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THE CAUSES OF THE DECLINE OF THE 1981-84 RATES OF CRIMES: ANOTHER INVESTIGATIVE APPROACH

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INTRODUCTION AND REVIEW OF THE LITERATURE

The official crime index in the United States reported by the government declined from 1981 to 1984. The movements of this index for 1960 to 1984 are shown in Figure 1. Four consecutive years of dropping overall crime rates are the largest number since such statistics have been compiled by the government.

The government index of crime is a composite of the incidence of reported murder, burglary, robbery, larceny-theft, motor vehicle theft, aggravated assault and forcible rape. While during this period some of the crimes in these categories increased, the overall composite declined.

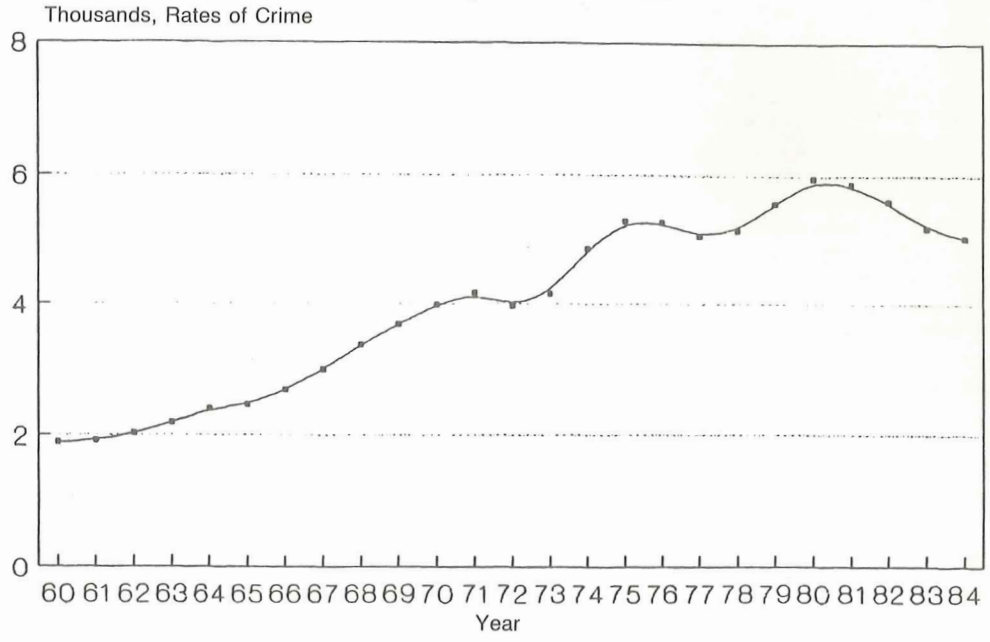
There are two major sources of national crime data, the Uniform Crime Report (UCR), by a government agency, and the National Crime Survey (NCS), by a non-government agency. The former index measures the crimes against persons, businesses and organizations which are only reported, and the latter is a survey of crimes against persons and their households, whether they are reported to officials or not. In this study we use the UCR. Neither of these two measures represents a full picture of crimes. These two sources of crime data are not always comparable. For example, the NCS demonstrates crime rate declining during the Carter presidency, when the UCR shows otherwise (Steffensmeier, Harer 1987). In addition, criminologists argue that the trend of rape reporting is upward due to greater public understanding of this crime. Furthermore, crime reporting by victims and officials is subject to the mood and the politics of the community and of political officials.

The subject of crime has been exclusively the field of sociologists and criminologists; however, economists have fairly recently become interested. Major contemporary contributions by economists to the study of crime began with a seminal study by Gary Becker in the late 1960s (Becker 1968). Becker disenchanted many sociologists when he stated that his work could not (and need not) take into account Edwin Sutherland's "differential association" theory (Sutherland, Cressey 1978) and Robert Merton's theory of "anomie" (Merton 1957). By failing to address differential association theory, Becker ignored the influence of role models in the learning of criminal behavior, that the individuals with whom one associates (and interacts with systematically) will provide an excess of favorable definitions to the individual to justify either criminal behavior or law-abiding behavior. By failing to address anomie theory, Becker dismissed the notion that those who substitute illegitimate means to get ahead are adapting to a gap between aspirations (to attain the American goal of success) and the availability of the socially approved avenues for reaching the culturally-induced goal of success.

