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MID–CONTINENT CITY CRIME RATES: A MULTIVARIATE ANALYSIS

BY
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Introduction

Preliminary crime data (1975) provided the basis for analysis of variations in major crime among cities of the Mid-Continent Region. The Uniform Crime Reports measure seven Crime Index Offenses: murder, forcible rape, robbery, aggravated assault, burglary, larceny-theft and motor vehicle theft. Remaining criminal offenses were not considered in this study. Crime rates per 100,000 population were compiled using the FBI Uniform Crime Reports and current population estimates (Table 1).

Major crimes per 100,000 population varied dramatically among cities of the region. Variation in rates for violent crimes such as murder and rape were greatest, as St. Louis reported 43 murders per 100,000 population in 1975 while Dubuque and Fargo reported none; Denver reported 55 times more forcible rapes per 100,000 population than Dubuque. Property crime

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TABLE 1
CRIME RATE PER 100,000 POPULATION FOR 25 MID–CONTINENT CITIES, 1975[a/]

	Violent Crime					Property Crime			
	Murder, Non-negligent Manslaughter	Forcible Rape	Robbery	Aggravated Assault	Total Violent Crime	Burglary Breaking or Entering	Larceny Theft	Motor Vehicle Theft	Total Property Crime
Denver	14.3	93.0	497.7	356.2	961.2	3,536.4	4,241.9	1,025.4	8,803.7
Cedar Rapids	2.7	20.0	99.1	130.9	252.7	1,551.8	6,289.1	510.9	8,351.8
Des Moines	7.0	22.6	280.4	142.2	452.3	1,064.3	5,677.9	498.9	7,241.1
Dubuque	0.0	1.7	52.9	58.1	112.7	846.1	3,985.8	467.7	5,299.6
Sioux City	16.8	19.8	61.2	174.7	272.5	1,066.7	4,573.4	513.5	6,153.6
Waterloo	5.6	24.3	92.2	119.2	241.3	1,111.4	4,685.0	260.9	6,057.3
Topeka	8.1	41.9	135.3	294.1	479.4	1,794.1	4,229.4	229.4	6,252.9
Wichita	13.8	20.3	245.2	154.4	433.7	2,153.3	4,910.0	539.8	7,603.1
Duluth	1.0	15.3	54.1	35.7	106.1	1,248.0	2,818.4	559.2	4,625.6
Minneapolis	12.3	80.4	481.2	296.9	870.7	2,727.7	4,208.1	1,214.4	8,150.2
St. Paul	6.3	32.1	417.4	316.7	772.5	2,671.1	3,503.1	917.1	7,091.3
Kansas City	23.4	61.9	631.4	527.7	1,244.3	2,727.6	4,474.4	765.6	7,967.6
St. Joseph	14.2	36.6	94.7	104.0	249.5	1,405.0	4,391.1	255.7	6,051.8
St. Louis	43.4	82.8	1,126.9	640.3	1,893.4	3,400.7	5,418.1	1,725.3	10,544.1
Springfield	3.9	10.9	96.1	175.0	285.9	1,971.1	5,619.5	248.4	7,839.0
Billings	6.2	28.7	99.9	117.4	252.2	1,540.0	6,319.0	459.7	8,318.7
Great Falls	4.9	16.9	114.4	186.1	322.3	1,812.5	6,301.4	577.5	8,691.4
Lincoln	2.5	26.4	47.2	193.9	269.9	1,031.9	4,136.8	240.0	5,408.7
Omaha	9.8	47.2	321.2	295.8	674.0	1,385.9	3,679.6	566.1	5,631.6
Fargo	0.0	13.3	53.6	39.1	106.0	961.5	4,080.2	420.3	5,462.0
Oklahoma City	16.3	66.6	265.2	364.7	462.0	3,064.2	4,234.8	956.1	8,255.1
Tulsa	11.6	40.6	173.4	302.1	527.8	2,706.9	3,923.3	691.3	7,321.5
Rapid City	4.4	24.8	115.6	661.2	742.9	1,504.0	5,599.8	366.4	7,470.2
Casper	2.6	24.2	59.6	100.1	186.5	1,320.0	4,028.2	360.8	5,709.0
Cheyenne	9.3	16.7	142.4	54.0	202.2	1,772.0	5,004.7	377.0	7,153.7

[a/]Crime rates were computed using data from *Uniform Crime Reports (UCR)* and population estimates by the Center for Applied Urban Research. *UCR* (Preliminary 1975) data used for cities in the Mid-Continent Region with populations over 100,000. *UCR* (1974) were used as a base in estimating 1975 offenses for cities in the 50,000 to 100,000 population class. This was accomplished by applying percent change reported in crime index trends *UCR*, (Preliminary 1975).

rates among cities in the Mid-Continent Region did not vary as much as violent crime rates; the high rate for reported larceny and theft cases (Billings) was only two times the lowest rate (Duluth). Duluth reported the fewest property crimes per 100,000 population and the second fewest violent crimes in 1975; St. Louis reported the highest rates in both composite categories.

