, SG recommended that passes for Zones 5-8 be eliminated to simplify pass administrative procedures. Queen City Metro decided to set the base price at $24 -- beginning after a three-month discount period.

In their analysis, SG had predicted that a $4 drop in the pass price would result in pass sales on the order of 4900. The summer discount, which offered a $4 decrease from what the pass would cost at a 20 round trip breakeven level, eventually produced sales of 4655; thus, SG's prediction was only six percent off in that respect. However, SG had projected sales of only 2750 at a $24 base price; the actual post-discount level (i.e., at $24) was 4620, although it eventually stabilized around 3900.

---

* It should be noted that SG subjected the trip frequency data from the surveys to rather extensive editing because of their feeling that the response errors (discussed in Section 3.5.1) produced average trip frequencies that were unrealistically high. In doing this editing, however, it was necessary to make a number of assumptions regarding the accuracy of individual responses.

SG's final product - the Monthly Pass Pricing Guidelines Manual (May 27, 1983) - is a generalization of the procedures used in making the pricing recommendations discussed above. This manual provides a step-by-step approach to analyzing sales and revenue impacts of price modifications to transit pass programs. It also specifies possible goals for pass programs, types of data required, and problems which may be encountered with survey data.

PROCEDURE FOR ESTIMATING IMPACTS OF PRICING ALTERNATIVES
(as developed by SG Associates)

---

1. Determine the number of trips made by daily riders and develop appropriate breakdown. On-board surveys were used for this purpose.

2. Determine the number of trips made by passbuyers before and after buying the pass. Both the passbuyer and on-board surveys were used for this purpose.

3. Develop relationship between number of trips per week taken and propensity to buy pass. Trips taken before pass purchase are used to avoid including induced trips in revenue loss calculations.

4. Develop relationship between benefit/cost ratio of pass purchase and propensity to buy pass. Benefit/cost ratio is calculated by dividing the number of monthly trips taken (weekly trips x 4.1) by 40.

5. Market is segmented by number of weekly trips taken. Means are calculated for multiple trip categories.

6. Trips are split into peak and off-peak. All trips up to ten are considered peak; trips above ten are considered off-peak.

7. Trips are multiplied by cash fare to obtain monthly cash fare which rider would pay.

8. Divide the cash fare by the pass price to obtain the benefit/cost ratio for the riders in each category.

9. Use the benefit/cost ratio to determine the percentage of riders in each category buying a pass. Pass sales are calculated for each trip category and summed together to obtain the total number of new passes sold.

10. To determine the revenue lost from persons switching to passes from cash fare, subtract the pass price from the cash fare and multiple by the number of new buyers. Revenue change in all groups is summed to obtain net revenue change from new pass users.

11. Determine the nature of additional revenue change. Additional revenue change results from change in the price paid by passbuyers. At a particular price, there is some loss from passbuyers who would have been willing to pay a higher price. However, there is also some gain at that lower price from passbuyers who would have left the system if they had to pay a higher price.

12. To obtain total revenue change, the revenue change from new pass users (step ten) and revenue change from existing passbuyers (step 11) are added together to obtain net revenue change.

EXHIBIT E-1

TABLE E-1 COMPARISON OF PASS PRICING ALTERNATIVES

Base Pass Price	Monthly Pass Sales	Pass Sales/Adult Peak Riders	Monthly Net Revenue Change	Revenue Change/ Total Revenue	Number of New Pass Buyers Required to Compensate for Revenue Loss*	Number of Additional Trips Taken due To Pass Sales**
$19.50	5,150	.29	-$21,500	-1.7%	1,100	13,500
$20.00	4,900	.28	-$18,000	-1.4%	900	12,800
$21.00	4,500	.26	-$12,500	-1.0%	595	9,200
$22.00	3,900	.22	-$ 7,000	-0.5%	320	6,500
$23.00	3,100	.18	-$ 2,000	-0.2%	90	2,500
$24.00	2,750	.16	BASE	BASE	---	BASE

*New passbuyers refers to persons not currently using the system.

**These are one-way trips which would not be taken at a $24 pass price.

Source: SG Associates, Technical Report #1 - Phase I Pass Pricing Documentation, August 26, 1983, p.44.

APPENDIX F - CALCULATION OF REVENUE LOSS

The following summarizes the procedure used in estimating the average revenue lost per passbuyer - through pass use in general, as well as through the summer discount.

