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Evaluation of the July 1980 Mercer Metro (Trenton, NJ) Fare Increase

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16. Abstract

This report evaluates certain effects of a July 1980 fare increase on Mercer Metro ridership. The evaluation addresses aggregate ridership change as well as effects on individual transit user groups.

The scope of this analysis was governed by a set of cross-tabulations derived from the original survey data. More extensive analysis would be possible with a more complete compilation of information contained in the original surveys.

The ability to draw definitive conclusions about the influence of the fare hike was also inhibited by the influence of a gasoline crisis and high gasoline prices around the time of the fare increase.

It appears, however, that the presence of high gas prices did not fully offset ridership losses brought on by the fare increase. Price-demand elasticity estimates appear to be slightly lower than would otherwise be expected, although the sample size on which these estimates are based is relatively small.

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PREFACE

The preparation of this report has been financed through a grant from the U.S. Department of Transportation, under the Urban Mass Transportation Act of 1964, as amended. The contents of this report were prepared by Multisystems, Inc. and do not necessarily reflect the official views or policies of the U.S. Department of Transportation or the Urban Mass Transportation Administration.

This report was prepared by Multisystems, Inc. The author is F. Brian Day. Technical and editorial input was received from Larry Doxsey of the Transportation Systems Center and John Attanucci of Multisystems. In addition, Tom Batz of New Jersey DOT and Roland Quigley and Ed Meany of Mercer Metro were of assistance in obtaining ridership data, fare information, and other facts concerning the original survey. The author expresses his appreciation to each of these individuals.

METRIC CONVERSION FACTORS

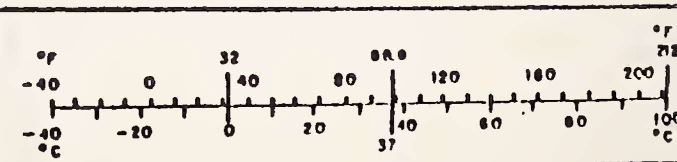
Approximate Conversions to Metric Measures

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 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights 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	35	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



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PART 1: INTRODUCTION AND BACKGROUND

1.1 ROLE OF FARE POLICIES

The decade of the 1970's was one of flux for the transit industry. Spurred by escalating operating costs and declining ridership, most transit systems shifted from private to public ownership. At the same time, federal operating assistance programs, established to preserve public transportation mobility, enabled transit systems to modernize and expand their services and stabilize fares. In some cities, declining ridership trends were reversed, and throughout the country, new state and local funding programs emerged.

At certain locations, fares were reduced or eliminated during the off-peak in attempts to bolster ridership. Trenton (NJ) and Denver (CO) were two cities that entered into "free-fare" experiments.

But on most transit systems, operating costs rose unchecked during the 1970's due to several factors. Transit labor wage settlements with so-called COLA's (or cost-of-living agreements) were pegged to keep pace with a high rate of inflation; and intermittent shocks to the U.S. energy supply hiked diesel fuel prices and ensured an escalation of bus operating costs.

As transit systems entered the 1980's, operating subsidies had risen to their highest levels ever, creating pressures on operators to cut costs and close the widening gap between revenues and expenses. Mercer Metro was one of many operators who chose to raise fares to close this gap, rather than cut back services, reduce service levels, or replace conventional bus transit with innovative paratransit operations in low-productivity sectors of their service areas.

Even as fare increases have been more frequently used as one means of balancing transit service budgets, the data and documented experience that are available for guidance in predicting the effects of fare increases on riders and revenues are relatively limited. Since fare increase effects can best be predicted by reviewing such experiences, it is important that those experiences be described and documented. In this way, transit management can make better decisions with improved revenue, ridership loss, and equity impact trade-off information on which to base those decisions.

It is for this reason that this report on the 1980 Mercer Metro (Trenton, NJ) fare increase is prepared.

1.2 MERCER METRO CHARACTERISTICS

Mercer Metro was established in 1969 as part of the Mercer County Improvement Authority; Metro is the principal supplier of fixed route bus transit service in Mercer County and the City of Trenton. It is a publicly-owned and -operated agency that is supported by subsidies from the State of New Jersey (through the Commuter Operating Agency), the federal government, and the county.

At the time of the fare increase evaluated in this report, Mercer Metro had the operating and service characteristics given in Table 1-1. These characteristics convey a picture of a small-to-medium size transit property with 16 routes (11 regular, 5 special or express) and 70 peak period buses.

Peak period headways averaged roughly 30 minutes over all 16 routes, constituting a low- to modest-level peak service in comparison to other more transit-intensive cities. Three of the 16 routes operated by Mercer Metro serve out-of-county destinations and could be viewed as express services (Fort Dix-McGuire, Asbury Park; and N.J. North Shore resorts.) However, only passengers on local service routes were included in the surveys taken before and after the fare change, and observations and conclusions about the fare increase are based on these routes only.

No service changes accompanied the July 1980 fare increase.

1.3 DATA AND INFORMATION SOURCES

The impacts of the fare increase on Mercer Metro ridership are assessed based on a selected set of cross-tabulations compiled by Zebe (1) for the U.S. Department of Transportation, Transportation Systems Center. The cross-tabulations were formed based on three sets of variables:

TABLE 1-1. OPERATING AND SERVICE CHARACTERISTICS OF MERCER METRO (July 1980)

FLEET CHARACTERISTICS		
	Total buses:	96
	Peak buses:	70
	Base period buses:	45
FARE POLICIES		
	Fare structure:	40 cents, flat fare
	Transfer payment:	5 cents
	Off-peak fares:	20 cents, for E&H only
	Shuttle service:	10 cents 5 cents (E&H) Sat., Sun., Holidays and after 7 p.m. (9:30 a.m.- 4:00 p.m.)
	Passes:	None
SERVICES		
	Routes (total):	16 (11 regular)
RIDERSHIP AND SERVICE UTILIZATION		
	Weekday trips:	23,000
	Peak period:	68% of total daily trips
	Mid-day:	26% of total daily trips
	Evening:	6% of total daily trips
	Work trips:	49% of total annual trips
	Shopping:	17% of total annual trips
	School:	14% of total annual trips
	Other:	20% of total annual trips
Average Trip Length:	2.5 miles (peak) 3.2 miles (off-peak)	
System-wide cost:	$0.72 per passenger	
System-wide revenue:	$0.29 per passenger	
Subsidy:	$0.43 per passenger	

Source: Mercer Metro

1. <u>Socio-economic characteristics</u>

   a. Sex
   b. Age
   c. Family
   d. Household income
   e. Number of autos

2. <u>Trip purpose categories</u>

   a. Commute
   b. Non-commute
   c. Total

3. <u>Attitudinal/opinion variables</u>

   a. Bus arriving on time
   b. Amount of fare
   c. Seat availability
   d. Bus frequency
   e. Reason for change in non-commute travel

(Issues relating to changed perceptions of service and attitudinal/opinion variables are not discussed in this report, although data about responses from the survey panel are contained in the tabulations cited above in Zebe (1)).

In addition to cross-sectional 'tabs', time series data were used to assess how ridership and revenues were affected by the July 1980 fare increase and certain exogenous influences that existed at the time of the fare increase.

To evaluate the impacts of the July 1980 fare increase, Mercer Metro relied solely on revenue-based ridership estimates, using a conversion formula developed for that purpose. No actual counts of passengers were conducted during the time immediately before and after the fare change data were made available for analysis of individual routes.

System-wide revenue and ridership information was supplemented by data obtained from a retrospective survey of Mercer Metro users. The survey was conducted in three parts:

1. an on-board survey to obtain some basic demographic data on ridership and to solicit rider willingness in participating in a more comprehensive phone survey prior to the fare hike;

2. a phone survey of those expressing such willingness, to obtain more detailed demographic data, relevant travel habits, and perceptions of service; and

3. a phone survey after the fare hike to poll the respondents of the second survey about changes in travel habits and perceptions about service.

The first (on-board) survey was conducted between May 28 and June 6, 1980, roughly one month prior to when the fare hike from 40 to 50 cents was set in place. Survey forms were distributed to all boardings on all days except Sundays. Of the 7,617 forms handed out, Mercer Metro received 3,949 returns; however, only 1,394 of the returns indicated a willingness to participate in the more detailed "before" survey by providing a phone number.

This second survey was conducted between June 10 and June 30 and yielded 918 responses. Nearly 500 of the original pool of 1,394 riders volunteering to participate were not included in this survey. It is likely that the decision to contact survey respondents only on weekends (and not, for example, on weekday nights) severely reduced the survey team's probability of making contact over the relatively short survey period. By this self-imposed limit, only 6 days were allocated for actual contact, a result that partially explains why such a significant portion of the willing respondents were not surveyed.

The third and final survey in the exercise (the "after" survey) was conducted on 18 days over a 2.5-month period between August 26 and November 14. A majority of respondents was contacted in the early part of the survey period. This survey yielded 711 responses, down 207 from the preceding survey, although the data tabulations in Zebe (1) indicate that the sample of valid responses was ultimately narrowed, still further, to 538. Conclusions derived from information from these surveys are thus based on a 7 percent sample of the original 7,617 riders given survey forms. This low return rate constitutes a likely major source of bias of the information available for study.

Two other potential biases in the survey procedure are also apparent. First, because the surveys were conducted during late spring and summer, many potential survey respondents may have been underrepresented. This group would, for example, include students and vacationers, who could have missed receiving a survey form in the first case or could have been unreachable for the second or third surveys. Inclusion of these groups in the survey would likely have constituted a sample more representative of year-round Metro ridership than was actually obtained.

A second potential bias of results is that knowledge about when individual respondents were surveyed is not available in the available tabulations (1), even though that information was originally noted. Thus, the tabulations do not make it possible to distinguish between immediate responses from the final (after) survey--say, those collected in August or early September--from those responses obtained from other riders in October or November, a full two or three months after the fare increase. Both types of responses constitute valid and useful information for interpreting ridership reaction to a fare change, but it can be important to compare the two. For example, ridership reaction to a fare increase is nearly always negative, more so immediately following the change. But, while most riders' negative reactions to the added cost will soften over time, some riders will ultimately switch to auto travel for all (or some) of their trip-making, while continuing to use buses in the short term.

There are, therefore, some important limitations of data, including those related to accuracy of revenue-based ridership, the ultimate survey sample size, and certain potential biases in the way the survey was executed. Notwithstanding these limitations, the data that provide insights about both aggregate and disaggregate ridership behavior in response to the fare change.