A number of studies in the past few years have attempted to isolate factors that might account for differences in crime rates among cities.[1] The demographic and socioeconomic factors most often considered to have an impact are: strength of the police force, population density, unemployment, age and racial composition, economic status and stability of residence of the population. The major purpose of this study was to investigate the relationship between socioeconomic factors and crime rates in cities of the Mid-Continent Region.

Methodology

Preliminary 1975 Uniform Crime Reports were available only for cities with populations exceeding 100,000. For Mid-Continent cities with less than 100,000 population, 1975 crime rates were estimated using 1974 Uniform Crime Reports and adjusting by the percentage change from 1974 to 1975, as reported by the FBI for cities of the 50,000 to 100,000 population class. Full-time law enforcement personnel for all cities were as reported in the FBI Uniform Crime Report, 1975.

Relationships between crime rates and the following factors were determined through cross sectional multivariate analysis, using property crime and violent crime rates for 25 cities in the Mid-Continent Region as dependent variables and ten socioeconomic factors as independent variables (see Table 2):

a. Full-time law enforcement employees per 100,000 population
b. Full-time law enforcement employees per square mile
c. Density (population per square mile)
d. Current unemployment rate
e. Participation rate (nonworker/worker)
f. Percent males 16-21 years old unemployed, not in school or not in labor force
g. Percent Negro
h. Persons under 18--percent living with both parents
i. Percent of families below poverty level
j. Residential mobility of the population

[1]See: Report of the Council on Municipal Performance (COMP), "City Crime," *Criminal Law Bulletin*, IX (September 1973), pp. 557-604; Greenwood & Wadycki, "Crime Rates and Public Expenditures for Police Protection: Their Interaction," *Review of Social Economy*, XXXI (October 1973), pp. 139-151; Charles Wellford, "Crime and the Police: A Multivariate Analysis," *Criminology*, XII (August 1974), pp. 195-213; and Israel Pressman and Arthur Carol, "Crime as a Diseconomy of Scale," *Review of Social Economy*, XXIX (September 1971), pp. 227-36.

Findings

Simple correlations between crime rates and each of the socioeconomic variables were computed. Factors were retained for additional analysis when correlations were found to be significant. Analysis of the data tested seven a priori assumptions about relationships between a city's crime rates and its socioeconomic and demographic characteristics.

A priori one would expect that the greater the per capita law enforcement the less the crime. The correlation between violent crime, property crime and the per capita law enforcement variable were +.91 and +.59 respectively, indicating the greater the law enforcement per capita the greater the crime rate. This high positive correlation between crime rates and per capita law enforcement is collaborated by similar findings in other studies.[2]

The empirical evidence would suggest a two-way simultaneous relationship between police and crime. The higher crime rates are related to greater public demand for law enforcement officials and higher per capita law enforcement is related to a higher probability of arrest and lower crime rates. The evidence, however, does not suggest that the latter outweighs the former. A number of studies have found no discernible relationship between changes in per capita law enforcement and the change in crime rates one and two years subsequently. The fact that the police deal daily with crime does not mean they are effective in preventing it, reducing it, or deterring it. They do not create and therefore cannot resolve the socioeconomic and demographic conditions that unquestionably stimulate crime.

[2]Pressman and Carol, *op. cit.*, explained the finding by the hypothesis that in an area with high crime rates, more police are employed. Greenwood and Wadycki concluded that the observed relationship was a function of police efficiency in detecting relative to deterring crime. (COMP) in attempting to determine if whether hiring more police can be expected to reduce crime rates took the annual changes in the number of police per capita in 30 cities and correlated this change with changes in the crime rates one and two years subsequently. They found no discernible relationship. The report concluded that ' merely increasing the size of the police force does not appear to reduce crime."

