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CRIME IN AMERICA: AN EXAMINATION OF BECKER'S PARADIGM VIA A SOCIAL-INDICATORS MODEL

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The prevalence of criminal behavior in the United States is of constant concern to the nation. Using a social-indicators model, five variables are used to help explain the rise, relative peak, and unexpected drop in crime that America experienced during the last three decades. Using annual time-series data from 1969 to 2003, the yearly fluctuations in three national crime rates are examined. In accordance with Becker's Rational Choice model, the results show that changes in macroeconomic conditions and societal-control policies have the most significant and consistent influence on a criminal's choice to commit a felony. Additionally, the model gains potency as the crime rates move from more violent to less violent, supporting past research.

Key Words:
Crime rates, Social-Indicators Model, Robberies, Homicides, Burglaries, Becker's Rational Choice model

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1. Introduction

Of constant concern to the American public is the perceived increase in violent behavior and criminal activity. From 1973 to 1991, violent crimes rose by 82.9%[1] after remaining relatively constant during the beginning and middle of the 20th century. The growing concern in regards to the level of crime is justified as its ramifications influence everything from the surrounding economy to the lifestyle of citizens who fear for their safety and security. For the purposes of this work, the criminal behavior of robbery is considered a measurement of violent crime, burglary is considered a measurement of property crime, and the rate of murder is the accepted measurement of homicide.[2]

In this research, I propose a model that can explain the yearly fluctuations in three of the nation's major crime rates. While previous studies have examined the influence of economic and societal factors on crime during the large increases felt between 1970 and 1990 or when crime began to subside following 1991, none have applied a social-indicators model to the years when crime rates grew, reached their peak, and then began to decline. In doing so, I hope to cite factors that are significant to those fluctuations and see what influence they have on the Rational Choice model developed by Becker (1968).

The rest of this paper will be organized as follows. In Section 2, I provide an examination of the criminal rational choice model and prior research that has examined its validity. I then present hypotheses of my expected results in Section 3. In Section 4, I offer explanations for variables included in this model and a description of the model used. The results of the analysis and comparison to the hypotheses appear in Section 5.

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[1] Crimes reported to police, FBI Uniform Crime Report
[2] As divided by the FBI Uniform Crime Report

Finally, I discuss the conclusions that can be drawn from my study and possible areas for future research in Section 6.

2. Literature Review

As crime rates began to increase after remaining relatively stable following the Second World War, citizens of the United States began to question the true cause of the surge. It was during this time that Becker (1968) proposed his now famous Rational Choice model. As economically rational individuals, criminals will measure the benefit of committing a crime (b) against the probability of becoming incarcerated (p) and the cost of the ensuing punishment (c). This results in an increased willingness to commit a crime if the perceived benefit increases and a decreased willingness as either the probability of incarceration or cost of incarceration rises. Thus, the expected net returns from a crime are shown as:

$$b-pc$$

and an individual's decision to commit a crime is based on:

$$(b-pc)>0 \tag{2.1}$$

As shown by Ehrlich (1973) and expanded by Oliver (2002), the opportunity cost of other behaviors is missing from the equation hypothesized by Becker. Ehrlich argues that the unemployment rate of the area examined helps provide insight into the other opportunities available to a criminal. Pointed out by Oliver, the measurement of the opportunity cost (o) perceived by the criminal can then be added to the rational choice model:

$$(b-(pc+o))>0 \tag{2.2}$$

By developing a theoretical model of the influences on a criminal's decision to commit a felony, Becker and Ehrlich opened the doors for research into what factors may shift the components involved. In an exploration of the population's age structure and its influence on national crime rates, Cohen and Land (1987) reach several conclusions concerning the percentage of those within a "crime prevalent" age bracket and crime rates in general.

Their findings provide support for the rational choice model, as their results highlight economic conditions and society's preventive measures as definite influences on the yearly variance in crime. Additionally, while confirming that age has a statistically significant relationship to some crime, they find that different ages "produce" different crimes. As a generality, Cohen and Land find that this "age proneness" causes individuals to become involved in more dangerous and violent crimes as they grow older.

Through their analysis, Cohen and Land find that reduced models can explain the trends in crime relatively well. Spurred by this, Devine, Sheley, and Dwayne (1988) attempt to create a single model that can explain the changes in robberies, burglaries, and homicides from 1948 to 1985. Developing what they call a social-indicators model, the authors break their four variables into the categories of economic distress and social-control policy. These two categories provide an influence on all four variables in the rational choice model as economic distress would influence the perceived benefit and the opportunity cost of a crime, while social-control polices would affect the probability and length of punishment. Under economic distress the authors place male unemployment rates and inflation while prison population and public expenditures make up social - control policies. In their results, only inflation and prison population rate maintain

statistically significant relationships across the three crimes. As predicted by Cohen and Land, the social-indicator model's coefficients of determination are all quite good with robbery, burglary, and homicide at .450, .466, and .426, respectively.