Table 1-2 indicates whether or not selected data collected by the survey enable a 95%-level confidence of correlation to be established between responses and the various socio-economic groups. Among the selected factors shown, 16 of 35 pairings meet this standard. The reader can refer back to this table as points concerning impacts on various groups of users are discussed in later parts of this report. Keep in mind, however, that the table assists in identifying correlations that are particularly strong, but not ones that are particularly weak or those slightly shy of the 95% confidence level. Only 7 of 28 pairings met the 95% standard among the "perception of service" indicators and, as mentioned earlier, are not addressed further in this report.

1.4 MERCER METRO FARE HISTORY

Because fare policy changes represent 'shocks' (minor or otherwise) to service patrons, those changes can have different effects, depending on whether they are spaced or follow closely, not allowing a period of rider acclimation to one change to be played out before the next change is introduced. Differences in effect may be evident even if fare increases are equivalent in size, relatively or absolutely.

In the case of Mercer Metro, there was a relatively stable fare history from its inception in 1969 until 1979, when a free off-peak fare demonstration took place. The diagram of Figure 1-1 summarizes the metro fare history germane to analysis of the July 1980 fare increase.

TABLE 1-2. DEGREE OF CORRELATION BETWEEN SURVEY RESPONSES AND SOCIO-ECONOMIC CHARACTERISTICS

Statistically Significant Correlation at 95% Confidence:

	Income	Auto Ownership	Age	Sex	Household Size
Reason for Increase in Non-commute travel	No	No	Yes	Yes	No
Reason for Decrease in Non-commute travel	Yes	Yes	Yes	Yes	Yes
Decrease in Commute travel	Yes	No	No	No	No
Change in Perceived Service Frequency	No	No	Yes	No	Yes
Change in Perceived On-Time Arrivals	No	No	Yes	No	Yes
Change in Perceived Seat Availability	No	No	Yes	Yes	No
Satisfaction with Fare Level (Before)	No	No	Yes	Yes	No

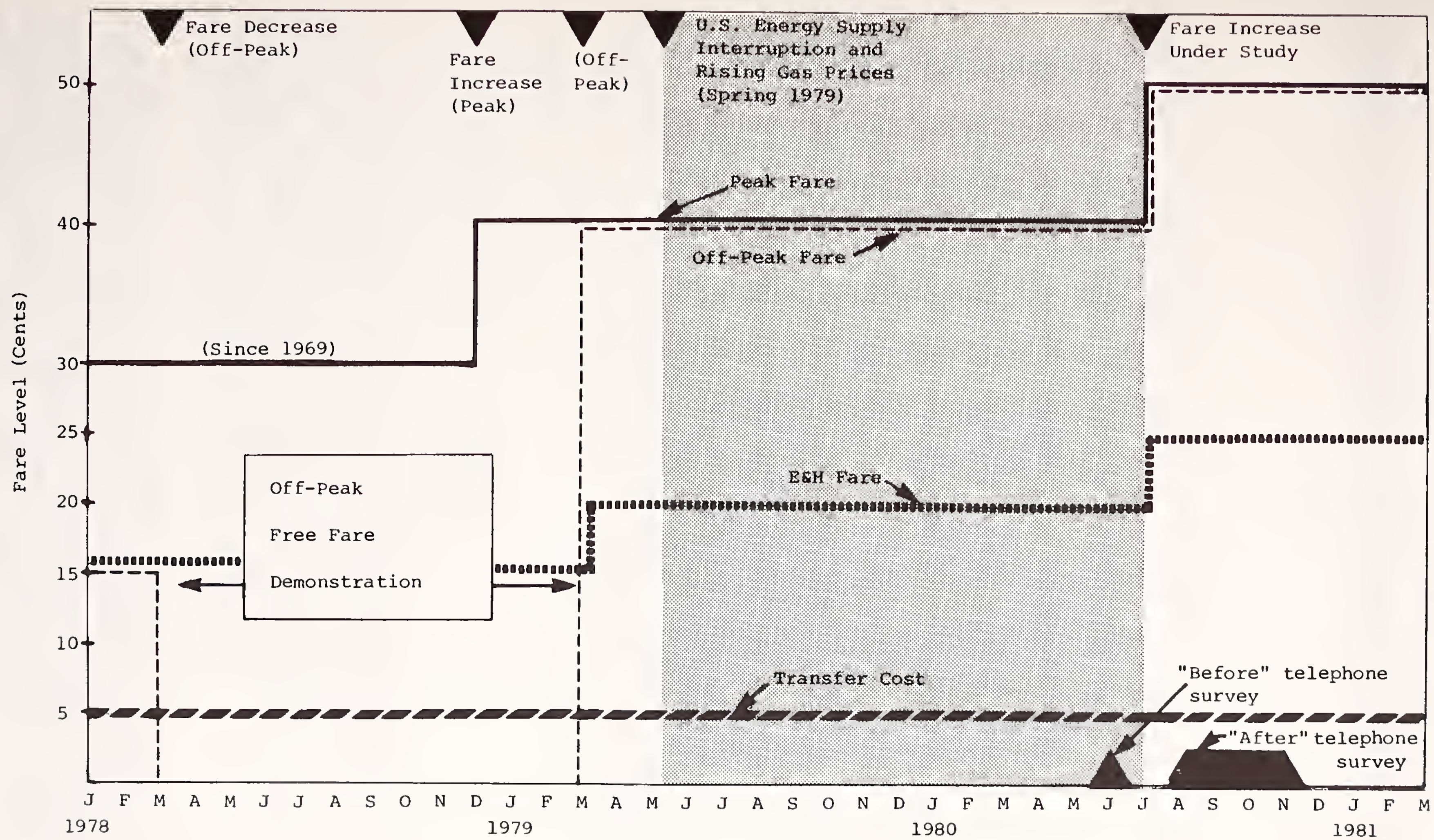
In December of 1978, near the end of the free fare demonstration, the base (peak) fare was raised from the 30-cent level, which had been in place since 1969, to 40-cents. At the end of the demonstration, off-peak fares also rose to the 40-cent standard fare. Elderly and handicapped (E&H) riders continued to be charged only "half fare", a policy established some time earlier. The E&H charge thus rose from 15 to 20-cents for all E&H users after the free-fare demonstration concluded. Prior to the free-fare demonstration, all off-peak riders, including E&H riders, rode for one-half fare.

It is noteworthy that Mercer Metro had always maintained a 5-cent transfer cost since the operating agency was founded. This transfer level was retained beyond the July 1980 fare increase, but is at a 20-cent level today.

Aside from the special off-peak and E&H fares, and a few out-of-county and seasonal routes on which a zone fare structure was applied, then, Mercer Metro operated a flat fare system. No monthly pass program has ever been implemented by Mercer Metro, so that shifts in the form of payment (cash vs. pass) caused by the fare hike were not an issue to be studied as part of the July 1980 fare increase evaluation.

1.5 ORGANIZATION OF THE REPORT

The evaluation of the impacts of the July 1980 fare increase is given in the following four parts of this report. Effects on ridership and revenues are the subject of Part 2; impacts on serving utilization and transit trip frequency are discussed in Part 3; and impacts on separate user groups are the subject of Part 4. The report closes with a brief summary of findings.



(Note: Since the end of the period shown here, Mercer Metro fares have risen twice: from $0.50 to $0.60 (July 1981), and $0.60 to $0.70 (July 1982); and transfer costs rose from $0.05 to $0.10, and $0.10 to $0.20 at the same times.)

FIGURE 1-1 FARE HISTORY FOR MERCER METRO (1978-1980)

PART 2: EFFECTS ON RIDERSHIP AND REVENUE

This part of the report analyzes the effects of the July 1980 fare increase on Mercer Metro system-wide ridership and revenue. Trip frequency, trip purpose and fare elasticities are among the other subjects addressed.

The analysis of ridership behavior in response to the fare change is complicated by the influence of rising gasoline prices experienced in the months immediately preceding the July 1980 fare increase. To adjust for this factor, an attempt is made to estimate the ridership changes that might reasonably have been expected as a result of the energy crisis alone, without a fare increase. A comparison is then made between this hypothetical scenario and observed ridership behavior and service utilization. Ultimately, an estimate is made about what the "revenue gained per rider lost" was as a result of the fare change over the year following that change.

It is emphasized that the Mercer Metro 1980 fare increase constitutes a somewhat special case because of its timing relative to the gas crisis, and, as a result, the conclusions of this report and their transferability must be cautiously assessed.

2.1 SYSTEM RIDERSHIP CHANGES

Under typical circumstances it is a straightforward matter to extrapolate recent transit ridership patterns beyond the date of a fare increase to estimate what the ridership would likely have been without a fare change. Actual ridership can then be compared to projected ridership to arrive at a fairly confident judgment about whether transit ridership was meaningfully affected by a fare hike.

In the case at hand, however, several closely-spaced events potentially altered ridership behavior and growth rates in the years and months immediately preceding and following the July 1980 fare increase. Some of these events appear to have had only a temporary impact, while, for others, effects likely were carried through the time of the fare hike and beyond. These events included:

1. The introduction and termination of a year-long off-peak free-fare demonstration (March 1978 through March 1979).

2. The U.S. energy supply interruption in the Spring of 1979.

3. Continually rising gasoline prices beginning in the Spring of 1979 and lasting until after July 1980.

Mercer Metro ridership in the context of these events is shown in Table 2-1 and Figure 2-1, while the corresponding revenue history is plotted in Figure 2-2. The history indicates that 1977 was the last year of relative stability before the 1980 fare increase. In 1978, the off-peak free-fare demonstration was in effect and a peak period fare increase (the first one ever at Mercer Metro) was introduced in December of that year. Within a month or so of the free-fare demonstration ending, and within about four months of the December 1979 fare hike, the Spring 1978 energy crunch hit, with gas prices rising steadily over at least the following 17 months, beyond July 1980.

Even though gasoline price control and supply allocation policies existed until January 28, 1981, the gasoline Consumer Price Index rose from about 250.0 in April of 1979 (when the crisis hit) to 334.6 in January 1980, and still higher to a peak of 376.7 in July of 1980--coincident with the month of the fare increase under study. Thereafter, the gasoline Consumer Price Index leveled off at about 370 for a number of months, keeping gasoline prices relatively constant--although at higher-than-ever levels--during the period when rider reaction to the July 1980 fare change would have been observed.

The use of automobile entailed other costs, which also influenced long- and short-term mode choice decisions: time spent in gasoline station queues, travel schedules dictated by early station closings, and uncertainty of fuel availability week-to-week were major non-out-of-pocket "costs" that had to be shouldered by those travelers continuing to use the automobile or those deciding to switch from transit to auto in the face of the fare increase. Even though uncapped gasoline price rises ultimately tended to clear the market demand for gasoline and keep gas lines short as the shortfall progressed into 1980, the uncertainty associated with continued dependency on auto use did not subside as quickly.

While lines at the pump early in the crisis were not uniformly experienced within states or across the country, the New York and New Jersey urbanized areas were much more acutely hit than most others, and wide national and local media coverage was given to the problems experienced in those regions.