TABLE 2
SOCIOECONOMIC CHARACTERISTICS OF 25 MID-CONTINENT CITIES

	X_1 Persons Under 18–Percent Living With Both Parents	X_2 Percent Negro	X_3 Density Population Per Square Mile	X_4 Those Residents in Same House Since 1965	X_5 Full-time Law Enforcement Employees Per 100,000 Pop. Oct. 31, 1974	X_6 Married Husband Present	X_7 Percent Families Below Poverty Level	X_8 Unemployment Rate Dec. 1975	X_9 Law Enforcement Officer Per Square Mile Oct. 31, 1974	X_{10} Negro Persons Under 18–Percent Living With Both Parents	X_{11} Participation Rate Non-worker Worker Ratio 1975	X_{12} Percent Males Aged 16-21 Unemployed Not in School Not in Labor Force
Denver	77.9	9.1	5,406	44.0	323.3	47.4	9.4	5.5	17.5	58.4	1.11	14.2
Cedar Rapids	87.4	1.6	2,182	47.7	170.0	56.0	5.3	5.4	3.7	47.3	1.13	9.1
Des Moines	81.6	5.7	3,174	53.7	207.0	51.7	6.9	5.9	6.5	55.3	1.02	13.2
Dubuque	90.1	0.3	3,799	59.9	123.1	45.8	6.0	7.2	4.9	91.8	1.20	14.6
Sioux City	85.8	1.2	1,652	55.4	167.4	53.5	8.2	5.7	2.9	50.6	1.20	13.8
Waterloo	83.0	8.5	1,276	56.8	196.1	58.6	7.6	7.6	2.6	56.1	1.18	15.1
Topeka	82.3	8.4	2,632	45.0	220.6	58.1	7.3	6.1	6.3	56.8	1.18	13.2
Wichita	81.6	9.7	3,197	46.5	211.5	58.6	8.2	5.8	6.4	54.2	1.02	15.7
Duluth	83.5	0.9	1,494	58.8	171.4	49.8	7.4	9.4	2.5	46.5	1.01	10.3
Minneapolis	78.6	4.4	7,884	49.1	245.8	40.6	7.2	6.3	17.0	48.6	1.19	11.3
St. Paul	83.3	3.5	5,938	56.6	223.0	45.5	6.4	6.3	12.3	49.6	1.19	10.9
Kansas City	77.7	22.1	1,603	51.3	340.0	51.0	8.9	8.1	5.2	57.8	1.18	16.4
St. Joseph	83.0	3.3	2,533	55.9	196.0	56.1	9.6	5.4	5.1	48.1	1.39	20.3
St. Louis	64.2	40.9	10,167	52.5	505.7	41.9	14.4	8.4	46.1	49.9	1.33	31.2
Springfield	82.0	2.0	1,953	42.5	151.6	53.2	10.1	4.9	3.2	58.4	1.21	12.6
Billings	85.6	0.6	4,189	48.2	185.5	58.1	9.0	6.5	8.7	88.9	1.08	11.2
Great Falls	83.1	0.6	4,088	48.8	132.3	59.5	7.7	8.6	5.9	65.9	1.69	11.0
Lincoln	86.8	1.5	3,033	43.7	182.2	53.9	5.6	4.8	6.0	66.2	0.83	6.5
Omaha	83.6	9.9	4,534	51.4	188.3	51.1	7.2	7.2	9.3	50.4	1.25	12.8
Fargo	91.5	0.5	4,640	42.9	174.1	51.7	5.4	4.8	8.8	100.0	1.12	5.6
Oklahoma City	78.5	13.7[a]	577	45.0	194.1	58.0	10.6	6.5	1.1	53.3	1.21	14.4
Tulsa	81.3	10.6[a]	1,929	44.8	199.4	58.7	9.0	5.5	3.9	47.3	1.16	15.5
Rapid City	83.0	0.9	2,657	44.8	191.8	60.6	10.7	6.4	5.7	NA	1.86	12.9
Casper	85.1	1.0	4,800	44.8	180.5	59.2	7.2	3.0	9.0	78.9	1.03	3.0
Cheyenne	82.8	2.5	3,589	48.3	141.3	61.7	8.6	4.1	5.7	66.6	1.22	3.6

Source: U. S. Bureau of Census (1970), Uniform Crime Report (1974), State Department of Labor Reports (1975), Employment and Unemployment data for SMSA's, except Duluth, Casper and Cheyenne.

[a]/Nonwhite population.

A priori, one would expect a high positive correlation between population density and crime. In a number of previous studies density was found to be insignificant as a variable. In those studies, however, crime rates and density were based on the SMSA as the unit of observation.[3] In the current study of city data, the density variable was highly significant in explaining variations in violent crime rates, although it did not appear significant in explaining variations in property crime rates.

