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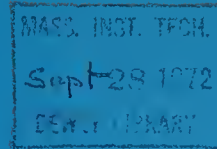




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**The Determinants of Juvenile Arrests**

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**Number 87**

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## The Determinants of Juvenile Arrests

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<sup>\*</sup>The views expressed in this paper are the author's sole responsibility and do not reflect those of the Department of Economics nor of the Massachusetts Institute of Technology. Earlier drafts of this paper were presented to the Winter 1968 Meetings of the Econometric Society and the Winter 1970 Meetings of the American Association for the Advancement of Science. I would like to thank Professors R. Beals, R. Penner, S. Rosen, R. N. Rosett, and L. Thurow for their comments and criticisms. The author is Assistant Professor of Economics at M.I.T.

## Introduction and Review of Literature

Juvenile crime is important to society because of both the harm (physical and human) incurred by victims and offenders. Juvenile offenders may suffer themselves as a result of early criminal associations, arrests and perhaps confinement which may be the beginning of a life of illicit activities.

Our interest in juvenile crime is especially strong because we hope that by understanding the causes and remedies for delinquency we can save society and the juvenile from further damage. Many social policies have been advocated as preventative, though little research has been undertaken to evaluate their effectiveness. Furthermore, until recently, little research had been undertaken to analyze and understand the theoretical or empirical causality and structure of crime.

Professor Gary Becker [1] has done a theoretical study of the structure of criminal activity. He hypothesizes that in the case of property or remunerative, rather than emotional criminal activities the potential gain from crime will be measured against the person's wages or earnings in legal activities (his opportunity cost) in deciding whether to pursue criminal endeavors. Hence, variables like education, race, and wealth, which determine a person's earnings in legitimate activities, could be expected to play an important role in decision making.

In the case of juvenile offenders who are still in school, having no established real wage or opportunity costs, various data on the family income would both indicate the present rewards the family can give the youth for not becoming involved in crime and serve as a proxy for the

youth's expected earnings in legitimate activities. Such variables would include median family income, home ownership, race, poverty, education and unemployment of the head of household. These variables could explain both the economic and emotional factors in delinquency. For example, discrimination against non-whites would be likely to depress present family and expected individual earnings of a juvenile, while reducing one's belief in the efficiency and legitimacy of the criminal justice system.

Becker theorizes that law enforcement policies and effectiveness are determinants of the supply or output of criminal activity. Following this line, he reasons that criminal activities are negative functions of: the probabilities of arrest, conviction and confinement; the expected lengths of confinement and probation; and the expected legal and other costs incident to arrest and trial.

His analysis is rather surely economic in that it does not mention the possibilities of social injustice and deprivation themselves contributing to crime and anti-social behavior independent of expected future earnings. In the case of discrimination, if it were found that non-white's committed more crime, independent of potential income and probability of arrest, etc., Becker would probably say that the reason is that there is less discrimination in illegal than legal occupations, hence blacks have higher relative illegal to legal wage ratios. Others might say that being discriminated against reduces one's belief in justice and lowers the peer group pressure against illegal activities. However, either line of reasoning would lead to the hypothesizing and testing of extremely similar econometric models so that the outcome of this argument



would affect our interpretation of results but not our empirical estimations.

In yet unpublished studies, Roy Carr-Hill<sup>and N.H. Stern</sup> [5, 6] has~~se~~ used recorded crimes in England and Wales to test the effects of the probability of arrest (the arrest to crime ratio) and the expected length of sentence on the rate of criminal activity. <sup>He</sup>has~~met~~ met with reasonable success, obtaining the results predicted by Becker. England (and Wales) provide a more fertile field than the United States for criminal data collection, since they have a centralized police force and criminal data system.

Directing our attention to juvenile delinquency, we realize that it differs significantly from adult crime in several ways. The data available, the method of handling defendants, society's attitude and preventative policies all offer contrasts. The differences in data available do not present a problem since they correspond to the differences in behavior we are modeling.

Accurate data on juvenile crimes is not available--only data on arrests is. A crime is not classified as juvenile in origin unless a juvenile arrest is made. However, the results obtained for arrests can be interpreted to apply to juvenile crime since it is reasonable to assume that arrests are roughly proportional to offenses (reported or actual), though the proportion may vary from area to area.