TABLE 2-1. MERCER METRO MONTHLY PASSENGER ESTIMATES--REVENUE BASED (1977-1981)

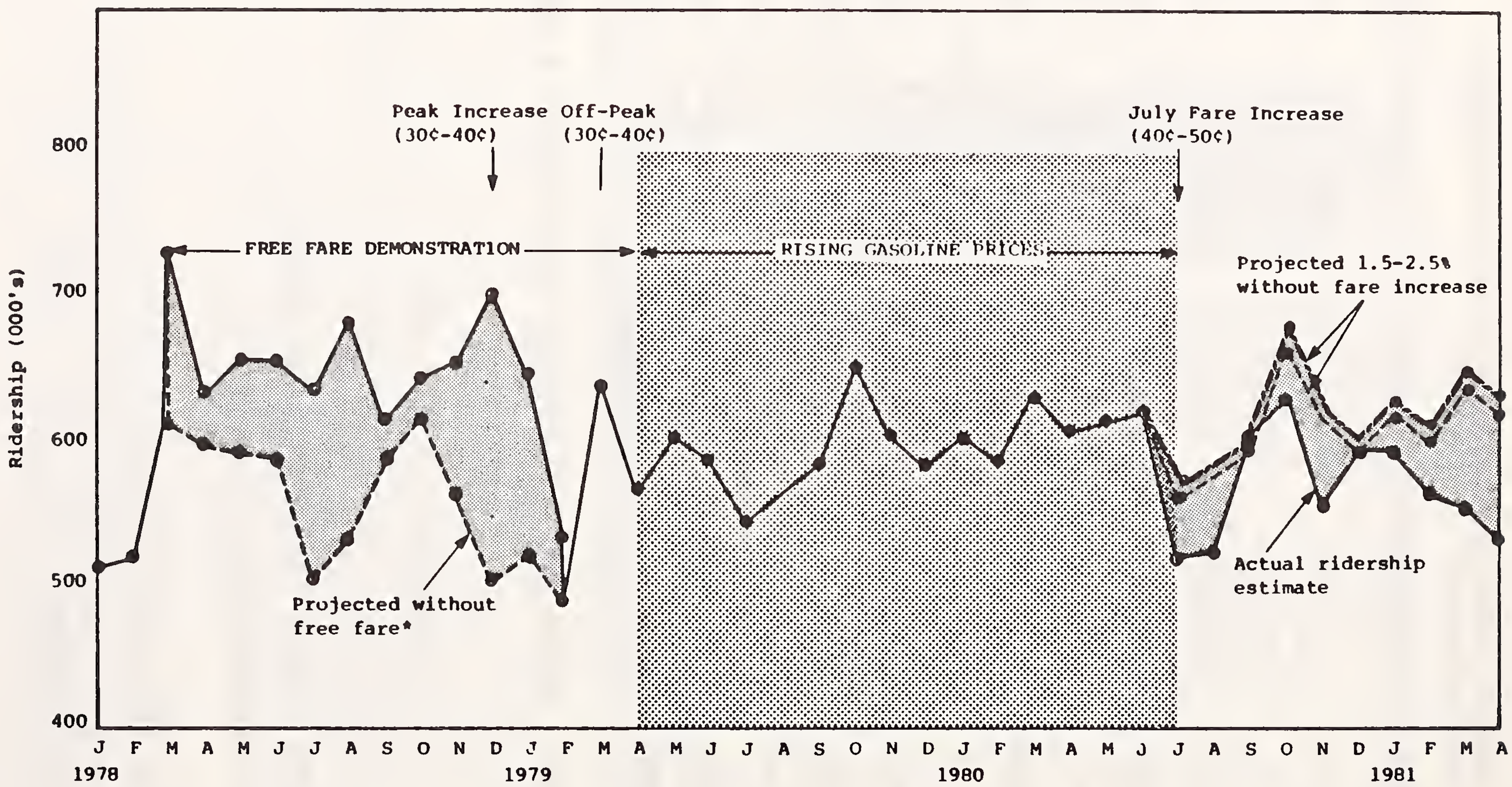
MONTH	1977	1978	1979	1980	1981
JANUARY	524,800	511,000	518,988	606,498	595,057
FEBRUARY	504,400	518,500	483,668	587,595	568,405
MARCH	596,600	613,400	641,821	631,826	655,260
APRIL	526,700	595,300	565,602	611,178	635,112
MAY	551,600	591,700	600,647	616,960	600,287
JUNE	535,700	586,800	591,894	574,741	593,098
JULY	547,700	504,500	549,138	524,088*	526,240*
AUGUST	532,000	530,700	565,529	525,261	502,183
SEPTEMBER	566,600	591,500	583,054	609,880	565,138
OCTOBER	570,700	614,300	652,252	632,721	599,955
NOVEMBER	529,100	565,400	605,084	556,128	522,775
DECEMBER	540,900	504,100*	581,661	597,767	556,612
Totals:	6,526,800	5,745,200	6,939,338	7,074,643	6,920,122
Including "free fare" passengers:		(7,629,200)	(7,113,982)	--	--

* Month during which a fare increase took effect.

Free-fare demonstration period

Escalating fuel price period

Panel survey period



*Assumes 2.3% annual growth

FIGURE 2-1. MERCER METRO RIDERSHIP TRENDS--1978 THROUGH 1980/81

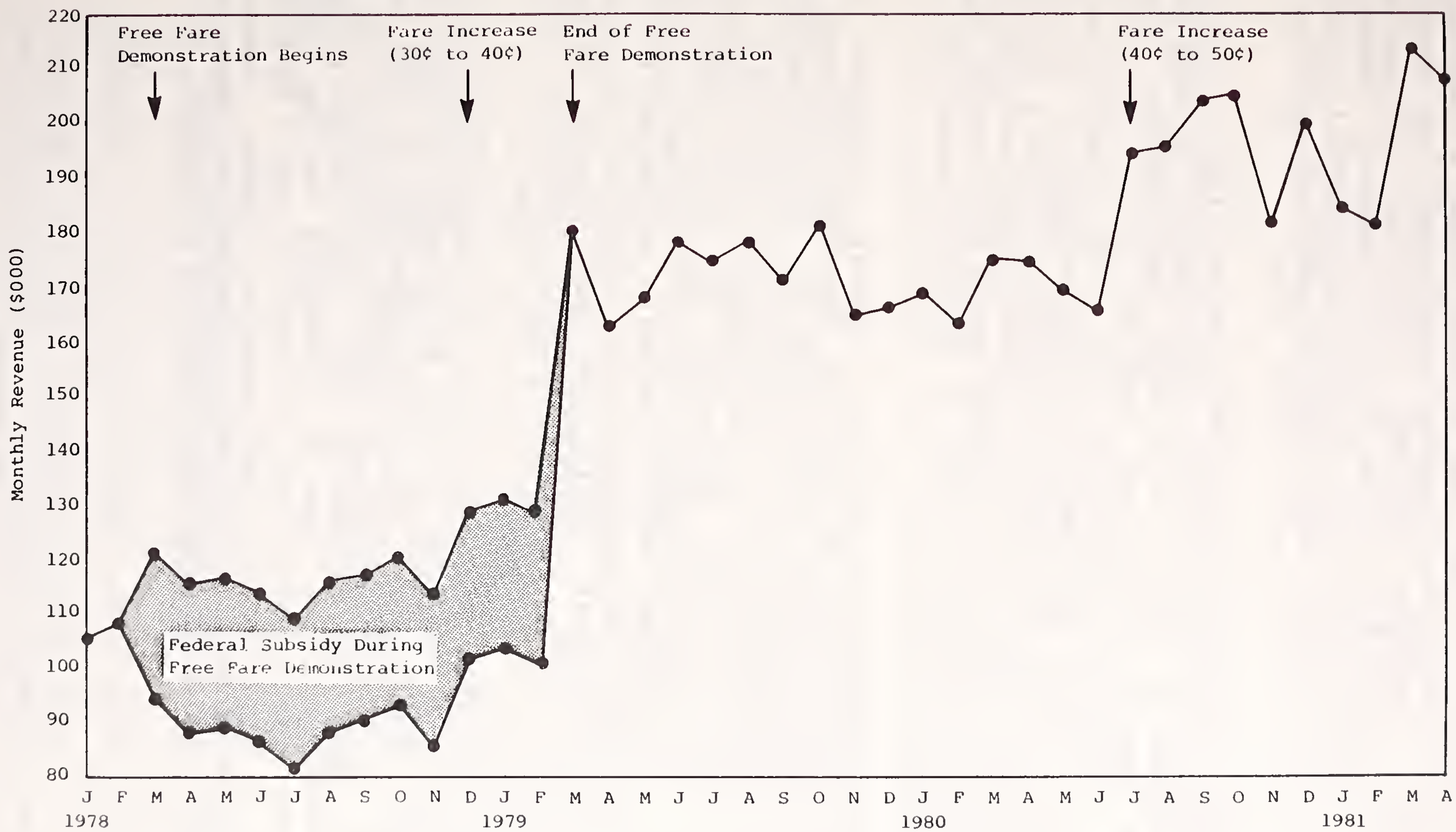


FIGURE 2-2. MERCER COUNTY MONTHLY REVENUES

At the time of the 1980 fare increase, then, it is clear that large segments of the Mercer Metro travel market and other regional travelers may have contrasted the dime additional fare against then-continuing precipitous increases in gasoline price (rising from 60 cents to the $1.20-level over a matter of months) and supply uncertainty experienced over the previous 12-month period. Compared to the "one-time" 25 percent increase in the transit fare (from 40 to 50 cents), the price of gasoline (i.e., the operating cost of auto) steadily rose by roughly 75 to 100 percent, depending on location within the state, and did so on a much larger "base" price.

Considering this information, the loss of ridership due to the fare increase on Mercer Metro was likely to have been dampened contrasted to what would have taken place in the absence of the energy crisis and gasoline price escalation. Moreover, it might be expected that any transit trips (discretionary or other) dropped as a consequence of the fare increase would have been nullified in whole or in part by other travelers switching from auto to transit for economic or convenience reasons related to gasoline price and supply (e.g., no need to wait in gas lines, and no need to leave work to avoid early station closings).

The ridership figures of Table 2-1 appear to support this theory -- that the gasoline shortage and the fare increase had mutually offsetting effects on ridership during separate periods of the 1980 calendar year. Specifically, the data show that ridership increased over the same month of the preceding year in 4 of the 6 months preceding the July 1980 fare increase, when the gasoline prices were mid-stream in their 17-month rise. In contrast, Metro ridership decreased in 4 of the 6 months following the fare increase, compared to the same month in the preceding year. This loss in ridership occurred despite the fact that gasoline prices held at their highest-ever levels during that second half of 1980.