A priori, those individuals most likely to engage in criminal activity would be the idle. The unemployment rate, however, as such a measure was found to be insignificant. This is not entirely surprising when one considers that crime rates rose rapidly during the latter sixties when unemployment rates were declining. Further, the unemployed may be either frictionally (those moving from one job to another) or structurally (hard core) unemployed, both groups reacting to crime differently. Professors Phillips and Votey have suggested that a participation rate (nonworker/worker) may be a better measure of economic opportunity than the unemployment rate alone.[4] Following their lead such a variable was considered, but it too was found to have little correlation with crime rates.

Youth are usually believed to be disproportionately involved in crime and those youth most likely to commit crime typically thought to lack proper parental guidance. The variable *percent of children under 18 living with both parents* was found to be negatively correlated with crime rates, showing the greater the percent of a city's youth living with both parents, the lower the city's crime rate.

Since arrest data indicates that blacks are disproportionately involved in crime, the variable *percent Negro* was tested for significance and found to have a positive relationship to violent crime but not to property crime.

Since economic status of the population is assumed to be an important cause of crime *percent below poverty level* was also considered. This variable was highly correlated not only with crime rates but also with *percent black* and *children under 18 living with both parents.* Stepwise regression analysis showed economic status to be insignificant when used in the same equation with the other two variables.

Relative stability of the population (length of residence at the same address) theoretically should also be a factor in explaining crime. The mobility variable in this study was found to be highly significant in explaining variation in property crime rates.

The final results of the regression analysis are presented in equations 1 and 2.

(1) $Y_1 = 3075.5414 - 34.2839X_1 + 19.5260X_2 + 0.0379X_3$

t-value: (2.2421)** (2.3098)** (1.9657)*

Estimated Standard error = 181.4301 $R^2 = 0.84$

[3]Studies finding no relationship have used SMSA rather than city data. See Pressman-Carol and Greenwood-Wadycki, *op. cit.*

[4]Votey, H.L., Jr., and Phillips, Llad. "Police Effectiveness and the Production Function for Law Enforcement." *Journal of Legal Studies*, 1:2 (1972), 423-37.

(2) $Y_2 = 26,724.4923 - 193.6939X_1 - 73.4893X_4$

t-value: (5.0660)** (2.0130)*

Estimated Standard error = 956.7626 $R^2 = 0.57$

Where:

Y_1 = Number of violent crimes per 100,000 population
Y_2 = Number of property crimes per 100,000 population
X_1 = Percent of persons under 18 living with both parents
X_2 = Percent Negro
X_3 = Population per square mile
X_4 = Percent of residents living at the same residence since 1965

*Significant at the 10 percent significance level
**Significant at the 5 percent significance level

The explanatory variables in both equations validate some common-sense assumptions about the causes of crime. Arrest data show that crime is predominantly an urban and youthful phenomenon with blacks more than proportionately involved. The results of multivariate regression analysis indeed suggest that a large amount of the variation in crime rates among cities of the Mid-Continent Region can be explained by these socioeconomic characteristics.

Three characteristics explain 84 percent of the variation in violent crime rates: population density, percent Negro, and percent of population age 18 and under living with both parents. On the other hand, 57 percent of the variation in property crime rates among the Mid-Continent communities can be explained by two variables--percent of youth under 18 living with both parents and the relative stability of the population.

Conclusions and Policy Implications

Estimates showing the degree of association between the independent variables with violent and property crime rates are useful as an aid to approximating the effect of changes in these variables on local rates of crime.

Crime rates that would be predicted from the regression equations (Equations 1 and 2) indicate that a one percentage point increase in youth 18 years and under living with parents in Omaha would decrease Omaha's violent crimes per 100,000 population by six percent and decrease the number of property crimes per 100,000 population by three percent. Decreasing population density would also lower crime rates. In the case of Omaha, a 10.2 percent increase in population density would be predicted to increase the violent crime rate by three percent. A one percentage point increase in population stability, as measured by those living at the same address five years or more, would be predicted to decrease the property crime rate by one percent.

In conclusion, evidence in this study gave no support to the assumption that the mere size of a city's police force deters crime. The study results have important implications for those involved in family counseling as well as those involved in urban planning. The relationship of youth and family structure is strong and should give traditional institutions such as the church, schools and local government justification for being more involved. Also the effect of population density on violent crime may mean the necessity for a tradeoff by city government--planners should recognize that however beneficial such a policy may be, controlling urban sprawl could result in substantial increases in violent crime.