Using juvenile arrest data may be preferable since society may attach more importance to juvenile arrests than crime. Our interest in the harm crime and arrest do to juveniles may be greater than our interest in the harm juvenile crimes do to victims. A juvenile arrested for breaking a

window does little damage to the victim but may mean that his family and community are unable to provide the kind of guidance which, even if it necessitate police being called, would lead to internalized correction rather than arrest.

Another difference between juvenile and adult offenders is that juveniles, aged seven through fifteen, are tried in an informal family court setting. They are usually not sentenced to punishment but remanded to parental, social, foster home, and occasional institutional custody. These actions are designed as corrective and not penal--the court's rulings and actions being kept secret. Thus, length of sentence does not have the same meaning or impact as in adult proceedings.

Another difference is that the extent to which society uses social agency programs to prevent and deter crime and arrest is much greater in the case of juveniles. Therefore, it is desirable that these preventative endeavors be modeled and their effectiveness tested. Settlement houses and recreation programs are in part established to act in this capacity. The different measures of and interpretations of the opportunity cost, income variables, affecting juvenile crime have already been mentioned.

Belton Fleisher has used time series analysis [15] to assess the effect of adult (male<sup>1</sup>) unemployment on delinquency (arrests) and cross section analysis to estimate the effects of juxtaposed difference in income on juvenile arrests for property crimes [12, 13, 14].

This study shall attempt to estimate the effects of: economic, demographic and sociological factors; social agency programs (recreation

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<sup>1</sup>This is not inappropriate since approximately 90 percent of all juveniles arrested are male.

and settlement houses); and police patrolling upon juvenile arrests. Fleisher's works did not include the effects of social agency programs or police patrolling on juvenile arrests.

Sociologists have been interested in the discovery of the causes (correlates) of juvenile delinquency. Authors like Chilton [8] and Lander [20] have used correlation coefficients to discover such causal variables. However, other sociologists including Cheim [7] and Hirschi and Selvin [18] have suggested that multiple regression technique would be preferable. The variables found to be significant in this study are similar to those cited in the above studies.

### The Model

The models will include a constant and three classes of variables which can be considered either a production function for arrests or a supply function for crime.

$$(1) \quad A = f(X, Y, P)$$

where A is the juvenile arrest rate;

X is a vector of economic, demographic and sociological variables representing the opportunity cost and environmental causes of juvenile crime and arrests;

Y is a vector of social programs which are in part intended to reduce juvenile crime and arrests; and

P is the per capita rate of police patrolling.

If juvenile arrests are roughly proportional to crime, the coefficients of vectors X and Y can simply be multiplied by the crime to arrest ratio to obtain values for crime. Furthermore, if this assumption holds, the elasticities of arrests and crime with respect to the independent variables are the same. In the case of Rochester, from which our data comes, the general crime to arrest ratio is three to one. The police believe the same ratio applies to juvenile crime, though there is no hard data to support this assertion.

There are several variables which may be included in the X vector, and we should not be surprised if some of their coefficients turn out being insignificantly different from zero.

The coefficient of police patrolling will only give us the effects of police patrolling on arrests but cannot be interpreted to apply to crime. The reason is that raising the rate of patrolling is likely to both increase the arrest to crime ratio and decrease the rate of crime. Therefore police patrolling could have a positive sign indicating that it increases the arrest rate while reducing the crime rate.

Police patrolling could be endogenous to the system,<sup>2</sup> since the X variables which explain the supply of crime could also determine the rate of police patrolling. Hence our model would become

$$(2) \quad A = f(X, Y, P) \quad \text{and} \quad P = g(X, Z),$$

which can be estimated by two stage least squares. Z is a vector of exogenous variables, explaining the rate of police patrolling. Due to the

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<sup>2</sup>Belton Fleisher does not use police patrolling as a variable and thus does not confront these questions.



fact that police not only patrol both residential population and aggregate economic activity, variables representing economic activity would be contained in Z. Aggregate economic activity is greatest at the center city decreasing in a non-linear manner with distance from the center, hence it can be represented by distance from the center and its square. The phenomena might also be represented by a dummy variable which takes on the value one for the center city and zero everywhere else.<sup>3</sup> Alternatively our model could become

$$(3) \quad A = f(X, P) \quad \text{and} \quad P = h(W)$$

where W is a set of dummy variables whose predicted value for P replace the actual values of P in  $A = f(X, P)$ .

We shall estimate all three models (1-3) in both linear (including quadratic terms<sup>4</sup>) and logarithmic form.