In aggregate terms, ridership rose by about 6.7% during the first half of 1980 compared to the first half of 1979, but dropped by 2.5% during the last half compared to the same period in 1979. The differential in growth rates for the two periods in 1980 was thus between 9% and 10%. There is some indication, therefore, that loss of ridership in the second half of 1980 was significantly smaller than it would have been in the absence of exceptionally high gasoline prices. However, only with a more extensive multi-variate analysis of these data could this general indication be more strongly confirmed.

2.2 RIDERSHIP LOSS AND REVENUE GAIN

Another perspective on the effects of the fare change on ridership is obtained by comparing what would likely have happened to ridership and revenues had there been no fare change to what actually did happen. Such an analysis requires three aspects of the fare increase impacts be examined: (1) an assessment of revenue gains; (2) an assessment of ridership loss; and (3) an "efficiency" indicator of estimated "ridership (trips) lost per revenue gain."

To establish a realistic range of these indicators' values, it can be assumed that, at minimum, ridership would have grown at roughly the rate observed during previous periods of relative fare stability.

DeLeuw-Cather, in its final report (2) on the off-peak free-fare transit demonstration, concluded that an annual ridership growth rate of roughly 2% was reasonable to assume in projecting ridership that would have occurred if the demonstration (March 1978 through March 1979) had not been introduced. This growth rate was arrived at based on the rates of growth observed during the preceding four years (1974-1977).

A comparison of actual and projected ridership and revenues assuming no fare increase is obtained using 1.5% and 2.5% growth rates as upper and lower bounds*. The resulting data are given in Table 2-2. Revenue projections for the period July 1980 through June 1981 are based on a derived "revenue per passenger" estimate from the 12 months immediately preceding the July 1980 fare increase ($0.287 per passenger).

The data indicate that somewhere between about 180,000 and 250,000 trips may have been lost in the 4 quarters following the fare hike; this would constitute a ridership loss of about 2.5% and 3.5% from what would likely have been observed had the fare increase not been imposed. The revenue gain that was realized despite this ridership loss, however, ranged between about $260,000 and $280,000, or about 12% to 13% greater than the revenues that would otherwise have been realized. It is estimated, therefore, that there may have been an increase in revenues of between 3.5 and 5.2% for each 1.0% loss in passengers.

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* It could be reasonably argued that a growth rate higher than 2.5% would have been observed at Mercer Metro, given that the gasoline prices were, on average, higher, and symptoms of the gas shortage were most acutely felt, in New Jersey compared to the rest of the country. By assuming the lower possible growth rates, the effects of the fare increase on ridership losses, as measured by "trips lost per revenue gained", tend to be overstated.

TABLE 2-2. ACTUAL VS. PROJECTED RIDERSHIP AND REVENUES

	With Fare Increase		Without Fare Increase			
	Actual		Projected at 1.5% Growth Rate		Projected at 2.5% Growth Rate	
	Ridership	Revenues	Ridership	Revenues	Ridership	Revenues
July 1980	524,088	$194,352	557,375	$ 159,967	562,866	$ 161,543
Aug	525,261	196,125	574,012	164,741	579,667	166,364
Sep	609,880	204,559	591,799	169,864	597,630	171,520
Oct	632,721	206,228	662,036	190,004	668,558	191,876
Nov	556,126	181,114	614,160	176,264	620,211	178,000
Dec	597,767	200,559	590,386	169,441	596,205	171,111
Jan 1981	595,057	184,420	615,595	176,676	621,660	178,416
Feb	568,405	181,321	596,409	171,169	602,285	172,856
Mar	655,260	213,109	641,303	184,054	647,622	185,868
Apr	635,112	207,936	620,346	178,039	626,457	179,793
May	600,287	194,023	626,214	179,723	632,348	181,483
June	593,098	202,400	583,362	167,425	589,110	169,075
TOTAL	7,093,062	2,366,146	7,272,997	$2,087,367	7,344,619	$2,107,905
Revenue per rider: (12 months following fare increase)		$.033		$0.29		$0.29

Table 2-3 presents estimates of ridership losses vs. revenue gains under the two growth scenarios examined. The data indicate that, in absolute numerical terms, the fare increase caused a loss of 645 to 974 riders for each $1,000 in additional revenue accrued, over 1-year period examined.

It is obviously an internal policy decision whether the "price" in loss of passenger trips (i.e., public mobility) is worth the financial benefit accrued through the fare increase. It is possible, however, for Mercer Metro policymakers to use these coefficients as a basis to compare the impacts of subsequent (or contemplated) fare increases or to evaluate alternative strategies by which to close the operating cost-revenue gap. For example, "riders lost per revenue gained" can be compared to "riders lost per reduction in operating cost" when deciding whether to hike fares as opposed to reducing service (e.g., through reduced service frequency, route elimination, or reduced hours of service) in an effort to cover expenses.

Because of the very speculative nature of the assumed ridership growth rates, however, the revenue gained vs. ridership lost trade-off figures are only suggestive of the probable magnitude and direction of change under the conditions existing at Mercer Metro in July 1980. Observations of future fare increases at other times may yield significantly different results. Nonetheless, it is safe to say that the effects of the rise in gasoline prices did not fully offset the effects of the fare increase imposed in July 1980.

TABLE 2-3. ESTIMATED RIDERSHIP LOST--REVENUE GAIN COMPARISON RESULTING FROM THE FARE INCREASE

	Assuming Growth Rate 1.5%			Assuming Growth Rate 2.5%		
	Estimated Ridership Loss	Estimated Revenue Gain	Trips Lost per $1000 Revenue Gain	Estimated Ridership Loss	Estimated Revenue Gain	Trips Lost per $1000 Revenue Gain
1980						
July-Sept.	63,957	$100,464	637	80,934	$95,609	846
Oct.-Dec.	79,968	52,192	1,532	98,360	46,914	2,096
1981						
Jan.-Mar.	34,585	46,951	737	52,845	41,710	1,267
Apr.-June	1,425	79,172	18	19,418	74,008	262
Total:	179,935	$278,779	--	$251,557	$258,241	--
Aggregate:	--	--	645	--	--	974

PART 3: IMPACTS ON TRANSIT TRIP FREQUENCY

A key issue to be evaluated is how the survey panel tended to adjust the frequency with which they used Mercer Metro bus service in response to the fare hike. Information concerning changes in travel frequency was obtained from passenger survey data collected in the months before and after the July 1980 fare increase. The "before" data were collected during June, while the "after" data were collected between August and November.

3.1 CHANGES IN TRANSIT TRIP FREQUENCY FOR COMMUTE AND NON-COMMUTE TRAVEL

The cross-tabulations of data available for analysis of this issue indicate that about 16.2% of panel respondents (87 of a total of 538) decreased their use of bus transit for commutation trips in the time between the "before" and "after" surveys, while 23.0% of respondents (124 of 538) decreased their non-commute trips. These results are consistent with the fact that non-commutation trips tend, on average, to be more discretionary than work trips and thus more readily forgone.

At the same time, about 5.8% (31) of survey respondents actually increased their non-commute trip frequency after the fare increase was in place. Of this group increasing their non-commute travel, 26 of them (83.9%) cited the need to travel more often as the reason for the increase, as opposed to the cost advantage of using bus compared to alternative means of travel (4 persons) or the loss of use of an automobile, as through breakdown or sale (1 person).

While available cross-tabulations do not enable a determination of those factors most motivating those panel members who decreased the frequency of commutation trips by bus, it is reasonable to assume that the fare increase (i.e., the increased cost of bus travel) had a relatively minor influence on that particular group of persons. This conclusion is reached indirectly, knowing that bus cost was cited as a causal factor by only 12.9% (4 of 31) of those persons decreasing non-commutation bus trips. Since non-commutation travel as a class is traditionally much more sensitive to transit fare increases than work travel, the reduction in commutation trips induced by the higher transit fare was likely to have been attributable to cost factors in far less than 12.9% of those cases.

In the absence of more specific data, it must also be inferred that a large majority of the 451 panel respondents who did not decrease their frequency of bus use for commutation were actually left unaffected by the fare change. The alternative--to increase the frequency of commutation in the face of the increase in transit cost--would only have occurred in a small number of fairly unique circumstances. Such circumstances might include the case wherein a survey respondent used bus for commutation for only a portion of each week's trips to work before the fare hike, taking alternative modes of transportation on certain other days. There would have then been some latitude (albeit limited) for an increased use of transit for commutation by that rider after the fare change.

Or, a Metro rider may have responded in the period between surveys to the escalation in gasoline prices, relative to which the fare increase was not a factor deterring increased use of transit in place of auto travel. Such cases, however, would have been extremely limited in number relative to the number of riders for whom there was neither the opportunity or necessity for an increase in bus commutation after the fare increase. For example, most riders using transit for commutation would tend to use it for all five weekly work days, not just a few; and, since gasoline prices had very nearly peaked prior to the initial survey in June of 1980, it is likely that those part-time transit commuters who would feel compelled to increase their use of transit in response to gas prices would likely have done so before the fare increase and the survey period.

Key data about changes in trip frequency obtained from the passenger survey information are summarized in Table 3-1. Note that the data indicate only the numbers and proportions of panel respondents changing their bus travel frequency and not the absolute number or proportion of weekly trips that those respondents added or dropped over the period of observation. This factor introduces an important degree of uncertainty regarding the findings of this study, since the degree to which individual survey respondents reduced trip-making by bus is not ascertained. All that can be stated based on the data shown is that changes in trip frequency occurred among a certain proportion of the survey respondents.

Some final comments about general trip frequency changes concern the accuracy of these responses as affected by the timing of the "after" survey. The occurrence of two, conceivably off-setting, biases are possible. First,

TABLE 3-1. PROFILE OF EFFECTS OF FARE INCREASE ON TRIP FREQUENCY

Total number of respondents: 538

Type of Trip	Respondents Decreasing Bus Trip Frequency	Respondents Not Changing Bus Trip Frequency	Respondents Increasing Bus Trip Frequency
Commutation:	87 (16.1%)	451 (83.8%)	n.a.* (0.0%)
Non-Commutation:	124 (23.0%)	383 (71.2%)	31 (5.8%)

* It is estimated that a negligible number of the respondents would have had the need or opportunity to increase the number of weekly commutation trips, even if there existed a cost savings (auto use vs. bus use) in doing so.

respondents polled immediately after any fare increase often can tend to overstate their negative reaction to the fare change, in this case overstating their trip decreases (stated vs. actual reductions), or not recognizing that negative reaction to the new fare may be transitory. Trip-making has been observed to return to the levels observed prior to the fare increase, perhaps within weeks or several months of the event.