Becker also disregarded the psychoanalytic criminological theory--a body of literature which stresses "ego strength" as a combination of good "ego" and "superego" development necessary to counteract "id" motivations (Friedlander 1947). Essentially, by ignoring the concept of conscience, Becker was reverting back to the classical school of criminology (Bentham 1825) which asserts that all individuals have free will, which in combination with hedonism, allows one to choose whether or not to commit a crime, depending upon whether the expected costs outweigh the expected rewards. Like Jeremy Bentham's notion of a "penal pharmacy" where penalties are prescribed and known in advance for specific crimes, Becker's simple "utility maximization" model rests on the concepts of choice, costs and benefits.

In Becker's model, an individual's 24-hour day is a fixed and scarce resource which must be allocated rationally to various activities. According to Becker, an offense will be committed if the individual perceives the expected utility to be greater than the utility expected in devoting time (and other resources) to other activities. Clearly, Becker's model disregards non-utilitarian crimes, such as those Albert Cohen studied among lower-class boys who maliciously struck back at the middle class (Cohen 1955). However, Becker was not concerned with explanations of individual criminal behavior as much as he was concerned with recommending policies

Figure 1: FBI Reported Rates of Crime



for the containment of crime. Like the classical school of criminology, Becker proposed that certainty of punishment, rather than severity of punishment, is the best deterrent to crime.

Becker's work was extended somewhat by Llad Phillips and Harold Votey (1981) in their equilibrium model known as the "system of crime generation and control." In their discussion of social costs (harm to the public) and social controllability, Phillips and Votey have had to address the varieties of crime: "victimless crime" and "white collar crime." The so-called "victimless crimes" either involve a victim and perpetrator as one and the same individual (drug possession) or involve a mutual exchange of goods and/or services between parties where such an exchange is proscribed by law (sale of pornography, gambling, prostitution). Victimless crimes are best categorized under "laws reinforcing mores and folkways" which are "mala prohibita"--bad because they are forbidden. "Street crime" (robbery, burglary) are best categorized under "laws restating mores" which are "mala in se"--bad in themselves. The issue of "social harm," then, is debatable and rests on competing value assumptions. Social controllability, where proactive (rather than reactive) police work is relied upon becomes debatable as well.

Phillips and Votey view "white collar crime" as difficult to control. The conflict theorists, however, would suggest that, if we remove the hypocrisy surrounding the enforcement of white collar crime by the upper echelon, we could control it. Phillips and Votey argue that controlling white collar crime should not be given priority (due to the difficulty involved in such efforts), although such crime is very costly to the public. Conflict theorists would see this as a class-biased view of law enforcement.

While the work of Phillips and Votey is important in its contribution to the understanding of a systems theory approach, it adheres too closely to the economic model of Becker's. Economists Schmidt and Witte (1984) are less inclined to endorse Becker's approach. Instead, Schmidt and Witte concentrate on a model of individual criminal behavior, using individual-level data. Their model includes allocation of time and income, attitude toward risk and moral development. In their work on recidivist rates for their samples of ex-inmates, Schmidt and Witte propose that certain external and non-economic factors (drug use) must

be taken into account.

The work of Ezzat Fattah (1983) summarizes the main arguments against the reliance on the economic approach to crime and punishment. Major points discussed by Fattah include the following: 1) While most property crime is instrumental and profit-oriented, many "crimes against the person" are expressive. 2) Punishment is perceived by the individual to be a remote risk in comparison to the immediate gratification from the crime. 3) Because we cannot measure the non-tangible (subjective) rewards and costs of criminal behavior, the economic model of deterrence is difficult to implement.