A. General Pass Use

1) Based on the combined retrospective trip frequency questions on the May and July passbuyer surveys (only respondents who had purchased MetroCard before the beginning of the discount), it was found that, before buying MetroCard, respondents made an average of 12.0 one-way trips per week (9.3 work and 2.7 non-work).

2) The average pass price paid by these respondents was determined to be $21.14. Using average peak and off-peak cash fares (before the price increase) of $.53 and $.43* and the above breakdown of work and non-work trips (assuming that the former represent predominantly peak and the latter predominantly off-peak trips), it was determined that passbuyers paid an average of $24.97 per month before buying MetroCard.

3) Subtracting the average price paid ($21.14) from the average pre-pass transit expenditure ($24.97) yielded an estimated per passbuyer revenue loss of $3.83. This translates into a monthly average loss of approximately $12,700, or $254,000 for the entire demonstration.

B. Summer Discount

1) During the three-month summer discount period, the cash fares were $0.10 higher than the per trip cash equivalent of MetroCard. Using average peak and off-peak cash fares of $0.64 and $0.54 (based on the zonal distribution of pass purchases by all of the July survey respondents), and an average pre-pass trip rate of 11.7 (9.1 work, 2.6 non-work),** it is estimated that passbuyers would have paid an average of $29.64 per month if they had not bought MetroCard during the discount period.

2) Subtracting the average pass price paid during the discount period ($21.77) from $29.64 yields an estimated revenue loss of $7.87 per discount passbuyer (or $1.56 per passbuyer for the entire demonstration). This translates into a loss of $34,518 per month during the discount period, for a total of $103,553 (or $5,178 per month over the entire demonstration).

---

* These average fares were calculated based on the zonal distribution of passes purchased by the survey respondents.

** This rate is for all of the July survey respondents.

APPENDIX G - CALCULATION OF NEW TRANSIT REVENUES

A. Revenue generated by passbuyers who formerly made less than breakeven number of trips on transit.*

1) Based on the distribution of pre-MetroCard trip frequencies as reported in the May and July (only respondents who had begun buying MetroCard before the discount period) passbuyer surveys, it was determined that approximately ten percent of all passbuyers made fewer than ten one-way trips per week before buying MetroCard. The pre-MetroCard trip frequencies break out as follows:

No. Trips	% of Passbuyers	Difference from Breakeven Number	Increased Revenue/mo. Pre-Oct.+	Post-Oct.
0	0.2%	9.75	$28.50	$48.10
1	0.7	8.75	89.50	151.20
2	0.5	7.75	56.60	95.60
3	0.4	6.75	39.40	66.60
4	0.7	5.75	58.80	99.30
5	1.3	4.75	90.20	152.40
6	2.0	3.75	109.50	185.10
7	1.5	2.75	60.30	101.80
8	2.4	1.75	61.30	103.70
9	0.9	0.75	9.90	16.70
Total	10.6%	-	$604.00	$1,020.50

+In October, the pass price was raised by $4.

2) The increased revenue figures shown above were calculated as follows:

- pre-Oct: 2864 passes/mo. x $0.51 overall average cash fare equivalent x percent of passbuyers x difference.
- post-Oct: 4046 passes/mo. x $0.61 average cash fare equivalent x percent of passbuyers x difference.

3. The total revenue generated in this fashion was calculated as follows: ($604/mo. x 12 mos.) + ($1,021/mo. x 8 mos.) = $15,416.

* The breakeven number of trips for a pass is 9.75 one-way trips per week.

B. Revenue generated by riders (who would not otherwise have used transit) accompanying pass users.

1) Based on the combined responses to the May and July passbuyer surveys, it was determined that non-transit riders accompanied the average pass user on 2.6 trips per month. (Because the survey did not request the number of persons accompanying passbuyers, this procedure assumes a single passenger per trip.)

2) The inreased revenue figures were calculated as follows:

- pre-Oct.: 2864 x $0.51 x 2.6 x 12 = $45,572
- post-Oct.: 4046 x $0.61 x 2.6 x 8 = $51,336
- total: $96,908

APPENDIX H - CALCULATION OF REVENUE FROM IMPROVED CASH FLOW

1) Using a breakdown of daily pass sales from June 1982, the following distribution of purchases was developed:

Dates during which passes sold	Average % sold	Relative interest rate	Interest per pass sold	Relative number of passes	Interest gained per month
before 20th	9%	0.69%	$0.16	299	$47.80
20-25th	17%	0.56	0.13	564	73.30
26-30th	53%	0.42	0.10	1758	175.90
2-5th	14%	0.27	0.06	465	27.90
5-15th	7%	0.14	0.03	232	7.00
Total	100%	-	-	3318	$331.90

2) The relative interest rates shown in the table are based on an annual interest rate of ten percent (0.83%/mo.); each interest rate shown is based on the amount of time receipts are deposited before the 15th of the month in which the passes are valid - e.g., for before the 20th, (50%+ 33%) x 0.83% = 0.69%.