Second, those panelists not having adequate time after the fare change and before the follow-up survey to replace their mode of travel (although they may have been intent on doing so) may create an underestimate of the long-term drop in bus use induced by the fare hike. Caution must thus be used in establishing the time periods in which the recorded or observed changes in trip-making are valid and truly representative of the long- and short-term impacts.

3.2 FACTORS CAUSING CHANGES IN TRANSIT TRIP FREQUENCY

The data in Table 3-2 provide some relevant insights about the degree to which the fare hike affected transit trip frequency when compared to other possible causes. The data indicate that the total number of individual respondents who said they changed their transit use rates in the course of the survey period was between 156 and 243 (or between 29.0% and 45.2%) of the survey panel of 538. The lower bound is established assuming complete redundancy of those 87 respondents decreasing commutation transit trips with the group of 125 respondents claiming to have decreased non-commutation transit use; the upper bound is established assuming both sets of respondents is non-overlapping. Also built into this range's derivation are the acceptable presumptions that (1) no respondents cited "other" or left blank the reason for a change in riding transit habit; and (2) no respondents increased their commutation trip frequency. Even with these presumptions, however, it is apparent that a significant proportion of respondents--possibly almost one-third to one-half--changed their transit use rate in one direction or the other in the course of the survey period.

Again accounting for potential overlapping of sets of respondents (e.g., those riders who might <u>both</u> decrease their non-commute trips and increase their commute trips or who decrease both types of trips), about 23.2% to 39.4% (125-212) of all respondents decreased their trip-making. Likewise, it is observed that, of those riders decreasing their use of transit, somewhere between 59.0% and 100% (125 and 212) elected to forgo some non-commutation travel.

TABLE 3-2. FACTORS CAUSING CHANGES IN TRIP FREQUENCY AMONG RESPONDENTS

CITED REASON FOR CHANGE IN TRIP FREQUENCY	For Travel Decreases	
	Commute Travel	Non-Commute Travel
o Fare increase	n.a.	90 (16.7%)
o Acquired car/license	n.a.	13 (2.4%)
o Less travel	n.a.	14 (2.6%)
o Bus condition/service quality	n.a.	8 (1.5%)
o Other/blank	n.a.	--
Total:	87 (16.2%)	125 (23.2%)

	For Travel Increases	
	Commute Travel	Non-Commute Travel
o Bus Cheaper	n.a.	4 (0.7%)
o More Travel	n.a.	26 (4.8%)
o Auto broken/sold	n.a.	1 (0.2%)
o Other or blank	n.a.	--
Total:	0 (0.0%)*	31 (5.8%)

n.a.: Cannot be derived from currently available data tabulations (Zebe, (1)).

* Assumed based on limited opportunities/motivations for increasing weekly transit commutation trips.

The dominant factor cited for curtailment of non-commutation transit trips was the fare increase, noted in 90 of 125 (72%) of the cases. Exogenous factors, such as the acquisition of a car or driver's license (13, or 10.4%), a lessening of need for travel (14, or 11.2%), and bus service quality (8, or 6.4%), accounted for the remaining portion of the reported decrease in transit use.

To estimate the relative influence of the same factors on decreases in commutation transit trips, the above profile of causes of non-commutation travel decreases can be used as a reference point. As would be expected, fewer respondents decreased commutation travel compared to those who decreased non-commutation travel (87 compared to 125). Of the 87 respondents who did decrease commutation, proportionally fewer would have been influenced to do so by the fare increase than were influenced to decrease non-commutation by the same factor. This conclusion is based on the assumption that commutation trips are less price-sensitive than non-commutation trips. Thus, it is judged that something fewer than 62 respondents (72.0% of those decreasing commutation) did so in response to the added fare.

Using this estimate, it is concluded that, at most, about 28% (152) of the whole survey population was induced to decrease transit use as a direct consequence of the fare change. This estimate assumes, too, that the rise in gasoline price sustained during the survey period had effects on riders' choice of mode over that short time period.

Using a similar line of reasoning, the following can be said regarding causes of changes in trip frequency:

1. There is no reason to expect that "acquiring a car or license" or "bus condition/service quality" would account for proportionally fewer or more respondents decreasing commutation trip frequency than did so for non-commutation transit trips (10.4% and 6.4% for each factor, respectively).

2. "Less travel" as a factor decreasing commutation trips probably accounted for significantly less than the 11.2% of survey respondents who decreased <u>non</u>-commutation trip frequency. In fact, since it is unlikely that the number of weekly commutation trips could be lessened for a vast majority of riders, it is estimated that the number of respondents reducing transit use in commutation as a result of a reduced need is close to zero.

Considering those Mercer Metro riders who indicated that they increased their use of bus in the course of the survey, it is seen from Table 3-2 that roughly 5.8% of the total respondent sample fall into this group--slightly more if an allowance is made for a small number of riders who may have increased commute travel for reasons exogenous to the fare hike.

Thus, only about one-fifth as many of those surveyed increased their use of transit as decreased their use. For obvious reasons, however, virtually none of the increase among this group can be attributed to cost (fare-related) factors. Based on the profile of factors affecting non-commutation trips, it could be speculated that "more travel" was a dominant factor inducing this direction of change among this group of riders. This factor was obviously not relevant for commutation, but (as stated earlier) it is likely that commutation was left largely unaffected by the fare increase.

Of those surveyed riders increasing their transit trip frequency after the fare increase, none can reasonably be understood to mean that the increase was induced by the fare change per se. Rather, the increase in transit use must be attributed to the fact that the increase in transit costs was outstripped by the effects of gasoline prices (or other factors), which sustained downward pressure on demand for auto use. The primary cause of this trip frequency increase is indicated in Table 3-2 to have been an "increase in travel." This conclusion is reached knowing that the number of riders increasing commutation travel for any reason was negligible and could thus be ignored in trying to ascertain the causes of trip frequency more generally.

3.3 FARE ELASTICITY ESTIMATES

One device used to gauge the degree of effect the fare increase may have had on Mercer Metro ridership is to derive estimates of fare elasticities, both generally and for several sub-groups of the same population. These estimates can then be compared to elasticities derived for other fare increases for reasonableness or any deviation from expected patterns of consumer response. Additionally, these estimates of elasticities can be correlated with ridership characteristics, enabling an assessment of impacts on certain classes of transit users.

The measure of elasticity selected for analysis of transit demand is the <u>arc elasticity</u> (sometimes referred to as the <u>midpoint elasticity</u>), defined by the relationship:

$$n_{arc} = \frac{(q_1 - q_o)/(q_1 + q_o)/2}{(q_1 - p_o)/(p_1 + p_o)/2}$$

where: p_o = fare before the fare change
p_1 = fare after the fare change
q_o = ridership before the fare change
q_1 = ridership after the fare change.

Simply stated, the arc elasticity is an indicator of what percent ridership will change with each one percent change in fare. Since there exists an inverse relationship between fares and transit patronage, arc elasticities have negative values for cases of fare increases.

In computing elasticities for the Mercer Metro fare increase studied here, q_1 and q_2 were respectively, the sums of all transit trips taken weekly by the full sample group in question before and after the fare increase; likewise p_o and p_1 were the fare levels before (40 cents) and after (50 cents) the fare increase. Because the "before" survey of riders was conducted, in part, during lower-volume summer months, the changes in transit ridership were adjusted for seasonality so that the "after" survey volumes would not be overstated (and so that ridership losses and elasticity values would not thus be underestimated). It was determined that a seasonal adjustment factor of 0.80, applied to the "after" survey estimate of non-commute trip-making frequency, was required to establish consistency between the before and after figures (DeLeuw-Cather, March 1982, cited by Zebe, July 1982).*

The results of the elasticity computations are given in Table 3-3. The data show that, overall, the elasticities are not too far from the values of elasticities traditionally observed, although there does appear to be some discernable and explainable differences.

In general, it has been observed that U.S. cities tend to have demand elasticities for fare increases of roughly -0.34 ± 0.11 (mean and standard deviation) (3). However, smaller cities (less than 500,000 population) tend to have slightly larger absolute values, in the range of -0.35 ± 0.12. Since the Mercer Metro service region had a population of about 300,000 at the time of the fare increase, its aggregate observed elasticity value would be expected to be about -0.35, or in the range of -0.23 to -0.47. However, as indicated in Table 3-3, the aggregate demand elasticity for all Mercer Metro

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* It might also have been appropriate to factor down commutation travel as well, since there tends to be a higher proportion of vacation days (that may or may not be concentrated in time) taken during summer months. Unless this average lessening of trips per week is reflected in the trip frequencies cited by each respondent, the frequency of trip-making could be overstated by not applying some reduction factor to commute, as well as non-commute, trips.

TABLE 3-3. ARC ELASTICITY ESTIMATES BASED ON RIDERSHIP RESPONSE TO THE JULY 1980 FARE INCREASE

Socio-Economic or Demographic Characteristics	Trip Purpose		
	Commute Travel	Non-Commute Travel	Aggregate for all Trips
Full Survey Sample			
	-0.15	-0.29	-0.21
Household Income			
Up to $10,000	-0.09	-0.37	-0.21
$10,000 - $20,000	-0.21	-0.13	-0.18
More than $20,000	-0.08	-0.54	-0.22
Number of Autos			
0	-0.18	-0.19	-0.19
1	-0.16	-0.42	-0.25
2	-0.20	-0.34	-0.26
3 or more	+0.05	-0.17	-0.01
Age of Respondent			
16 or younger	-0.09	-0.38	-0.29
17-24 years	-0.07	-0.30	-0.16
25-44 years	-0.30	-0.23	-0.28
45-64 years	-0.06	-0.49	-0.21
65 or older	-0.01	+0.01	0.00
Sex of Respondent			
Male	-0.22	-0.21	-0.22
Female	-0.12	-0.33	-0.20
Household Size			
1 member	-0.10	-0.10	-0.10
2 members	-0.03	-0.12	-0.07
3 members	-0.04	-0.71	-0.27
4 members	-0.42	-0.38	-0.40
5 members	-0.21	-0.19	-0.20
6 or more members	-0.21	-0.38	-0.29

trips is only -0.21. This low value indicates that the fare increase had significantly less effect on ridership than would have been expected based on comparable fare hikes and the ridership responses they induced in cities of similar size.

Regarding the relative values of elasticities for commute vs. non-commute trip-making, it appears that, as for most previous observed experiences with fare increases in other cities, non-commute elasticities had absolute values roughly 2 to 3 times greater than those for commute travel. This observation would indicate that, even though the overall response to the fare hike was less than "nominal", the cutbacks that were made conformed with the way that alternative kinds of trips were reduced in response to previous fare hikes.

The values of elasticities by specific demographic and socio-economic characteristic are also given in Table 3-3. Observations concerning impacts of the fare change on these sub-groups of the survey sample are discussed in later sections of this report.