CAN METRO AREA TRANSIT BECOME SELF–SUPPORTING?

BY
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Introduction

The nationwide decline of mass transit has been a problem, not because of inadequate technology and management, but because of the inadequate transit market to support the system.[1] Omaha's Metro Area Transit (MAT) Authority was established in 1972; since then the area transit system has been greatly improved and the transit service area expanded. Consequently, ridership increased substantially during the 1972-1974 period. Yet MAT continues to operate with a deficit. In 1974, for example, MAT's revenue paid for only 68 percent of the operating cost and 62 percent of the total cost. The $1,926,601 deficit was financed by public subsidies.[2]

The energy crisis in 1973 drew more attention to mass transit as a means of conserving the amount of energy consumed for transportation.[3] In 1974, MAT's bus fuel economy measured 4.2 vehicle miles per gallon. With average bus occupancy at 10.4 passengers, the bus-passenger fuel economy was then 43.7 passenger miles per gallon, 2.2 times higher than the auto-passenger fuel economy of 19.5 passenger miles per gallon.[4] To study how MAT might achieve the higher bus-passenger fuel economy necessary to become self-supporting, the following were considered: changes in a) transit policies, b) land use policies and c) socioeconomic factors.

Possible Methods to Expand Ridership

Since improved service generally leads to higher ridership, the first possibility is to further improve the convenience, dependability, and comfort of Metro Area Transit service. Assuming no change in fare structure, if revenue from additional riders increased faster than the cost of improving the transit system, bus occupancy would increase and MAT could become self-supporting.

Unfortunately, this is not likely to happen in the Omaha area. MAT has been providing satisfactory transportation service to the area, as indicated by most riders interviewed in a 1974 MAT survey. With intensive transit market studies conducted by the MAT Authority, the transit system was improved to capture as many potential riders as possible. As a result, the service area was expanded to the extent that newly served areas had low ridership, resulting in a decrease in average passengers per mile. Furthermore, despite MAT Authority's efforts to improve the transit system, the total passengers decreased slightly from 8,818,915 passengers in 1974 to 8,580,987 passengers in 1975;[5] this does not necessarily forecast a downward trend of ridership, but the level of ridership may have temporarily peaked. Evidently MAT has captured most of the current transit market.

A second possibility is to promote an urban land-use pattern emphasizing high density developments concentrated in a defined central city and corridor area where most major employment and shopping centers, institutional services and housing for low-income and elderly population would locate. In such a corridor area, urban development programs would consider the needs of mass transportation of higher priority than those of automobiles. Should such a land-use pattern develop, most transit demands would concentrate in a smaller area and buses would enjoy higher occupancy. At the same time, bus service to some outlying low-density areas where demands are minimal could be terminated or reduced, thus diminishing the operating deficit without actually reducing the percent of potential transit market captured. If this second possibility for MAT to be self-supporting were actively pursued, however, its implementation and effects would occur slowly.

If MAT cannot be expected to expand its ridership by further improving services, and if active pursuit of a transit oriented urban growth policy cannot be expected, a third possibility for MAT to become self-supporting would lie in a change of socioeconomic factors such as people's preferences toward means of transportation, housing types and life style; urban land costs; gasoline prices and family income; any of these could result in changed land-use patterns.

Study Methodology

For a typical weekday in 1974, MAT had 40,105 passengers, $10,911 revenue and $16,192 total cost. A total of 59,515 daily passengers, a 48 percent increase, would be required to generate enough revenue to cover Metro Area Transit's total costs. The bus-passenger fuel economy would then be 65.1 passenger miles per gallon, 3.3 times higher than auto-passenger fuel economy. Because MAT can contribute to more efficient use of energy, it is essential to encourage transit ridership. Yet it is also desirable that MAT pays its way. This section examines possible changes of socioeconomic factors necessary to expand MAT ridership.

To find the extent to which socioeconomic factors would need to change to result in the 48 percent increase in daily passengers needed for MAT to break even, relationships between transit riders (Y) and single family density (X_1), multiple family density (X_2), net population density (X_3), commercial land concentration (X4), employment concentration (X5), median family income (X_6), per capita auto ownership (X_7), and distance to CBD (X_8) were examined. The study area included most developed land in Omaha. It had 94 percent of MAT's 1974 ridership (see Table 1). The Transportation Super Districts were 1-12 and 15-17, as defined by MAPA. Transit trip ends by Super District were based on the 1974 MAT survey previously cited. Land use and socioeconomic data were from the 1970 Census.

