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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 St. Louis reported none; Denver reported 55 times more forcible rapes per 100,000 population than Dubuque. Property crime

*Assisted by Dr. Paul S. T. Lee and Yeshe Chen.

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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 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 robbery and larceny (Bismarck) was about the same as the lowest rate (Des Moines). 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 computed 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.6 The demonstration that socioeconomic factors most often considered to have an impact are: strength of the police force, population density, unemployment, age and racial composition, economic status of the area, and the percent of families living below the poverty level. 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, 1976 crime rates were estimated using 1974 Uniform Crime Reports and adjusting by the percentage change from 1974 to 1976, as reported by the FBI in the Uniform Crime Reports for the 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 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. Male unemployment rate/female unemployment rate
f. Percent males 16-21 years old unemployed, not in school or not in labor force

g. Negro, nonwhite population
h. Persons under 18 percent-living with both parents
i. Percent of families below poverty level
j. Residential mobility of the population

Findings

Simple correlations between crime rates and each of the socioeconomic variables were computed. Factors were retained for further 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 characteristics (violent crimes, property crimes).

A priori one would expect that the greater the property crime law enforcement per capita the lower the crime rate. The correlation between violent crime, property crime and the property crime law enforcement variable were .91 and .59 respectively, indicating the greater the law enforcement per capita the greater the crime rate. This correlation, however, does not suggest that the latter outweighs the former. 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 these studies, however, crime rates and density were based on the SMSA as the unit of observation. 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 are 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 1960's, while the unemployment rates were declining. Furthermore, the unemployed may be either fractionally (those moving from one job to another) or structurally (hard core) unemployed, both groups reiterating to crime differently. Professor Phillips and Voyce have suggested that participation rate (non-worker/participant) may be a better measure of economic opportunity than the unemployment rate alone. 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 percentage of youth living with both parents was considered. This variable was highly correlated not only with violent crime rates, but also with property crime rates. It was 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 rates, 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 in the home. Each analysis showed unemployment as the most significant socioeconomic 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 property crime rates.

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

\[ Y_1 = 5076.4541 + 9.4230X_1 + \text{cost of living} + \text{other factors} \]

\[ Y_2 = 26744.92 - 193.69X_1 - 73.48X_2 + \text{cost of living} + \text{other factors} \]

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 effects 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 under 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 seven 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 lower the violent crime rate by three percent and the property crime rate by five percent. Decreasing population density would also lower crime rates.

In conclusion, evidence in this study gave no support to the conclusion, evidence in this study gave no support to the assumption that the more size of a city's police force deterr crime. Crime rates are not significantly lower in cities with more police, although police may be dealing daily with crime or deterring it. They do not create and prevent crime. The results of this study, however, do not contradict the police effectiveness and the production function for law enforcement.7

![Table 2: Socioeconomic characteristics of 25 Mid-Continent cities](https://example.com/table2.png)

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7Pressman and Carol, op. cit., explain the finding by the hypothesis that the high cost of employing a police force reduces the ratio of police to population because employment is lower in high crime areas and that population growth is the result of migration from high crime areas to low crime areas. Greenwood and Wadzsky concluded that the observed relationship was a function of police recruitment. Their hypothesis is that police are trained to keep property crime rates per capita low by recruiting from lower crime areas.

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8Adjusted Standard error = .957629

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**Significant at the 10 percent level**

**Significant at the 5 percent level**

The explanatory variables in both equations validate some common-sense assumptions about the causes of crime. Arrest data show that crime is predominately an urban and youthful phenomenon with blacks more than proportionately involved. The results of multivariate regression analysis indeed suggest that a large number of factors, in the case of the crime rates among cities in the Mid-Continent Region can be explained by these socioeconomic characteristics. These characteristics explain 54 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, 27 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.
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 (X1), multiple family density (X2), net population density (X3), commercial land concentration (X4), employment concentration (X5), median family income (X6), per capita auto ownership (X7), and distance to CBD (X8) 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 (X1 to X4) 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:

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.
The THE FLORENCE BUSINESS DISTRICT:

A SURVEY OF PUBLIC OPINION

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 first Nebraska encampment and functioned as a supply post on the Oregon Trail. Florence continues to have a historical image for most Omahas. 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 growth in Northeast Omaha as a whole declined more than 17 percent during the same period. 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. Nearness to all of retail centers 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 was adequate to serve the needs of area residents, the limited variety of available goods and services is the most commonly cited weak-

ness 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 (B) in particular. Sixty-six percent of area residents do only some shopping in Florence, including two-thirds of those who rated shopping conditions excellent. Several residents 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 estab-

lishments 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 the Florence Business District with the potential for Florence establishments to attract a market sufficient to support the more competitive business services, are desired.