Finally, a note is again made that all elasticity estimates derived from the Mercer survey data must be used cautiously since the sample size from which they are derived is relatively small. This caution is highlighted by the fact that an even lower aggregate elasticity value (of between -0.10 and -0.14) would have been expected based on the time series ridership data discussed in Part 2. It cannot be stated with certainty whether ridership losses were underestimated by the assumed growth rates, or whether the survey panel was simply not reflective of the Mercer Metro ridership as a whole.

PART 4: EFFECTS ON USER GROUPS -- EQUITY IMPACTS

4.1 GENERAL PROFILE OF IMPACT

As important as "what happened" as a result of the fare increase is the question of "who was affected". To shed some light on the incidence of effects, the riders sampled can be stratified within several socio-economic and demographic categories, including:

1. Household income
2. Auto ownership
3. Age
4. Sex
5. Household size

The data available for analysis of how these factors correlated with changes in travel behavior in response to the fare change fall into three groups:

1. Riders decreasing non-commute trip frequency
2. Riders decreasing commute trip frequency
3. Riders increasing non-commute trip frequency.

Data on riders increasing commute trip frequency are not available in the Zebe paper (1), but can be assumed, for the present analysis, to be close to zero in number. Even with this fairly safe assumption, however, it is not possible to accurately determine the total number of riders whose trip frequency was affected by the fare increase. This constraint is a consequence of the fact that the above three groups of riders, for which trip data are available, are potentially overlapping. As alluded to earlier, some riders may have elected to decrease both commute and non-commute trip-making as a result of the fare change. Thus, the estimate of the number of riders who decreased their trip frequency would be inflated if the numbers in both groups were simply added (assuming that some riders actually did fall into each group).

Notwithstanding this characteristic of the data, Table 4-1 summarizes the numbers of riders in each impact category who were influenced to change their travel habits by the fare change. In that the numbers of riders forgoing commute and

TABLE 4-1. PROFILES OF SURVEY RESPONDENTS CHANGING BUS TRANSIT USE

	HOUSEHOLD INCOME ($K)			AUTOS PER HOUSEHOLD				AGE					SEX		HOUSEHOLD SIZE						TOTAL BY GROUP
	≤ 10	10-20	≥ 20	0	1	2	3 or more	16	17 -24	25 -44	45 -64	≥ 65	Male	Female	1	2	3	4	5	≥ 6	
RIDERS DECREASING TRAVEL																					
Non-Commute	65 (92%)	43 (35%)	16 (13%)	43 (35%)	41 (33%)	33 (27%)	6 (5%)	31 (25%)	48 (39%)	28 (23%)	17 (14%)	0 (0%)	28 (23%)	96 (77%)	16 (13%)	18 (15%)	30 (24%)	18 (15%)	17 (14%)	25 (20%)	124 (23%)
Commute	26 (30%)	47 (54%)	14 (16%)	28 (32%)	32 (37%)	15 (17%)	12 (14%)	9 (10%)	22 (25%)	35 (40%)	16 (18%)	5 (5%)	32 (37%)	55 (63%)	6 (7%)	23 (26%)	19 (22%)	8 (9%)	12 (14%)	19 (22%)	87 (17%)
Sub-total:	91 (43%)	90 (43%)	30 (14%)	71 (34%)	73 (35%)	48 (23%)	18 (9%)	40 (19%)	70 (33%)	63 (30%)	33 (16%)	5 (2%)	60 (28%)	151 (72%)	22 (10%)	41 (19%)	49 (23%)	26 (12%)	29 (14%)	44 (14%)	211 (39%)
RIDERS INCREASING TRAVEL																					
Non-Commute	12 (39%)	14 (45%)	5 (16%)	17 (55%)	7 (23%)	7 (23%)	0 (0%)	11 (36%)	4 (13%)	5 (16%)	3 (10%)	8 (26%)	15 (48%)	16 (52%)	2 (7%)	11 (36%)	9 (29%)	5 (16%)	2 (7%)	2 (7%)	31 (6%)
Commute	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 (0%)
Sub-total:	12 (39%)	14 (45%)	5 (16%)	17 (55%)	7 (23%)	7 (23%)	0 (0%)	11 (36%)	4 (13%)	5 (17%)	3 (10%)	8 (29%)	15 (48%)	16 (52%)	2 (7%)	11 (36%)	9 (29%)	5 (16%)	2 (6%)	2 (6%)	31 (6%)
TOTAL RIDERS CHANGING TRAVEL HABITS:	103 (42%)	104 (43%)	35 (15%)	88 (36%)	80 (33%)	56 (23%)	18 (7%)	51 (21%)	74 (30%)	68 (28%)	36 (15%)	13 (5%)	75 (31%)	167 (69%)	24 (10%)	52 (22%)	58 (24%)	31 (13%)	31 (13%)	46 (19%)	242 (45%)
TOTAL IN SURVEY	255 (47%)	204 (38%)	79 (15%)	178 (33%)	202 (38%)	106 (20%)	52 (10%)	77 (14%)	132 (25%)	170 (32%)	105 (20%)	54 (10%)	176 (32%)	362 (67%)	77 (14%)	138 (26%)	104 (19%)	81 (15%)	51 (10%)	88 (16%)	538 (100%)

non-commute travel were added to arrive at a "total" who decreased transit trip-making, the total represents on "upper bound" (worst case) of the actual effect since individual riders who decreased both commute and non-commute travel are double-counted. If, in fact, both groups are non-overlapping, then the totals are accurate as shown.

Likewise, to the degree that any riders increased some types of transit trip-making while decreasing others, then there is some double-counting in totaling the number of riders impacted one way or the other by the fare change.

Keeping in mind the fact that the estimated impacts are roughly correct upper bounds, the following general conclusions are derived from the data in Table 4-1:

1. Almost half (45%) of all 538 surveyed riders indicated that they changed their transit use in the time between surveys.

2. About 39% of all riders surveyed decreased their trip-making compared to before the fare increase, while almost 6% of the sample actually increased their trip-making, all of that increase being in the form of non-commute trips.

3. The proportions of riders changing travel behavior within socio-economic sub-groups roughly matched their respective proportions in the full sample.

4. The proportions of riders changing travel behavior within any given socio-economic sub-group were in rough correlation to their respective proportions in the full sample, but with some important exceptions.

This latter observation is important since at least one criterion of equity might hold that no single group of riders should be asked to shoulder a burden disproportionate to their representation in the sample, assuming the response rate was roughly equivalent among all groups in the total ridership.

4.2 CHARACTERISTICS OF THOSE RIDERS DECREASING TRAVEL

It appears from the data in Table 4-1, that if proportions of total riders decreasing travel for all types of trips are compared across all socio-economic characteristics, there are some notable instances in which they are significantly out of line with their proportions in the total sample. If we define those "decreased travel" cases in which there is roughly a deviation of 5% or more from a sub-class representation in the survey sample as constituting a group "relatively advantaged" or "relatively disadvantaged", then the profile of impacts on socio-economic groups shown in Table 4-2 emerges.

The figures indicate that riders who cut back their travel tended to come from larger and middle-income families and tended to fall in the under-25 age groups. At the same time, senior citizens and those persons coming from smaller (1- and 2-person) households tended to be among those groups least markedly affected by the fare change. This observation is consistent with the discount half-fare Mercer Metro continued to offer senior citizens and the probability that single- and two-person households included childless individuals, young married and dual-income couples for whom the added fare would be less of a factor affecting trip-making than for other classes of riders.

It must be kept in mind, however, that the data in Tables 4-1 and 4-2 only indicate the relative numbers of riders experiencing a decrease in travel, not the extent by which those riders actually decreased tripmaking. Thus, for example, a lower-income rider averaging two fewer weekly trips after the fare change than he did before is viewed the same as a higher-income rider decreasing his use by only one weekly trip. A truer perspective on actual behavior impacts on those riders decreasing transit use is obtained by examining the disaggregate elasticities shown earlier in Table 3-3. These elasticity estimates indicate that there is a relatively limited deviation from the -0.21 average for all trip-making (commute and non-commute, as well as cases of increased travel and decreased travel).

Tables 4-3 and 4-4 indicate the reasons cited by survey panelists for altering their trip-making habits after the fare increase. With respect to the individual socio-economic characteristics, the following observations are most pertinent regarding the data contained in Tables 3-3, 4-1, 4-3, and 4-4.

4.2.1 Household Income

1. While, on average, all three income levels reflected virtually equivalent sensitivities to the fare increase, commute travel was highly inelastic for the groups of riders at the upper and lower ends of the income scale; these elasticity values were offset by much higher-than-average sensitivities for the same groups for non-commute travel.

2. The exceptionally high elasticity of non-commute travel among sampled higher-income riders (-0.54, compared to the -0.22 sub-group average) is likely

TABLE 4-2. COMPARISON OF PROPORTIONS OF RIDERS DECREASING TRAVEL TO PROPORTIONS IN SAMPLE

Socio-economic Characteristic	Groups Relatively Advantaged*	Groups Relatively Disadvantaged**
Household Income	None	$10-20k per year
Autos per household	None	None
Age	65 yrs and older	16 yrs and younger 17-24 yrs
Sex	None	None
Household size	1-person 2-person	3-person 5-person

* Relatively advantaged: Group as a whole had more than 5% of its riders decreasing travel than their proportional representation in the survey sample.

** Relatively disadvantaged: Groups as a whole had more than 4% more of its riders decreasing travel than their proportional representation in the sample.