Study Results

Simple correlations among the variables were calculated. Transit trips were positively correlated with land use densities (X_1 to X_4) and employment concentration, negatively correlated with median family income, per capita auto ownership and air distance to CBD (Table 2). Stepwise multiple regression analysis was employed to generate the following explanatory equations:

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[1]Nationwide transit trips accounted for only 5.2 percent of urban trips in 1972, as indicated in the *1974 National Transportation Report.*

[2]Major source of MAT data: MAT and MAPA, *Short Range Transit Development Plan for the Omaha-Council Bluffs Metropolitan Area,* February 27, 1975.

[3]Transportation accounts for 60 percent of U.S. petroleum consumption, and is extremely vulnerable to shortages of petroleum and to the effects of higher petroleum prices; private automobiles in particular account for almost 80 percent of the energy used for passenger transportation. Data Source: U.S. Department of Transportation, *1974 National Transportation Report,* Chapter XI. (Washington: U.S. Government Printing Office, 1974.)

[4]Assumes auto fuel consumption to be 0.077 gallons of gasoline per vehicle mile. U.S. Department of Transportation. *Characteristics of Urban Transportation Systems,* Table 38. May 1974. Also assumes average auto occupancy to be 1.5 persons.

[5]Source-Metro Area Transit.

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TABLE 1
VARIABLES EXAMINED IN REGRESSION ANALYSIS

Transportation Districts	Y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
1	286.5	14.5	90.3	119.9	16.5	44.67	3,813	.250	0.0
2	98.5	7.9	24.9	29.5	4.1	3.09	5,629	.318	2.0
3	85.7	5.7	21.3	20.1	2.9	1.43	9,681	.495	3.7
4	88.1	6.2	27.9	24.2	5.2	5.87	2,478	.453	3.0
5	104.7	8.0	24.4	28.5	3.6	2.90	6,523	.329	2.5
6	28.5	6.3	10.9	19.9	0.5	0.67	7,543	.413	3.2
7	87.9	6.2	18.8	22.3	1.3	0.56	9,218	.423	4.7
8	27.2	3.6	23.2	15.0	1.1	0.44	11,516	.472	5.7
9	37.7	3.8	17.6	15.8	3.8	1.61	11,789	.499	6.3
10	39.2	2.9	14.4	12.0	5.9	3.09	14,972	.536	6.3
11	6.1	4.4	13.0	17.9	2.8	2.51	11,126	.503	7.5
12	63.9	5.3	16.6	21.6	2.4	1.98	8,253	.379	4.5
15	13.2	3.1	9.1	14.6	1.2	0.14	15,560	.482	9.5
16	10.5	3.8	12.1	15.8	0.8	0.48	13,588	.483	10.6
17	10.1	4.8	14.1	20.0	0.8	1.49	11,907	.430	11.0
1, 2, 5 (Center)	158.0	8.0	31.5	31.3	5.1	7.28	5,649	.315	2.0
3, 4, 6, 12 (Ring 1)	78.9	5.9	23.9	21.9	2.7	2.58	8,758	.448	3.6
7, 8, 9, 10, 11 (Ring 2)	42.8	4.0	16.4	15.9	3.1	1.67	11,675	.483	6.3
15, 16, 17, (Ring 3)	10.8	3.8	11.2	16.3	0.9	0.71	13,640	.470	10.4
Total (Study Area)	86.8	5.2	23.9	20.6	2.7	2.41	8,903	.425	5.4

Sources: Column Y from MAT and MAPA, *Short Range Transit Development Plan for the Omaha-Council Bluffs Metropolitan Area.* Columns X_1 – X_7 from MAPA calculations based on 1970 Census. Column X_8 author's measurements.

(a) $Y = 12.4533 + 4.0053\ X_1 + 1.9957\ X_2 - 5.2530\ X_8$

F-value: 2.9* 14.1** 6.9**

with: R^2 (coefficient of determination) = 0.44
SE (Standard error) = 17.85

(b) $Y = 103.7549 + 1.8129\ X_3 - 0.00819\ X_6$

F-value: 33.0** 13.4**

with: R^2 = 0.87
SE = 24.78

(c) $Y = 149.3974 + 1.8256\ X_3 - 295.3996\ X_7$

F-value: 19.8** 5.7**

with: R^2 = 0.82
SE = 28.69

Where: Y = Trip ends per 1,000 (population + employment + school enrollment)
X_1 = Single family units per acre of single family land
X_2 = Multiple family units per acre of multiple family land
X_3 = Population per acre of residential land
X_6 = Median family income in dollars
X_7 = Per capita auto ownership
X_8 = Distance to CBD in miles