### The Data

Since differing police jurisdictions may have different policies with regard to juvenile offenders, it is desirable to use arrest data from one police jurisdiction and central command. To this goal, we selected all of Rochester's (88) census tracts for the years 1959-1961.

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<sup>3</sup>In the case of Rochester, there is also a lakeside entertainment district suggesting another dummy variable taking on the value one for the district and zero elsewhere.

<sup>4</sup>Diminishing or increasing marginal effects of some of the X variables may indicate they're being used in quadratic form.

Arrest data for the three years was pooled (averaged) to form our independent variable since the annual number of juvenile arrests in any census tract is always a small number, thus is subject to large fluctuations. Many tracts had one or two or no arrests in the years. If the structure of crime, policing and the socio-economic configuration remains stable over the time period of pooling, the procedure will increase the efficiency of our estimate without introducing bias. Using the three year data rather than just the 1960 data as the independent variable in the same equation increased the F ratio and  $R^2$  from 16 and .58 to 43 and .79 in, respectively, equations A8 and A4.<sup>5</sup>

Data on juveniles arrested (aged seven through fifteen) by the residence of the offender was obtained from the Rochester Youth Board [20]. This was quite convenient since it conformed to our census, social agency and police data. A study by the Rochester Youth Board for one of the three years showed that two-thirds of all juvenile crimes occurred either within the juvenile's census tract of residence or one contiguous to it. Therefore, our data is close to being both data on the residence of offender and the location of offenses.

The number of juvenile settlement house members in each census tract were obtained from the files of Rochester's five settlement houses. Data on arrests and settlement house membership were converted to per capita rates by dividing by the number of juveniles in census tract in 1960.

An index proportional to the average per capita juvenile attendance

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<sup>5</sup>Equation number beginning with A refers to the appendix.

at recreation facilities (the number of times an average juvenile attended a recreation facility in a year) by census tract was computed by obtaining the recreation bureau's total seasonal attendance records for the city's approximately seventy city parks, gyms, etc., and attributing it to various census tracts.<sup>6</sup> Attendance at each facility was summed for each tract then divided by the number of juveniles in the tract, tacitly assuming that the proportion of attendance that is juvenile is close to the same proportion for all facilities.

An index of police patrolling per capita was constructed from data obtained from the Rochester Police Bureau.<sup>7</sup> Socio-economic and demographic variables were obtained from the 1960 United States Census [40].

### Estimation of the Model

#### The X Variables

Our first task was to select the variables which comprise our X vector. The method was to try all reasonable variables, selecting those which contributed significantly to variance and had significant t-ratios.

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<sup>6</sup>In the case of parks, half of all attendance was assumed to come from census tracts within one-half mile of the park, one-fourth from census tracts located between one-half and one mile from the tract, one-eighth from one to one and a half miles from the tract, and one-eighth from the rest of the city. For gyms which serve older juveniles the distances were increased by 50 percent.

<sup>7</sup>This was done by taking the number of auto based patrolmen in each of nine sub-districts and dividing the number of patrol days by the population in each of these nine areas. Each three sub-districts formed a district to which varying numbers of foot patrolmen and officers were assigned, which were divided by the population in each district to obtain an index of foot patrolling and officials per capita. These rates of foot patrolling were added to the auto rates to obtain nine different rates of total patrolling for the city. Again the underlying assumption is that police patrol the population proportionately at all levels.

The four variables meeting these criteria were the: percent of families with incomes below \$3,000 in 1960 squared, PP2; percent of owner occupied homes, OWN; percent non-whites squared, PB2; and median family income, MIN.<sup>8,9</sup>

Estimating our model without police patrolling, PAT, recreation facility attendance, REC, and settlement house membership, S, yields:<sup>10</sup>

$$(4) \quad A3Y = 16.4 \quad -1.8 \text{ MIN} \quad +.91 \text{ PP2} \quad +.10 \text{ PB2} \\ (2.7) \quad (2.4) \quad (3.8) \quad (1.9)$$

$$R^2 = .76 \quad F(3,83) = 88 \quad E1.^{11}$$

and,

$$(5) \quad A3Y = 14.8 \quad -.84 \text{ MIN} \quad -.65 \text{ OWN} \quad +.76 \text{ PP2} \quad +.13 \text{ PB2} \\ (2.7) \quad (1.1) \quad (2.9) \quad (32) \quad (2.5)$$

$$R^2 = .78 \quad F(4,82) = 74 \quad E1.$$

adding our social agency variables gives:

$$(6) \quad A3Y = 16.5 \quad -2.0 \text{ MIN} \quad +.63 \text{ PP2} \quad +.14 \text{ PB2} \quad +.0053 \text{ REC} \\ (2.7) \quad (2.6) \quad (2.3) \quad (2.5) \quad (0.6)$$

$$-.033S \quad +.22 \text{ PAT} \\ (0.8) \quad (2.2)$$

$$R^2 = .78 \quad F(6,80) = 46 \quad E1.$$

and,

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<sup>8</sup>The other variables tested include the: percent employed males; percent of families whose head of household had less than an eighth grade education; number of rooms per family; percent of residents who have moved in the last five years; percent of families having an occupancy rate of more than one person per room; percentage of juveniles under eighteen years not living with both parents; percent of families living in delapidated housing or deteriorated housing with faulty plumbing; median number of years of education adults; ratio of juveniles (7-15) to adults (25 and over); and the linear form of the above squared variables.

<sup>9</sup>The means and standard deviations of the variables are listed in the appendix. The data is available from the author upon request.

<sup>10</sup>t-ratios of coefficients in brackets below.

<sup>11</sup>E1 after an equation means that the coefficients have been converted to elasticities.



$$\begin{array}{rcllcl}
 (7) & A3Y = & 15.8 & -1.1 \text{ MIN} & -.57 \text{ OWN} & +.56 \text{ PP2} & +.15 \text{ PB2} \\
 & & (2.6) & (1.4) & (2.4) & (2.1) & (2.8) \\
 & & +.0009 \text{ REC} & -.022 \text{ S} & +.16 \text{ PAT} & & \\
 & & (0.01) & (0.06) & (1.6) & & \\
 & R^2 = & .79 & F(7,79) = & 43 & E1. & 
 \end{array}$$

Examining equations (4)-(7), we can see that the coefficients of OWN, PP2 and PB2 are all significant at the five percent or one percent level with the expected signs, except the coefficient of PB2 in equation (4) which is only significant at the 10 percent level (two tail tests). Calculating F-ratios in equation A5-A7, in the Appendix, shows all three of the above contribute significantly to the explanation of variance. Once OWN is introduced into equations (5) and (7), the coefficient of and variance explained by MIN became insignificant, equations A3 and A5.

#### The Single Equation Linear Model

Having selected the variables making up the X vector, let us turn our attention to the social agency and police variables. In both equations (6) and (7), the coefficients of REC and S are insignificant with t-ratios below 0.8. The coefficient of PAT is positive in both equations and significant at the five percent level in (6). Performing Chow tests on REC, S, and PAT in equations (4) versus (6) and (5) versus (7) yields F-ratios of 2.62 and 1.51 respectively, with 2.72 being the critical value at the five percent level. The hypothesis that they jointly have no contribution to the explanation of variance is not refuted. REC and S are of no significance and PAT of uncertain significance so far.

In examining the residuals of (4)-(7), A1-A8, the predicted arrest

rate for census tract 28 was five (5) standard errors of regressions or more below the actual value. In attempting to ascertain the explanation of this phenomena, we discerned that the tract's uniqueness lay in its possessing a preponderance of the city's transient hotels and rooming houses. It therefore seemed that this would best be handled by a dummy variable, D1, taking on the value one for census trade 28 and zero elsewhere. This procedure yielded:

$$(8) \quad A3Y = 7.4 \quad -.55 \text{ OWN} \quad +.88 \text{ PP2} \quad +.15 \text{ PB2} \quad +3.1 \text{ D1} \\ (4.6) \quad (3.5) \quad (5.9) \quad (4.0) \quad (7.5)$$

$$R^2 = .87 \quad F(4,82) = 136 \quad E1.$$

$$(9) \quad A3Y = 12.7 \quad -.79 \text{ MIN} \quad -.45 \text{ OWN} \quad +.74 \text{ PP2} \quad +.16 \text{ PB2} \quad +3.1 \text{ D1} \\ (3.0) \quad (1.3) \quad (2.5) \quad (4.0) \quad (4.1) \quad (7.5)$$

$$R^2 = .87 \quad F(5,81) = 110 \quad E1.$$

$$(10) \quad A3Y = 8.8 \quad -.60 \text{ OWN} \quad +.87 \text{ PP2} \quad +.15 \text{ PB2} \quad -.094 \text{ REC} \quad +.013 \text{ S} \\ (4.4) \quad (3.6) \quad (4.9) \quad (3.6) \quad (1.3) \quad (0.4) \\ -.026 \text{ PAT} \quad +3.3 \text{ D1} \\ (0.3) \quad (7.3)$$

$$R^2 = .87 \quad F(7,79) = 77 \quad E1.$$

The dummy variable is significant at the one percent level. MIN is still not significant by either the t or F test when OWN is introduced.<sup>12</sup> Moreover, REC, S, and PAT have insignificant t-ratios, are insignificant by a Chow (F) test, and explain almost no variance, while OWN, PP2, and PB2 are all significant at the one percent level.