Perhaps the most promising work by economists concerned with crime rates is that of Phillip Cook and Gary Zarkin (1985). According to Cook and Zarkin, robbery and burglary are countercyclical with regard to business conditions--their rates increase during a recession. However, auto theft is procyclical and declines during a recession. Homicide rates, according to Cook and Zarkin (1985 116), are insensitive to business conditions. These findings agree with those of Dorothy Swaine Thomas (1927) in her study of crime rates and the British business cycle during 1857-1913. Thomas found that robbery and burglary had a strong negative correlation with business conditions and that crimes of violence had no relationship to business conditions.

There are others, however, who would disagree about the relationship between homicide and business conditions. Among those is sociologist M. Harvey Brenner (1976), who compared U.S. unemployment rates (from 1940 to 1974) and seven indicators of social stress (including homicide). Brenner found that when the unemployment rate rose, these stress indicators rose, but after a time lag. Brenner supports the view that homicide rates do increase, if only slightly, due to stress resulting from joblessness.

Cook and Zarkin's (1985) work examined the nine complete business cycles between 1933 and 1981. They found that an increase in the unemployment rate from 7 percent to 8 percent will result in a 2 percent increase in the robbery rate and a 2 percent increase in the burglary rate. They conclude that

> major movements in crime rates during the last half century cannot be attributed to the business cycle. Recessions have caused relatively small increases in some types of crime (robbery, burglary) but have reduced auto theft and had negligible influence on murder rates. (Cook, Zarkin 1985 128)

Exceptions to this pattern are noted by Cook and Zarkin, the reduced crime rates for 1982 (a year that clearly represents the phrase "hard times") and the large increases in crime rates during the 1960s (which were the years of economic growth and declining unemployment rates).

As early as 1974, some criminologists predicted that crime would drop in the 1980s due to the changing demographic structure of the population (Wolfgang 1974). A recent study by Darrell Steffensmeier and Miles Harer (1987) used "indirect method of standardization" to determine the extent to which changes in the crime index were a direct result of changes in the age of the population. The study implies that for the overall crime index a sizable part of the reduction, as high as 42 percent, is explained by the demographic factor. However, the rates were only adjusted for the demographic factor, and they were not adjusted nor quantified for other elements influencing crime. Consequently, it was not possible to explain the causes of the declines fully.

Using a different approach the present research investigates and quantifies other causes, in addition to the demographic factor, of the recent decline in the index of crimes. Specifically, its aim is to investigate whether the 1981-84 decline can be explained by past trends and traditional determinants, or whether it should be attributed to some new element. A polynomial distributed lag econometric model to explain the behavior of the rates of crime was specified and its parameters were estimated. It is compared with two other models to answer the question of why the rate of crime declined during the 1981-1984 period.

The findings confirm those of sociologists and suggest that this reduction in the crime index is explained by the traditional variables, mostly age of the population, and follow the past paths. After adjusting for the secular trends, factors influencing the rates of crime that are statistically significant are the relative size of the age group from 16 to 24 within the population, the rate of economic growth, and the rate of growth of real expenditure on the

criminal justice system.

The remainder of this paper is divided into four sections. The next is devoted to the discussion of a model which explains the behavior of the crime index. The results of the estimation of the parameters of the model are then outlined. Tests of the existence of any new variables contributing to the declines in the rates of crimes are explained in the following, and the overall summary and conclusions are presented in the final section.

A MODEL EXPLAINING THE BEHAVIOR OF CRIME

To be able to investigate the causes of the recent reduction of the crime rate a model explaining the behavior of crime is specified. The plot of the official crime rate between 1960 and 1984 clearly suggests that the index has an upward trend (Figure 1). Thus, to adjust for this upward movement a time variable is injected in the model; its sign is expected to be positive. Secular Trend (ST) or Time variable is measured from ST = 1960 to 1984. The explanation of this upward movement in the rates of crime itself can be attributed to different factors. But this is not the concern of this study.

The literature indicates that the change in the age composition of the population is one of the major factors influencing reductions in the crime rate. The age distribution of crimes shows that crimes are committed mostly by people between the age of 16 to 24. Therefore, a relatively smaller population between age 16 to 24 in recent years has contributed to the reduction of the rates of crime.