TABLE 4-3. REASONS CITED BY SURVEY RESPONDENTS FOR DECREASING NON-COMMUTE TRANSIT USE

REASON FOR DECREASE	HOUSEHOLD INCOME ($K) Up to 10	10 -20	More than 20	AUTOS PER HOUSEHOLD 0	1	2	3 or more	AGE 16	17 -24	25 -44	45 -64	65	SEX Male	Female	HOUSEHOLD SIZE 1	2	3	4	5	6	TOTAL BY REASON FOR DECREASE
Fare Increase	55	31	4	32	31	23	4	23	35	21	11	0	19	71	11	14	19	13	9	24	90
Acquired Car or License	2	1	11	1	2	10	0	3	1	7	1	0	8	5	1	1	4	4	4	0	13
Less Travel	4	8	1	7	4	1	2	5	8	0	2	0	1	12	1	0	7	1	4	1	14
Bus Condition or Service Quality	4	3	0	3	4	0	0	0	4	0	3	0	0	8	3	3	0	0	0	0	8
TOTAL RESPONDENTS DECREASING NON-COMMUTE TRAVEL	65	43	16	43	41	34	6	31	48	28	17	0	28	96	16	18	30	18	17	25	124

TABLE 4-4. REASONS CITED BY SURVEY RESPONDENTS FOR INCREASING NON-COMMUTE TRANSIT USE

REASON FOR INCREASE	HOUSEHOLD INCOME ($K)			AUTOS PER HOUSEHOLD				AGE					SEX		HOUSEHOLD SIZE						TOTAL
	Up to 10	10-20	More Than 20	0	1	2	3 or more	16	17 -24	25 -44	45 -64	65	Male	Female	1	2	3	4	5	6	BY REASON FOR INCREASE
Bus Cheaper	0	4	0	3	0	1	0	0	1	3	0	0	4	0	0	0	4	0	0	0	4
More travel	12	9	5	14	6	6	0	11	2	2	3	8	11	15	2	11	5	5	2	1	26
Auto Broken Sold	0	1	0	0	1	0	0	0	1	0	0	0	0		1	0	0	0	0	1	1
TOTAL RESPONDENTS INCREASING NON-COMMUTE TRAVEL	12	14	5	17	7	7	0	11	4	5	3	8	15	16	2	11	9	5	2	2	31

reflective of the existence of mode alternatives (i.e., auto) for that group. In contrast, the high elasticity value (-0.37) for the lower-income sub-group is likely a result of lowered affordability of discretionary bus travel as much as a consequence of a lack of model choices for that group.

3. Of the 65 low-income riders decreasing non-commute travel, 55 of them (84.6%) cited cost (fare) as a reason for the decrease. In contrast, of the 16 high-income riders decreasing their non-commute travel, only 4 (25.0%) cited cost as a reason, while 11 (68.6%) cited the acquisition of a car or license as a reason for the decrease.

4. Because a greater proportion of trips by low-income riders were more likely to have been forgone entirely (and not simply shifted modal alternatives, as would more likely be the case for high-income riders), it could be argued that the lower-income riders were more seriously affected by the fare hike than other income groups, notwithstanding the fact that, in terms of absolute numbers of riders, their proportions were consistent with their overall sample representation.

4.2.2 Number of Autos

1. Although the number of riders decreasing transit use within each auto ownership sub-group is in virtually equivalent proportion to that group's representation in the sample, one- and two-auto households' non-commute and total travel was significantly more sensitive to the fare increase than households at other auto ownership levels.

2. Higher auto ownership households (3 or more cars) showed a net increase in commute travel after the fare hike, a fact reflected in a positive elasticity value (+ 0.05) for that sample group for commute travel, and a very low (-0.01) aggregate elasticity level.

3. The fare increase was the dominant factor behind the decrease in transit use among all auto ownership levels, being cited between 67-75% of the instances, depending on auto ownership class. This fact suggests that travel habits after the fare increase were changed relatively independent of auto ownership level.

4.2.3 Age of Respondent

1. The only age displaying any notable demand sensitivity for commute travel was the 25-44 year group. While commute travel tended to have markedly lower elasticity values among all socio-economic characteristics examined, the demand elasticity value of -0.30 for the commute travel of respondents in the 25-44 years old group is uncharacteristically high. One possible explanation for this is that larger households--and therefore higher auto ownership households--would tend to be concentrated in this age group. Higher auto ownership, in turn, would create more alternatives to transit travel in the face of a fare increase.

2. Senior citizens (65 or older) showed no sensitivity to the fare increase, primarily due to the senior citizens half-fare policy.

3. Non-commute travel was apparently highly sensitive to the fare change among two groups: those riders 16 or younger (-0.38) and those riders age 45-64 (-0.49); this second group thus had more than double the demand sensitivity for non-commute travel than for the next younger age group (-0.23 for ages 25-44). This large differential in elasticity values may be partially explained by the possibility that a larger proportion of non-commute travel among the 16 and under and 45-64 age groups may have been truly "discretionary" (e.g., social or recreational visits) and not of an "essential" nature (e.g., doctors visits or food shopping).

4.2.4 Sex

1. In aggregate, the incidence of negative effect of the fare increase fell slightly more on female riders than on male riders.

2. While females outnumbered males in the survey sample 2:1, the number of females vs. male cutting back transit use was more than 2.5:1.

3. Compared to males, females evidenced a significantly lower sensitivity to commute travel (-0.12 vs. -0.22) and a higher sensitivity to non-commute travel (-0.30 vs. -0.21). Commute travel was reduced by over 18% of the males and by only 15% of the females in the sample.

4. Females, on average for all travel, were slightly less sensitive to the fare increase than males (-0.20 vs. -0.22).

5. A majority of both males (68%) and females (74%) who decreased non-commute travel cited the fare as a reason for their change. However, a significant proportion of females also cited less travel (13%) or bus condition/service quality (8%) as a cause for curtailing non-commute transit use; less than 4% of males cited either of these reasons for their change, but almost 29% cited the acquisition of a car or license as a reason.

4.2.5 Household Size

1. The decreases in transit use was distributed across all family classes roughly in proportion to their representation in the sample, although riders from 1- and 2-member families appeared to be slightly less negatively affected, and riders from families of 5 or more members slightly more negatively affected, than their representation in the survey would indicate.

2. Between 93% and 96% of riders within each household size category cited the fare as a reason for reducing non-commute travel. Only in families of 3, 4, or 5 members were other reasons (such as "acquired license or car", and "less travel") cited.

3. Riders from 1- and 2-member families were markedly insensitive to the fare increase with respect to both commute and non-commute travel; 3-member families surveyed displayed a very high demand elasticity for non-commute travel; and 4-member families evidenced relatively high sensitivity to both commute (-0.42) and non-commute (-0.38) trip-making.

4. Thus, even though in terms of numbers of persons affected, the decreases in travel were more less proportionally distributed among all sizes of household, those riders in 3- and 4-member families apparently cut back a greater proportion of trip-making than riders from other family groups.

4.3 CHARACTERISTICS OF THOSE RIDERS INCREASING TRAVEL

The data presented in Table 4.1 also shows that some riders actually increased their use of transit after the fare increase. However, data on any riders who may have increased their commute travel, in particular, are unavailable at this writing, and it is assumed for this discussion that those riders were zero in number (or negligibly small). This assumption seems permissible for the reasons cited in an earlier mention of this subject.

Non-commutation travel therefore accounts for virtually all of the travel increase observed between the survey times. As Table 4.1 indicates, about 6% of all riders surveyed fall into this class. It is also observed from the data that a majority of these travelers have certain socio-economic characteristics in common:

1. <u>84%</u> of those who increased their transit trip-making had annual family <u>incomes under</u> <u>$20,000</u>;

2. <u>61%</u> of those who increased travel were either <u>16 and younger, or 65 and over</u>; and

3. <u>55%</u> of those riders were from <u>households with no</u> <u>autos</u>.

These results, however, are subject to question due to the small survey sample; and although statistical correlation is present, that correlation is weak. Additionally, a significant portion of the increased non-commute travel that was recorded may have reflected a sampling skewness stemming from the timing of before and after surveys. In June and in the fall, when the surveys were conducted, riding habits would tend naturally to be somewhat different, particularly for school trips and non-commute trips. The observed increases in travel after the fare hike may thus be attributable to this natural rise (rather than to conditions brought on by the fare hike) or to a mis-estimate of any correction factors used to compensate for those seasonal variations.

Finally, it is reiterated that the data on increases in trip-making only indicate the <u>number of riders</u> from the survey sample who increased their transit use. Those data do not reflect the total <u>volume</u> of increased trip-making.

While the small proportion of riders increasing travel limits the strength of conclusions about these data, the following observations are indicated regarding socio-economic classes of riders:

4.3.1 Household Income

1. A clear majority (84%) of sampled riders increasing their travel were classified as either low- or middle-income groups. This fact would indicate that transit fare affordability was not a deterrent felt primarily by those most susceptible to cost.

2. "More travel" was a dominant reason given for the increase in travel across all income groups. This fact would tend to indicate that, among those riders who increased their transit use, higher gasoline prices were not likely to have been a major influence.

4.3.2 Autos Per Household

1. "More travel" was also the most frequently cited reason for increasing transit use among all auto ownership levels.

2. No surveyed riders from households with 3 or more autos increased their transit usage, and almost one-half of those who increased travel were from households with no autos.

4.3.3 Age

1. More than 61% of riders who were surveyed and who increased their travel were either 16 and under or 65 and older, implying that the old and the young may have been captive riders with no alternative to transit when faced with the need to increase their travel.

2. Only those riders in the age group 25-44 attributed their increase in transit use to something other than "more travel", naming "bus cheaper" in a small majority of cases.

4.3.4 Sex

1. Even though males represented only one-third of the riders surveyed, just about one-half of those riders who increased their transit use were males. This response may have reflected more latitude in mode choice for males as opposed to a greater price sensitivity.

2. No females who increased their transit use cited "bus cheaper" as a reason; this compares to over 25% of the males who gave this reason for their increase. The absence of this reason among females may reflect the fact that fewer females than males have access to alternative transportation modes.

4.3.5 Household Size

1. All those surveyed riders who cited "bus cheaper" as a reason for their increase in travel fell into the 3-person household classification.

2. Over 35% of all surveyed riders who increased transit use were from 2-person households, from which it might be concluded that such households were more able to afford increased transit travel. This possibility is intuitively appealing since this classification of household would encompass childless couples, dual-income couples, and young married couples, who, on average, would tend to have a higher disposable income per household and thus be able to expand their transit use in the face of the fare hike.

PART 5: CONCLUDING REMARKS

The preceding review of information derived from the July 1980 Mercer Metro fare increase from 40 cents to 50 cents has indicated that the ridership loss due to the fare increase was somewhat less than might have been expected. A cause of this limited impact may have been the 17-month rise in the price of gasoline (reflected in the cost of auto travel), which peaked at roughly the time of the fare increase. In addition, the fare increase was modest in size and thus would not have been expected to have disrupted ridership trends significantly. This combination of influences meant that the fare increase may have had more effect in slowing diversion from auto to transit, rather than in driving transit users away from Mercer Metro.

The strength of these and other observations of ridership behavior discussed earlier is compromised by several factors. Foremost in importance is the fact that only a very small sample size was obtained, meaning that the confidence one can have in the data is limited. Additionally, there was a relatively long period of fare policy shifts between 1978 and the time of the fare increase that did not enable Mercer Metro to establish firm patterns of ridership trends. This meant that ridership that would have been observed without the July 1980 fare increase could not be confidently predicted and compared to actual changes.

The data available for analysis also placed some restrictions on the conclusions. For example, while data on the number of persons adjusting transit trip frequency in response to the fare change were tabulated by socio-economic sub-groups, the absolute degree of difference in that change among groups could not be evaluated. Also, while the panel was asked about changed perceptions in service, no data were collected during the survey period that would enable those changes to be verified as having actually occurred.