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<sup>12</sup>The reason we retain the variable MIN though insignificant is that it is the only significant variable in the logarithmic form.

### Multi-Collinearity and the Simultaneous Model

As previously stated, there is reason to believe that PAT might be endogenous to our model thus introducing simultaneous equation bias. Therefore, we re-estimated our model treating simultaneity in PAT by two different methods. REC and S were also examined for any possible simultaneity or multi-collinearity, confirming our belief that neither existed.<sup>13</sup>

Regressing PAT which has a fair likelihood of being endogenous (simultaneously determined) upon our X variables we obtain:

$$(11) \quad \begin{array}{cccccc} \text{PAT} = & 1.7 & +.97 \text{ MIN} & -.55 \text{ OWN} & +1.3 \text{ PP2} & -.14 \text{ PB2} \\ & (0.03) & (1.20) & (2.2) & (4.9) & (2.2) \end{array}$$

$$R^2 = .59 \quad F(4,82) = 30 \quad E1.,$$

which seems to support the notion of simultaneity.

Adding the exogenous variables distance from the center city and its square, DC and DC2, to equation (11), yielding equation ALL, increases the  $R^2$  to .65, which is significant at the one percent level. The coefficients of DC and DC2 are significant at the five percent level. The only X coefficient that remains significant is PP2 at the one percent level.

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<sup>13</sup>In order to test for these possibilities, REC and S were regressed on the four variables of X. Using REC as the independent variable against X in A12 produced an estimate with an  $R^2$  of .11, an F-ratio of 2.52. Only the coefficient of OWN was significant at the five percent level. Hence our a priori belief that recreation attendance is exogenous to the model since the facilities are located wherever the city historically obtained land for parks, etc., is confirmed. Furthermore, REC is not significant in equation (6) without OWN or equation (7) with it.

Regressing S upon our X variables yields an  $R^2 = .43$ , an F-ratio of 15.5 and a negative coefficient of MIN significant at the one percent level. Our a priori belief that S is not endogenous, since settlement house location is also historic dating from the depression and before, holds up. S is similarly not significant in equations A5, A6, A7, and 10 that exclude MIN.

Alternatively adding dummies for the lake district, D2, and for the center city, D3, to (11), forming equation A16, yields an R<sup>2</sup> of .98, an F-ratio of 495 and no significant coefficients (a Chow test of all four X variables shows that they are not significant as a group) except those of D2 and D3, both significant at the one percent level. Eliminating the X variables and explaining PAT by D2 and D3 only, yields

$$(12) \quad \text{PAT} = 4.6 + 6.9 \text{ D2} + 18.0 \text{ D3}$$

$$(35.8) \quad (9.0) \quad (55.0)$$

$$R^2 = .97 \quad F(2, 84) = 1547$$

Equation (12) supports the argument that police patrolling is not endogenous, but is done at three levels (downtown, lake district, and the rest of the city). However, we shall still re-estimate the model with PAT treated simultaneously.

This was done by taking the predicted values of PAT in equation A15 (the X and DC variables independent) and in equation (12) (using D2 and D3 as the only explanatory variables) and substituting them for the actual values of PAT in (7). Two almost identical estimations, A18 and A19, were produced. The estimator using the predicted values PAT in equation (12), the two dummy model, is presented below.

(13)      A3Y = 16.1   -1.1 MIN   -.59 OWN   +.57 PP2   +.16 PB2   -.002 REC  
              (2.7)   (1.3)        (2.5)        (2.0)        (2.7)        (0.02)

             -.025 S   +.15 PAT  
              (.6)        (1.3)

             R<sup>2</sup> = .79      F = 42      E1.

Again, MIN, REC, S, and PAT are insignificant, jointly making no significant contribution to the explanation of variance and having insignificant



t-ratios. Again OWN, PP2, and PB2 are all significant at the five percent level or above. Eliminating MIN from (13) makes them all significant at the one percent level.