Economists state that the rate of unemployment and the rate of economic growth are two contributing influences on crime. Lower rates of unemployment and higher economic growth can reduce crimes. Obviously the rate of unemployment and the rate of real economic growth should have a negative correlation. However, as the results of this study show, this correlation did not cause any severe multicollinearity problem.

Those who follow Becker's line suggest that if society makes the cost of crime high, the effect will be a lower crime rate. Accordingly, a higher growth of real expenditure on the criminal justice system could result in more and better law-enforcement and a subsequent reduction of crimes. In addition, the model is partly dynamic in the sense that it incorporates the effect of current, as well as that of a one year lag of, spending on the criminal justice system.

Thus, the impacts of these factors on the rate of crimes can be assessed in a multiple regression equation as follows

$$(1)\ CR_t = \beta_0 + \beta_1 ST_t + \beta_2 YOT_t + \beta_3 U_t + \beta_4 GRG_t + \sum_{n=0}^{1} \beta_{5i} GRE_{t-i} + e_t$$

Where

CR = Rate of crime per 100,000 inhabitants
ST = A secular trend measure, 60 to 84
YOT = The number of persons between 16-24 years of age/population
U = Rate of unemployment
GRG = Rate of growth of real GNP
GRE = Annual percentage changes in real expenditure on criminal justice by public sector

Equation (1) states that the rate of crime (CR), is subject to a secular trend (ST), and determined by the proportion of population between 16-24 year old (YOT), rate of unemployed (U), rate of growth of GNP (GRG), and annual growth of real dollar spending on crime prevention by government at all levels (GRE).

The coefficients β_0 to β_{5i}, and β_{50} are the corresponding parameters of the equation. Specifically, β_{51} is the coefficient of the lag expenditure, and β_{50} is the coefficient for the current expenditure on the criminal justice system. This makes the model partly dynamic, and is based on the assumption that the effect of expenditure on crime prevention takes time. Furthermore, the model assumes that the expenditure effect increases to a peak and declines just like a U-inverse. Nevertheless, these two parameters are constrained to lie on a second degree polynomial, and the lagged endpoints equal to zero.

In sum, the polynomial structure for the expenditure on the criminal justice system, GRE, is based on the assumption that both the past and current growth of real expenditures have an impact on current crime rates, and that their coefficients reach a stationary peak point and then decline like a U-inverse.

ESTIMATED RESULTS OF THE MODEL

1960-1984 data and ordinary least square

Table 1: Polynomial Distributed Lag Hildreth-Lu First-Order Autocorrelation Correction Ordinary Least Squares Estimated Results of the Rates of Crimes for Two Equations

	Equation 1 Without Dummy Variable			Equation 2 With Dummy Variable D		
Variables[1]	Coefficient of β	't' Value	Coefficient of Beta	Coefficient of β	't' Value	Coefficient of Beta
Constant	-9295.4	18.38*	na[2]	-9458.4	16.39*	na[2]
ST	95.39	9.00*	.51	111.81	4.94*	.59
YOT	408.61	9.90*	.47	344.49	4.31*	.40
U	62.73	2.11	.08	65.19	2.28*	.09
GRG	-54.60	4.16*	.10	-57.27	4.33*	.11
GRE_o	-810.32	2.46*	.06	-567.66	1.19	.04
GRE_{-1}	-934.87	2.91*	.07	-1077.40	2.92*	.08
Sum E	-1745.20	4.19*	.12	-1645.10	3.76*	.12
D				-204.99	0.84	.06
No of Observation		22			22	
Adjusted R2		0.99			0.99	
Standard Error		127.61			130.04	
Durbin-Watson		1.95			2.02	
Sum Square Error		244264			236738	

[1] ST = Time, represents the trend factor, 60 to 84.
YOT = The number of persons between 16-24 years of age/population.
U = Rate of unemployment in the economy.
GRG = Rate of growth of real GNP.
GRE_o = Real expenditure on criminal justice system, current year.
GRE_{-1} = Real expenditure on criminal justice system, one year earlier.
Sum E = Sum of the lagged and current effect of real expenditure on criminal justice system.
D = Dummy variable, equal to 0 for 1960 to 80, and equal to 1 for 1981 to 84.
[2] na = not applicable
*Significant at least by 5 percent.

and the first-order autocorrelation correction method were used to estimate the parameters of equation 1. The estimated results are shown in the left portion of Table 1. To find the contribution of business cycles, unemployment and economic growth, data were used from 1960 to 1984, the last year that the crime rate declined and all data were available.