Despite these and other limitations, this fare increase constituted one of the few opportunities to observe ridership reaction to a fare change when the cost of alternative means of travel (auto use) was artificially high. Based on the fare elasticity analysis in this report, and using plausible assumptions about what would have happened had there been no fare change, it was observed that riders tended to be less sensitive to the fare increase than has been historically observed under comparable circumstances. However, the responses among those riders who did respond to the change appear to fall into traditional patterns:

1. Non-commute travel was forgone with greater frequency than commute travel.

2. Lower-income groups, lower auto-ownership households, and female riders tended to be more affected by the change than their group's proportion in the sample would have indicated.

3. The predominant reason cited for decreasing all types of transit travel was the fare change.

Finally, it is observed that the responses of the survey panel about trip frequency change could not have been reflective of the gains in new riders experienced as a result of the gasoline shortfall and price rises. This fact explains in part why the aggregate ridership loss after the fare increase was small, even though one-third to one-half of surveyed riders decreased their trip frequency in the period following the fare hike.

APPENDIX : SURVEY FORMS

MERCER METRO ON-BOARD BUS SURVEY

This survey is being administered by Mercer Metro in cooperation with the New Jersey Department of Transportation. Please take a few minutes to answer the following questions. Thank you.

1. During a typical week, how many one way trips do you make on Mercer Metro buses?

   - ☐ 1 2 or fewer
   - ☐ 2 3 to 5
   - ☐ 3 6 to 10
   - ☐ 5 11 to 15
   - ☐ 6 over 15

2. What kind of place are you coming from?

   ☐ 1 home ☐ 2 work ☐ 3 school ☐ 4 shopping ☐ 5 social or recreational ☐ 6 other

3. What kind of place are you going to?

   ☐ 1 home ☐ 2 work ☐ 3 school ☐ 4 shopping ☐ 5 social or recreational ☐ 6 other

4. Are you female ☐ 1 or male ☐ 2?

5. What is your age?

   - ☐ 1 16 or under
   - ☐ 2 17 to 24
   - ☐ 3 25 to 44
   - ☐ 4 45 to 64
   - ☐ 5 65 or over

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

   ☐ 1 under $10,000 ☐ 2 between $10,000 and $20,000 ☐ 3 over $20,000

If you are willing to participate in a telephone survey to help Mercer Metro improve service, please complete the following:

Telephone number ________ - ____________

best time to call ☐ morning
☐ afternoon
☐ evening

For whom should we ask? ______________________________

The First Telephone Survey

Today's date June______

Serial number from on board______________________________ 2

Telephone number from on board______________________________

Hello, this is *GIVE FULL NAME* with Mercer Metro. May I speak with *NAME OF TARGET PERSON*.

IF TARGET PERSON IS ON THE PHONE SAY: "When we recently interviewed you on the bus you gave us your name and number. To help complete our survey, we would appreciate your help in answering some questions about your travel."

IF TARGET PERSON COMES TO THE PHONE SAY: "This is *GIVE FULL NAME* with Mercer Metro. When we recently interviewed you on the bus you gave us your name and number. To help complete our survey, we would appreciate your help in answering some questions about your travel."

IF TARGET PERSON IS NOT AVAILABLE SAY: "Can you tell me when I can reach him/her at this number?"
*RECORD TIME*______________________

First, I'd like to ask you about you impressions of Mercer Metro service. I am going to read a list of different things about bus service. Please tell me how satisfied or dissatisfied you are with each of them. Would you say you are very satisfied, somewhat satisfied, somewhat dissatisfied or very dissatisfied with: *READ*

	Very Satisfied	Somewhat Satisfied	Somewhat Dissatisfied	Very Dissatisfied	Don't Know	
1) The bus arriving on time						16
2) The amount of the fare						17
3) The availability of a seat						18
4) The frequency with which buses come						19

Now I'd like to ask you about your use of Mercer Metro buses.

5) How many days per week do you commute to and from work by bus? _____ 21

6) *IF ANY:* Which routes do you use?____________

7) Do you usually take the bus both ways? Y_____ N_____ 26

8) How many one-way bus trips do you make each week for purposes other than commuting to and from work? ____________ __ __27

9) Over the last few months, has your usage of Mercer Metro varied from week to week?

Y_____ N______ __28

10) *IF YES:* Has it varied substantially? Y______ N_____ __29

_____

12) Which Mercer Metro routes are within walking distance of your home?

_______ _______ _______ _______ __ __ __ __

13) How long does it take to walk from your home to the nearest bus stop?

_______ __ __35

Now I would like to ask you questions about the trips you made yesterday.

RECORD ANSWERS IN THE TABLE BELOW

14) Beginning with yesterday morning, could you tell me the kind of place you went on the first trip you made? Please indicate any trip of a block or more, even to places you walked.

15) At what time did you leave?

16) By what means did you travel?

IF BUS ASK: a) Did you need to transfer from one bus to another?

b) Was a car available to you for the trip

c) At what time did you arrive at your destination?

17) Where did you go on the next trip you took?

18) At what time did the trip begin?

19) By what means did you travel?

IF BUS ASK: a) Did you need to transfer from one bus to another?

b) Was a car available to you for the trip?

c) At what time did you arrive at your destination?

GO BACK TO 17 AND REPEAT FOR ALL TRIPS

	Purpose of. Destination									Mode of Travel								
	home	work	school	shopping	social or recreational	eat a meal	personal business	other	departure time	bus	transfer	car available	arrival time	auto-drive	auto-ride	walk	taxi	other
first																		
second																		
third																		
fourth																		
fifth																		
sixth																		
seventh																		
eighth																		
ninth																		
tenth																		

Finally, in order to compare your answers with those of other people being surveyed, we need to know a few things about your household.

20) How many people in your household are aged 17 or over?_____

21) How many are under 17?__________

22) How many cars, pickups and vans are registered to members of your household? __________

23) Do you, yourself, have a driver's license? Y________ N________

24) Do you generally have a car available for your use?__________

<u>*RECORD INCOME CATEGORY FROM ON-BOARD*</u>

0-10 __________

10-20 __________

20+ __________

blank __________

25) <u>*IF 0-10 ASK:*</u> Is the total income of your household over or under $5,000?

Over __________ Under __________

26) <u>*IF 10-20 ASK:*</u> Is the total income of your household over or under $15,000?

Over ________ Under ________ No Answer ________

27) <u>*IF 20+ ASK:*</u> Is the total income of your household over or under $25,000?

Over ________ Under ________ No Answer ________

28) <u>*IF BLANK SAY:*</u> Please stop me when I read the range that includes the total annual income of your household?

Under $5,000 __________

Between $5,000 and $10,000 __________

Between $10,000 and $15,000 __________

Between $15,000 and $20,000 __________

Between $20,000 and $25,000 __________

Over $25,000 __________

No Answer __________

RECORD SEX FROM ON-BOARD M__________ F__________

RECORD AGE FROM ON-BOARD 0-16 __________ 17-24 __________

25-44 __________ 45-64 __________ 69+__________

IF NO ANSWER SAY: Please stop me when I read the range that includes your age.

Under 17 __________ 17-24 __________

25-44 __________ 45-64 __________

65 or over __________ No answer __________

THANK YOU VERY MUCH FOR YOUR COOPERATION

The Second Telephone Survey

Today's date August __________ 2

Serial number ______________ 3 7

Telephone number ______________ 8

Hello, this is *GIVE FULL NAME* with the New Jersey Department of Transportation. May I speak with ____________________
NAME OF TARGET PERSON

IF TARGET PERSON IS ON THE PHONE SAY: "In June, you were generous enough to speak with us about your use of Mercer Metro. I would like now to ask you a few questions about your current use of the bus. This is the last survey for which will will ask your cooperation."

IF TARGET PERSON COMES TO THE PHONE SAY: "This is *GIVE FULL NAME* with the New Jersey Department of Transportation. In June you were generous enough to speak with us about your use of Mercer Metro. I would like now to ask you a few questions about your current use of the bus. This is the last survey for which we will ask your cooperation.

IF TARGET PERSON IS NOT AVAILABLE SAY: Can you tell me when I can reach him/her at this number?

First, I'd like to ask you your impression of recent changes to Mercer Metro service. Would you say that since last spring each of the following has improved, worsened or not changed?

	Improved	Worsened	No Change	Don't Know	
1. Bus arriving on time					15
2. The availability of a seat					16
3. The frequency with which buses come					17

4. How many day per week do you commute to and from work by bus __________ 18

   don't work __________ 19

5. Do you usually take the bus both ways? Y__________ N__________ 20

   If NO: how many days per week do you travel one direction by some means other than bus? ______________ 21

6. How many one-way bus trips dc you make each week for purposes other than commuting, to and from work? ________________ 22

7. (Unless don't work)

IF NO WORK TRIPS, ASK: Prior to the July first fare increase, did you use the bus to commute to or from work? Y________ N__________ 23

IF CURRENT WORK TRIPS LESS THAN 5 DAYS/WEEK, ASK: Prior to the July first fare increase did you use the bus more frequently for commuting to and from work? Y__________ N__________ 24

For purposes other than commuting to or from work, are you using the bus more, less or the same amount as you did before the fare increase?

More__________ Less__________ Same__________ 25

IF MORE, ASK: Why are you now using the bus more often?

27

IF LESS, ASK: Is this due to the fare increase or other reasons?

Fare increase__________ Other__________________ 29

IF OTHER: What other reasons have contributed? 31

9. Since June, has there been any changes in the number of autos owned or operated by members of your household?

Y____________ N____________ 32

If yes, what change has there been?

____ 34

____

9a. Have you changed your place of residence in the past two months?

Y____________ N____________ 36

Now I would like to ask you questions about the trips you made yesterday.

RECORD ANSWERS IN THE TABLE BELOW

14) Beginning with yesterday morning, could you tell me the kind of place you went on the first trip you made? Please indicate any trip of a block or more, even to places you walked.

15) At what time did you leave?

16) By what means did you travel?

IF BUS ASK: a) Did you need to transfer from one bus to another?

b) Was a car available to you for the trip

c) At what time did you arrive at your destination?

17) Where did you go on the next trip you took?

18) At what time did the trip begin?

19) By what means did you travel?

IF BUS ASK: a) Did you need to transfer from one bus to another?

b) Was a car available to you for the trip?

c) At what time did you arrive at your destination?

GO BACK TO 17 AND REPEAT FOR ALL TRIPS

	Purpose of. Destination													Mode of Travel				
	home	work	school	shopping	social or recreational	eat a meal	personal business	other	departure time	bus	transfer	car available	arrival time	auto-drive	auto-ride	walk	taxi	other
first																		
second																		
third																		
fourth																		
fifth																		
sixth																		
seventh																		
eighth																		
ninth																		
tenth																		

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