### The Logarithmic Form

The last step was to re-estimate our models in log form, equations A20-A27, yielding:

$$(14) \quad \text{LA3Y} = 44.9 - 4.7 \text{ LMIN} \\ (3.9) \quad (10.5)$$

$$R^2 = .57 \quad F(1,85) = 110 \quad \text{El.}$$

and

$$(15) \quad \text{LA3Y} = 44.0 - 4.2 \text{ LMIN} - .32 \text{ LOWN} + .033 \text{ LPP} + .051 \text{ LPB} \\ (3.2) \quad (3.1) \quad (1.1) \quad (0.07) \quad (0.8)$$

$$+ .055 \text{ LREC} - .038 \text{ LS} - .19 \text{ LPAT} \\ (1.1) \quad (0.9) \quad (0.9)$$

$$R^2 = .59 \quad F(7,79) = 16.4 \quad \text{El.}$$

LMIN is significant at the one percent level and is the only significant variable in (14) and (15). LOWN, LPP, LPB, LREC, LS, and LPAT all have insignificant coefficients.<sup>14</sup> A Chow test indicates that as a group they do not contribute significantly to variance. Equation (15) was run treating PAT simultaneously as in (13), and produced no significant change in the regression results, equation A26.

OWN and PP becoming insignificant in the logarithmic form may be due in part to their also being measures of wealth or income. The same may be true of the race variable PBL. If this is correct, we would

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<sup>14</sup>The actual and predicted values of LA3Y did not differ by a significant amount for tract 28 in equations (14) and (15).

want to test the effect of PP2 in the linear case independent of the effects of home ownership and race. So doing yields:

$$(16) \quad A3Y = 6.1 + 1.1 PP2 + .12 PB2 + .098 REC - .003 S + .20 PAT$$

$$(0.6) (5.4) (1.4) (1.1) (0.07) (1.9)$$

$$R^2 = .76 \quad F = 50 \quad E1.$$

$$(17) \quad A3Y = 5.9 + 1.4 PP2 + .07 REC + .001 S + .15 PAT$$

$$(0.6) (8.7) (.07) (0.4) (1.5)$$

$$R^2 = .75 \quad F = 60 \quad E1.$$

The elasticity of arrests with respect to the percent of families having incomes below the poverty level rises to +1.1 and +1.4 in equations (16) and (17) respectively, using a dummy variable for tract 28 increases them. Since decreasing poverty is likely to increase home ownership and somewhat reduce racial difficulties, it would not seem unreasonable to conclude that the elasticity of arrests with respect to poverty is almost unity (+1.0  $\pm$  .2).

### Interpretations

All of our research points to the conclusion that recreation facilities and settlement houses have no significant impact upon juvenile arrests and crime. We also conclude that police patrolling probably has no significant effect upon the arrest rate.<sup>15</sup> A zero coefficient for police patrolling would not mean that it does not deter crime but that it raises the arrest to crime ratio by the same percentage it reduces crime.

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<sup>15</sup>The variable did have an elasticity of .22 and a coefficient that was significant at the five percent level in one equation only, (6), which would mean that police increase the juvenile arrest to crime ratio by a larger percentage than they decrease juvenile crime.

In the linear model the percentage of blacks squared, in a census tract, has a positive effect on the arrest rate. The explanation of this could be that police have a greater tendency to arrest blacks, ghettos and discrimination raises the crime rate, or race is a proxy for extreme deprivation and poverty. The last explanation could be considered to be supported by the percent black being insignificant in the logarithmic form where median income became the only significant variable.<sup>16</sup>

Home ownership may have been a significant variable in the linear model because it represents wealth or stability. It was subsumed by income in the logarithmic model. Going on this assumption, we estimated linear models without OWN and PB2 leaving PP2, the percent below poverty squared, as the only remaining X variable. This procedure gave estimates of the elasticity of arrests with respect to poverty of +1.1, +1.4 and above (using a dummy for tract 28) as opposed to +.76 and +.87 when OWN and PB2 are included. Hence, +.95 or +1.0 would be a reasonable estimate of the elasticity of juvenile arrests with respect to poverty.

This is not inconsistent with the logarithmic case in which all variables except LMIN were insignificant and the elasticity of arrests with respect to median family income was approximately -5.00.