To reduce the serial correlation problem the Hildreth-Lu method (1960) was adapted. In this approach, a set of "grid" guesses for the value of Rho on a first-order autocorrelation correction equation are tested. For each value of Rho, the transformed model is estimated. The technique chooses the equation with the minimum sum of squared residuals (SSR) as the best equation.

Almon's polynomial distributed lag technique (Almon 1965) with the zero tail restriction on the lag variable was used to estimate the parameters of the growth of expenditure on criminal justice system, GRE.

According to the results in Table 1, all of the variables have the expected signs, and evaluated by 't' test and overall 'F' test, are statistically significant. There is no indication of serial correlation, and the equation fits the data well.

As the sign and the estimated parameter for the time trend suggest, the overall crime index has had an upward trend of an average annual rate of over 95. The estimated coefficient for the youth population indicates that a one percent increase in the relative percentage of population in the 16-24 age group can increase the crime rate by over 408.

Similarly a one percent reduction of the rate of unemployment, and a one percent increase in the rate of economic growth can result in a reduction of the rate of crime by over 62, and 54 respectively. The estimated coefficients further suggest that a one percent growth in the real dollar expenditure on the criminal justice system in the current year can reduce the rate of crime by over 810 in the current year and by over 934 the next year. It is argued that higher expenditures on the criminal justice system results in a higher number of arrests, and not necessarily a lower number of actual incidences of crime. However, because the estimated coefficients of the real expenditure on the criminal justice system are negative, it seems that the impact of a higher growth of this variable results in a reduction of the rates of crime or in a reduction of the number of arrests. Therefore,

Table 2: ANOVA for Testing the Null Hypothesis

Source of Variation	Sum of Squares Resid	D. F. Regression	'F' Ratio
Reduced model equation 1	244,264	7	
Complete model equation 2	236,738	8	0.445

the findings of this study do not support that line of arguments.

The relative importance of each of the independent variables to the changes in the rate of crime measured by the Beta coefficient are also calculated and are shown in Table 1. Beta coefficient, β_{*i}, normalizes the original parameters of the equation, β_i, by the ratio of standard deviations of independent variable, S_{xi}, to the standard deviations of the dependent variable (rate of crime), S_{cR}, and calculated as follows

$$\beta_{*i} = \beta_i (S_{Xi}/S_{cR}),\ i = 1, 2,...6$$

for each of the six independent variables. For instance, the Beta coefficient of .474 for the relative youth population, YOT, means that a 1 standard deviation change in that variable will lead to a .474 standard deviation change in the rate of crime, CR. Accordingly, after the time trends, the order of the importance of the variables is the relative size of the youth population between age of 16 to 24, the rate of economic growth, the rate of unemployment, and real spending on criminal justice system.

INVESTIGATION OF THE REDUCTION OF CRIMES

To examine whether the reduction of the rate of crime between 1981 to 1984 was due to traditional variables such as those indicated earlier, or due to other fundamental changes, several techniques were used.

First, a dummy variable distinguishing the years of 1960-80 from those of 1981-1984 (years of consecutive decline in the rate of crime), was added to the earlier model (equation 1) as follows

$$(2)\ CR_t = \beta_0 + \beta_1 ST_t + \beta_2 YOT_t + \beta_3 U_t + \beta_4 GRG_t + \sum_{n=1}^{1} b_{5i} GRE_{t-i} + \beta_6 D_t + e_t$$

where D is the dummy variable and its values are assigned as follows

D = 0 for 1960 to 1980, and
D = 1 for 1981 to 1984.

The Hildreth-Lu methodology was used to estimate equation (2). The estimated parameters of the equation are shown in Table 1 (right side). The signs of all variables are as expected and are statistically significant, except for the dummy variable D, and the current growth of real expenditure on criminal justice system. Specifically, the sign of D is negative as expected, and the 't' ratio is not statistically significant even at a 20 percent level of significance. This suggests that although the drops in the rate of crimes are confirmed, they are not statistically significant.