Variables rejected because the resulting coefficients were found to be insignificant were:
X_4 = Commercial land as percent of total land
X_5 = Employment per acre of total land

*Significant at 10 percent significance level
**Significant at 1 percent significance level

Equation (a) explained 44 percent of the variation. The variations in land use densities (X_1 and X_2) can best explain the differences in the trip ends. This equation was used to estimate the change in land use densities under which daily passengers would increase 48 percent. Since median family income and per capita auto ownership were rejected from this equation but have higher correlation coefficients with bus ridership, Equations (b) and (c) were generated to estimate the necessary changes of median family income and per capita auto ownership.

The relation between the socioeconomic variables and transit ridership were then estimated for the Omaha area under two conditions. Condition I assumed no change in the ratio between population, employment and school enrollment or in the proportions of different land uses. Under Condition I, the 48 percent increase in MAT passengers would occur if median family income decreased by 13 percent, auto ownership decreased by seven percent, employment concentration increased by 22 percent and land use densities X_1 and X_2 increased by 22 percent. (Table 3 summarizes these relationships.)

TABLE 2
CORRELATION COEFFICIENTS

	Y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
Y	1.00	0.93	0.92	0.88	0.86	0.85	-0.79	-0.79	-0.79
X_1		1.00	0.89	0.91	0.79	0.85	-0.86	-0.88	-0.75
X_2			1.00	0.97	0.93	0.96	-0.65	-0.69	-0.63
X_3				1.00	0.90	0.98	-0.62	-0.72	-0.54
X_4					1.00	0.94	-0.51	-0.55	-0.59
X_5						1.00	-0.53	-0.62	-0.49
X_6							1.00	0.87	0.87
X_7								1.00	0.66
X_8									1.00

Condition II further assumes no change in median family income (price index adjusted), since it is unlikely to decrease without a drastic change in the existing economic structure, and no change in per capita auto ownership.[6] Under Condition II, the necessary increase in transit ridership would occur if land use densities X_1 and X_2 and employment concentration increased by 31 percent (Table 3).

The existing residential density of the study area is 6.86 dwelling units per acre. An increase in residential density of 22 percent (Condition I) or 31 percent (Condition II) would result in 8.37 or 8.99 dwelling units per acre, an increase not likely to occur in a short period of time.

From this analysis, it appears unlikely that Metro Area Transit will become self-supporting simply through improved transit service, the first possibility considered. Pursuing a land use policy which emphasizes concentration of high-density development along corridors where transit service would be emphasized, the second possibility, would be beneficial. However, trends in socioeconomic characteristics affecting MAT ridership, the third possibility, support the belief that at least in the near future Metro Area Transit will continue to require public subsidy.

[6]Median family income and per capita auto ownership were highly correlated. Both these variables could not be introduced into an equation with trip ends and any of the land use densities. Thus based on equations (b) and (c), if one of these two variables did not change, the other did not change either.

TABLE 3
CHANGE OF VARIABLES NEEDED FOR MAT TO BECOME SELF-SUPPORTING

	Existing	Condition I	Percent Change	Condition II	Percent Change
Population	379,794	463,797	+22	497,578	+31
X_1 Single family density (units/acre)	5.2	6.37	+22	6.81	+31
X_2 Multiple family density (units/acre)	23.9	29.16	+22	31.31	+31
X_3 Net population density (population/acre)	20.6	25.13	+22	26.96	+31
X_4 Commercial land concentration (percent of total land)	2.7	2.7	0	2.7	0
X_5 Employment concentration (employment/acre)	2.41	2.94	+22	3.16	+31
X_6 Median family income ($)	$8,903	$7,757	- 13	$8,903	0
X_7 Per capita auto ownership	0.425	0.393	- 7	0.425	0
X_8 Air distance to CBD (miles)	5.4	5.4	0	5.4	0
Y Transit ridership [trip ends/1,000 (population + employment + school enrollment)]	86.8	104.4	20	98.3	+13

Source: Variables X_1 through X_7 and Y based on MAPA calculations from 1970 Census data.
Variable X_8 author's measurement.

THE FLORENCE BUSINESS DISTRICT: A SURVEY OF PUBLIC OPINION

(Editor's Note: This is the third of a series regarding attitudes toward traditional business centers--Benson, South Omaha, Florence, Near North Omaha and the Central Business District. These surveys are part of a CAUR study for the City of Omaha on the economic impact of the five study areas and incentives to private investment in these areas.)