These results indicate that a 100 percent decrease in the rate of poverty or a 20 percent increase in median family income, raising the opportunity cost of crime and alleviating social distress, would almost

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<sup>16</sup> Nationally (and in Rochester) blacks account for approximately 50 percent of all arrests. The per capita arrest rate for blacks is eight times that for whites. If race was the sole explanation of this phenomenon the elasticity of arrest with respect to the percent black would be +.5, whereas the highest estimates of the elasticity that we estimated is +.16 in the linear and +.07 in the logarithmic models.

eliminate juvenile arrests and crime. Of course this interpretation is subject to the qualifications that our regressions can be validly interpolated and that re-distribution policies which may change the composition of income will not change these structural relationships significantly. Furthermore there is no feasible policy, except long term growth, that will increase the median income for all groups. Furthermore, relative income difference might be part of the explanation of the importance of income and poverty. It is, however, possible to raise the incomes of those living in poverty by 20 percent or more. Furthermore, any absolute increase in income will bring about the largest percentage increase in income and decrease in juvenile arrests and crime when allocated to the poorest segment of the population.

### Conclusions

Eliminating poverty or increasing the incomes of the poor by a little over 20 percent would probably decrease juvenile arrests to near zero, though juvenile crime would probably drop less since not being poor certainly must create an environment in which it is easier for a juvenile to avoid arrest for minor offenses. However, this would not represent any significant drawback to the policy since the arrest of a juvenile may be worse than the crime itself and minor crimes for which arrest can be avoided are probably of little significance.

Lastly, we must point out that poverty reduction cannot be called an optimal policy but only an effective or even most cost effective policy on the basis of this study, since the benefits accruing to society from reducing juvenile crime and arrests and the other benefits of poverty reduction have not been calculated in the literature.



Appendix: Regression Results  
(Means and Standard Deviations of Variables)

Number	Dependent variable	Form	F-ratio	R <sup>2</sup>	Constant	MIN	OWN	PP2	PB2	REC	S	PAT	OTHER	NOTES <sup>17</sup>
A1.	A3Y	Lin.	88	.76	16.4 (2.7)	-1.8 (2.4)		+9.1 (3.8)	+10 (1.9)					E1
A2.	A3Y	Lin.	74	.78	14.8 (2.7)	-.84 (1.1)	-.65 (2.9)	+76 (3.2)	+13 (2.5)					E1
A3.	A3Y	Lin.	46	.78	16.5 (2.7)	-2.0 (2.6)		+63 (2.3)	+14 (2.5)	+0053 (0.6)	-.033 (0.8)	+22 (2.2)		E1
A4.	A3Y	Lin.	43	.79	15.8 (2.6)	-1.1 (1.4)	-.57 (2.4)	+56 (2.1)	+15 (2.8)	+0009 (0.01)	-.022 (0.06)	+16 (1.6)		E1
A5.	A3Y	Lin.	49	.79	8.4 (2.8)		-.71 (3.3)	+76 (3.4)	+15 (2.6)	+0082 (0.1)	-.0057 (0.15)	+14 (1.4)		E1
A6.	A3Y	Lin.	50	.76	6.1 (0.6)			+1.1 (5.4)	+12 (1.4)	+098 (1.1)	-.003 (.07)	+20 (1.9)		E1
A7.	A3Y	Lin.	60	.75	5.9 (0.6)			+1.4 (8.7)		+07 (0.7)	+001 (0.4)	+15 (1.5)		E1
A8.	A60	Lin.	15.6	.58	27.9 (3.0)	-1.87 (1.3)	-1.3 (3.3)	+39 (0.9)	+12 (1.4)	-.14 (0.9)	-.021 (0.3)	+43 (2.6)		E1

<sup>17</sup> E1: Coefficients of linear independent variables have been converted to elasticities, coefficients of logarithmic variables are elasticities.

2SLS: PAT treated by two stage least squares.

Inst.: PAT replaced by instrument variables.