Second, the null hypothesis that both models, (1) as a reduced model and (2) as a complete model, are similar was tested. That is, the null hypothesis that the second model does not contribute more information for the prediction of the rate of crime is an 'F' statistic as follows:

$$F = \frac{(SSR_r - SSR_c) / (k - g)}{SSR_c / (n - k - 1)}$$

Here, SSR_r and SSR_c are the sum square residuals from equation 1, as the reduced regression, and from equation 2, as the complete regression respectively; k is the number of parameters in equation 2, g is the number of parameters in equation 1, and n is the number of observations.

This statistic is calculated and shown in Table 2. The resulted 'F' ratio of .445 does not reject the null hypothesis, and therefore the equation with the dummy variable does not predict the behavior of crime any better than the first model.

Thus, statistically, and adjusted for the traditional variables which are in the equation and explain the behavior of crimes, the years of 1981 to 1984 should not be considered as different from the earlier ones in the sense that some new element(s) contributed to the decline.

Table 3: F Test for the Null Hypothesis

Source of Variation	Sum of Square Resid	D. F. Regression	'F' Ratio
Reduced model ($n_1 = 18$)	149,287	7	
Full model ($N = n_1 + n_2 = 22$)	236,738	7	1.61

Third, in order to examine the reduction of crime from 1981 to 1984 further, equation 1 was estimated again. This time 1960-80 data was used as a restricted equation. The estimated results are compared with those of the equation with 1960-84 data, as the full model. The results of the estimated parameters of the equation with 1960-80 are not shown in the Table. The null hypothesis that these two models are similar and that statistically, there is no structural differences between the two, yield an 'F' statistic of

$$F = \frac{(SSR_f - SSR_r) / n_2}{SSR_r / (n_1 - k)}$$

Here, SSR_f is the sum of square residuals for the full model with 1960-84 data, SSR_r is the sum of square residuals for the restricted model with 1960-80 data; n_2 is the difference between the number of observations in the full model and those of the restricted model ($=4$); n_1 is the number of observations in the restricted equation ($=18$); and k is the number of parameters in the equation ($=7$).

The values of the test of the null hypothesis and its result are shown in Table 3. The 'F' ratio of 1.61 is far below the critical value of the 5 percent level of significance. Accordingly, this test does not reject the null hypothesis that the 1960-80 equation has the same structure as that of the 1960-84. Thus, those variables which explain the behavior of the index of crime for years of 1960 to 1980 explain those of 1980 to 1984 as well.

In sum, the results of each of the three tests were consistent. Accordingly, although the coefficient of the dummy variable, D, in the second model implies that the drop in the rate of crimes between 1981 to 1984 was independent from the impact of the other six independent variables, the 't' test and two other 'F' tests suggest that the declines are not statistically significant. Thus, it appears that the reductions were mainly attributable to and explained by the traditional variables and not the dummy variable in the second model. The traditional factors responsible for these declines were the reduction of the youth population between the age of 16 to 24, and the growth of the real expenditure on the criminal justice system.

SUMMARY AND CONCLUSIONS

The primary purpose of this research was to investigate some possible explanations of 1981-84 reductions in the rate of crime in the United States. A polynomial distributed lag regression model with 1960-84 data was employed to explain the behavior of crimes. The results of the model confirm previous research, including Steffensmeier and Harer (1987); Wolfgang (1974); Brenner (1976); and Becker (1968) and suggest that the relative size of the population aged 16-24, rate of economic growth, the rate of unemployment, and past and current growth of real spending on criminal justice system contribute to the rate of crime.

Three procedures were utilized to examine the significance of the decline in the rate of crime between 1981 and 1984. The findings confirm those of sociologists with different approaches and imply that this decline was mostly due to the aging of the population from the "baby boom," and not due to any new fundamental factor. The results further suggest that the reduction of the relative percentage of the population aged 16 to 24 since 1981 has contributed to this decline, and dominated other variables.

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