The Florence neighborhood is the vicinity of 30th Street south of Highway 36 in northeast Omaha. The original city of Florence was incorporated three years before Omaha on the site of the Mormons' first Nebraska encampment and functioned as a supply post on the Oregon Trail; Florence continues to have a historical image for most Omahans. After its annexation by Omaha in 1917, Florence received little attention as the city grew westward. Recently, however, the Florence area has figured in plans for the North Freeway and in the 1975 completion of the north sector of Interstate 680.

Florence residents maintain a strong sense of neighborhood. Population loss between 1970 and 1975 in the Florence area was 4.4 percent, while population in Northeast Omaha as a whole declined more than 17 percent during the same period.[1] As retail trade centers shift from the Central Business District to outlying shopping areas, a strong commercial core in the Florence Business District becomes even more valuable for shopping needs of Florence area residents.

To determine shopping patterns and attitudes, 161 residents of the Florence area were asked to rate conditions in the Florence Business District in one of five categories from *excellent* to *very poor* and to identify the extent to which they shop in Florence. Their responses are summarized in Table 1. Residents were also asked to state their reasons for shopping or not shopping in Florence, describe characteristics of the area they like most and least and suggest improvements to encourage more shopping in the area.

A majority of Florence residents rated shopping conditions there as excellent or good. Florence's strengths were identified as the very qualities distinguishing it from shopping centers. Nearly 40 percent of all respondents said the characteristic they like most about the Florence Business District is the atmosphere, a small-town feeling attributed to friendly people, personal recognition, uncrowded conditions and proximity to the Florence residential neighborhood. All except three residents who do almost all their shopping in Florence and more than half of those who rated conditions there excellent cited the area's convenience as the explanation.

Although the location and arrangement of the Florence Business District is considered convenient, the limited variety of available goods and services is the most commonly cited weakness of the area. More than one hundred Florence residents suggested that the improvement most needed in Florence is more businesses, some referring to a full-line department store (17 respondents), grocery store (21), discount store (14) or clothing store (8) in particular. Sixty-two percent of area residents do only some shopping in Florence, including two-thirds of those who rated shopping conditions excellent. Several respondents directly stated their preference for shopping centers, and most criticisms of the Florence Business District strengthen the indication that Florence businesses are in competition with the larger discount and shopping centers.

Florence residents had few complaints about existing establishments or problems common to other traditional business districts such as difficult parking or deteriorated physical conditions, and they do not want to sacrifice the pleasantness that accompanies small size. Nevertheless, they most often shop where they can accomplish several errands at one stop, and most improvements suggested for the Florence area focus on practical needs. Continuing improvements in transportation systems providing access to the Florence Business District suggest the potential for Florence establishments to attract a market sufficient to support the more complete business district Florence area residents desire.

[1]Northeast Omaha is the segment north of Dodge and east of 42nd Street. Population estimates are based on 1970 Census figures and 1975 City Planning Department estimates; census tracts 2, 3, 61.02, 62.01 and 62.02 were used to estimate Florence area population.

TABLE 1
THE FLORENCE BUSINESS DISTRICT: A SURVEY OF PUBLIC OPINION

	Overall, would you rate shopping conditions in the Florence business district as:						How much shopping for non-grocery items do you do in the Florence business district?			All Respondents
	Excellent	Good	Fair	Poor	Very Poor	No Opinion	Almost All	Some	None	
	Percent									Number
Total Respondents	11	43	26	12	3	6	21	62	18	161
Age:										
Under 25	0	25	50	13	0	13	25	25	50	8
25-64	6	45	28	15	3	4	14	67	19	105
65 or over	23	43	19	6	2	6	33	56	10	48
Income:										
Under $4,000	18	43	29	0	3	7	35	52	13	29
$4,000-$8,000	22	39	17	11	0	11	33	50	17	18
$8,000-$12,000	3	41	29	18	6	3	12	59	29	34
$12,000-$16,000	6	47	22	19	3	3	12	72	16	32
$16,000-$20,000	7	47	26	20	0	0	7	73	20	15
$20,000-$25,000	0	20	80	0	0	0	20	80	0	5
Over $25,000	15	57	14	0	0	14	0	71	29	7
No response										21
Own Auto:										
Yes	11	42	26	14	2	5	17	65	18	142
No	11	50	28	0	6	5	47	37	16	19

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