No.	Dependent variable	Form	F-ratio	$R^2$	Cons- tant	MIN	OWN	PP2	PB2	REC	S	OTHER		NOTES
												D1	PAT	
A9.	A3Y	Lin.	136	.87	7.4 (4.6)		-.55 (3.5)	+ .88 (5.9)	+ .15 (4.0)			+3.1 (7.5)		E1
A10.	A3Y	Lin.	110	.87	12.7 (3.0)	-.79 (1.3)	-.45 (2.5)	+ .74 (4.0)	+ .16 (4.1)			+3.1 (7.5)		E1
A11.	A3Y	Lin.	77	.87	8.8 (4.4)		-.60 (3.6)	+ .87 (4.9)	+ .15 (3.6)	-.094 (1.3)	+ .013 (0.4)	+3.3 (7.3)	-.026 (0.3)	E1
A12.	REC	Lin.	2.5	.11	11.0 (3.0)	-.56 (1.0)	-.46 (2.0)	-.28 (1.6)	-.16 (0.5)					
A13.	S	Lin.	15.5	.43	4.8 (2.9)	-.73 (2.8)	+ .62 (0.6)	+ .20 (0.3)	+ .25 (1.7)					
A14.	PAT	Lin.	30	.59	1.7 (0.03)	+ .97 (1.20)	-.55 (2.2)	+1.3 (4.9)	-.14 (2.2)					E1
A15.	PAT	Lin.	26	.65	27.5 (0.5)	+1.6 (1.5)	-.39 (0.8)	+1.3 (4.6)	-.95 (1.8)			DC -1.3 (2.3)	DC2 +4.2 (3.1)	
A16.	PAT	Lin.	495	.98	6.4 (4.0)	-.27 (1.0)	-1.7 (1.5)	-.91 (1.1)	-1.6 (1.2)			D2 +5.4 (4.1)	D3 18.6 (35.2)	
A17.	PAT	Lin.	1547	.97	4.6 (35.8)							+6.9 (9.0)	18.0 (55.0)	
A18.	A3Y	Lin.	41	.79	-1.1 (1.2)	-.58 (2.1)	+ .56 (1.4)	+ .14 (2.4)	-.012 (0.1)	-.012 (0.3)	+ .15 (0.6)			E1, 2SLS
A19.	A3Y	Lin.	42	.79	-1.1 (1.3)	-.59 (2.5)	+ .57 (2.0)	+ .16 (2.7)	-.002 (0.02)	-.025 (0.6)	+ .15 (1.3)			E1, Inst.

No.	Dependent variable	Form	F-ratio	R <sup>2</sup>	Cons- tant	LMIN	LOWN	LPP	LPB	LREC	LS	LPAT	OTHER	NOTES
A20.	LA3Y	Log.	27.9	.58	36.7 (2.9)	-3.5 (2.7)	-3.1 (1.2)	+0.069 (0.15)	+0.033 (0.54)					E1
A21.	LA3Y	Log.	16.4	.59	44.0 (3.2)	-4.2 (3.1)	-0.32 (1.1)	+0.033 (0.07)	+0.051 (0.8)	+0.055 (1.1)	-0.38 (0.9)	-0.19 (0.9)		E1
A22.	LA3Y	Log.	19.4	.59	44.8 (5.4)	-4.3 (4.4)	-0.33 (1.2)		+0.051 (0.8)	+0.055 (1.1)	-0.38 (0.9)	-0.19 (0.9)		E1
A23.	LA3Y	Log.	23	.59	46.4 (5.7)	-4.9 (5.8)			.067 (1.1)	+0.71 (1.5)	-0.050 (1.3)	-0.84 (0.4)		E1
A24.	LA3Y	Log.	28	.58	50.1 (7.2)	-5.4 (7.4)				+0.062 (1.31)	-0.38 (1.0)	-0.11 (0.6)		E1
A25.	LA3Y	Log.	110	.57	44.9 (3.9)	-4.7 (10.5)								E1
A26.	LA3Y	Log.	19.5	.59	48.1 (3.5)	-5.0 (3.8)		+0.12 (0.3)	+0.070 (1.1)	+0.063 (1.3)	-0.053 (1.3)	-0.28 (1.3)		E1, Inst.
A27.	LPAT	Log.	20	.50	26.5 (3.9)	-1.6 (2.4)	-0.52 (4.0)	-0.29 (1.2)	-0.036 (1.1)					E1

Means and Standard Deviations of Variables

<u>Variables</u>	<u>Means</u>	<u>Standard Deviation</u>
A3Y	.76%	.85%
A60	.74%	.97%
PP	16.1%	9.1%
PB	9.1%	19.1%
MIN	\$6,146	\$1,113
REC	41.1 visits	28.3 visits
S	8.1%	15.9%
OWN	49.3%	20.9%
PAT	7.4 per 10,000	6.6 per 10,000
PP2	341	421
PB2	445	1,382



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