3) The interest per pass sold was calculated by multiplying the average monthly price paid per pass ($23.25) by the relative interest rate (e.g., $23.25 x 0.69% = $0.16 per pass).

4) The relative numbers of passes were calculated by multiplying the average number of passes sold per month (3,318) by the average percentage of passes sold for each category (e.g., 3,318 x 9% = 299).

5) The interest gained per month was calculated by multiplying the interest per pass sold by the relative number of passes for each category (e.g., $0.16 x 299 = $47.80). The total revenue gained was then calculated: $332/mo x 20 mos. = $6640.

APPENDIX I - BOARDING TIME MULTIPLE REGRESSION MODEL AND RESULTS

A multiple linear regression model was used to determine the relationship between boarding time and type of fare payment, as discussed in Chapter 5. A stepwise backward elimination procedure was used first, to identify the significant independent variables; these variables were then included in he final model. The variables used were as follows:

- NOMCARD = number of persons boarding using MetroCard
- NOFAREDL = number of persons boarding using Fare Deal cards
- CROWDED = an indication of the load factor of the bus (i.e., whether it had persons standing when it arrived at the stop)
- NOSTUPAS = number of persons boarding using student passes
- NOCC = number of persons boarding using cash or a combination of cash and tokens
- NOTT = number of persons boarding using transfers or tokens
- NOREQTFR = number of persons boarding requesting a transfer

The model tested was of the general form

$$y = b_o + b_1x_1 + b_2x_2 + b_3x_3 \ . \ . \ .$$

where y = BOARDTIM = the total boarding time at a stop, and

x_i = NOMCARD, x_2 = NOFAREDL, x_3 = CROWDED, etc.;

b_o = the intercept, and b_1, b_2, etc. represent the coefficients which we sought to determine.

These coefficients represent the relative weights of each of the independent variables. The coefficients for each of the fare payment categories (all expect CROWDED AND NOREQTFR) indicated the average number of seconds it took for each person using that particular fare payment method to board (under non-crowded conditions and assuming that the person boarding did not request a transfer).

The model was tested first using data from all bus stops recorded, and then using only those stops at which at least one MetroCard user boarded (31 percent of all stops). The results of the first model are as follows:

VARIABLE	DF	COEFFICIENT	STANDARD ERROR	T FOR HO: PARAMETER	PROB> |T|
INTERCEP	1	3.41	0.30	11.32	0.0001
NOMCARD	1	2.35	0.29	8.11	0.0001
NOFAREDL	1	1.94	0.32	6.05	0.0001
CROWDED	1	-0.03	0.57	-0.05	0.9580
NOSTUPAS	1	3.25	0.36	9.03	0.0001
NOCC	1	1.78	0.09	19.34	0.0001
NOTT	1	2.65	0.15	17.89	0.0001
NOREQTFR	1	0.51	0.23	2.24	0.0251

$r^2 = 0.56$ F value = 184.44 Prob> F = 0.0001

To test the significance of the results, an F-test was applied, compring the coefficients for NOMCARD and NOCC. This test revealed that the difference between the two coefficients was significant at a confidence interval of 92.5 percent.

The results of the second model (i.e., using only stops at which at least one MetroCard user boarded) are as follows:

VARIABLE	DF	COEFFICIENT	STANDARD ERROR	T FOR HO: PARAMETER	PROB> |T|
INTERCEP	1	1.59	1.04	1.53	0.1274
NOMCARD	1	2.76	0.70	3.95	0.0001
NOFAREDL	1	4.95	0.83	5.94	0.0001
CROWDED	1	0.24	1.14	0.21	0.8340
NOSTUPAS	1	1.99	0.72	2.77	0.0059
NOCC	1	1.92	0.16	11.64	0.0001
NOTT	1	2.66	0.25	10.46	0.0001
NOREQTFR	1	0.66	0.57	1.16	0.2464

$r^2 = 0.64$ F value = 77.85 Prob> F = 0.0001

When an F-test was applied, the coefficients for NOMCARD and NOCC were found to be different at a confidence interval of 74.5 percent.