In his look at 683 counties across the United States, Bausman (2004) attempts to find a link between economic marginalization and property crime rates for the years 1980 through 1983. An important point to note in Bausman's work is his definition of economic marginalization. Breaking it down into three categories, Bausman uses unemployment, number of individuals below the poverty line, and finally employment volatility as the primary components of economic marginalization. All three would act as increases to the benefit of a crime and decreases to the opportunity cost of legal ventures.

Bausman's findings prove to be informative as his measurements for economic marginalization show a statistical significance to the property crime rates used. Similar to Cohen and Land, Bausman also employs a variable for the percentage of the population between the ages of 12 to 24 - what he considers to be the primary "crime producing" years. As expected, this variable maintains a direct and statistically significant relationship with the rates of property crime. Reaching a final conclusion, Bausman urges that his results not be overemphasized. He concludes that while economic marginalization may be the cause of some aspects of property crime, it simply "served as a minor brake to the broader decline in property crime during the 1980-1983 period."

In his work with incarceration effects, deterrence effects, and crime rates, Levitt (1999) attempts to rectify a possible problem usually associated with the relationships found. The author explains that in most prior research, incarceration and deterrence rates

maintain inverse relationships to individual crime rates and the general crime rate as a whole. Criminologists, however, have questioned that relationship based on the fact that a "significant" number of crimes go unreported to police. Using a correction for measurement error in panel data, Levitt finds that the inverse relationship is not the product of the supposed error, but a true negative influence. Additionally, the majority of that negative influence is attributed to incarceration rates, as Levitt finds that an increased incarceration rate in one crime will translate to a decrease in crimes rates overall.

3. Hypotheses

The purpose of this research is to develop a single model that can explain the variance in burglaries, robberies, and homicide as national crime rose, reached a relative peak, and then began to unexpectedly wane. I use Becker's rational choice model (equation 2.2) as a base for the development of a model in which the explanatory variables are national economic and social characteristics. The resulting model can be described as a social-indicators model, as defined by Devine et al.

Under the category of macroeconomic factors, the number of individuals below the poverty line, percentage of the population between 15 and 19, and male unemployment rates are used as variables. For social-control variables, a measurement of annual public expenditures for the poor[3], and a prison population rate are used. In their conclusion, Devine et al. cite that examinations of crime have only taken limited looks at the influence of societal controls on crime and to that end, I will also be including arrests

[3] In this case, the annual national expenditures for the Food stamp program is used as a general public expenditures measurement.

due to cocaine and heroin and a 20-year lagged abortion rate—both debated and recent additions to the examination of crime.

As Table 1 indicates, I posit four positive relationships and three negative relationships between the chosen variables and crime rates. Both intuition and prior research have helped yield these expected relationships.

[Table 1 Here]

4. Data and Model

In this study, annual time-series data will be used from the years 1969 to 2003[4]. This particular time period presents an accurate picture of the increase, peak, and decrease in crime rates felt over the last three decades.

[Table 2 Here]

Crime Rate Measurements

For the purposes of this study, the three crime rates examined will be robberies, burglaries, and homicides. The rate of each criminal offense is calculated by finding the annual number of offenses per 100,000 individuals in the general population.

One area of potential concern that has only received minimal attention in past crime rate studies is non-stationarity. The properties of a least squares estimator used in a regression operate under the assumption that the variables involved are stationary, stochastic processes (Hill, Griffiths, and Judge (2001)). A stochastic process is non-stationary if its mean and variance are not constant over time. To correct for the possibility of this, first-differences of all variables were calculated. This also falls in line

[4] Data was gathered from 1968, but due to use of first-differencing, a year had to be sacrificed.

with the research of Devine, et al. who used first-differencing in all four variables as well[5].

Individuals Below Poverty Line

Found to be one of the three main causes of metropolitan violent crime in Blau and Blau (1982), some measure of the population below the poverty threshold should be a factor in the amount of crime that the United States has experienced between 1969 and 2003. Using the national percentage of families below the poverty line, Fadaei-Tehrani and Green(2002) find a direct relationship between it and the national crime rate. In the case of this work, the first difference of the number of individuals below the poverty threshold per 100,000 in the US population is used.

Percentage of the Population Between 15 and 19

While not explicitly stated, there is much disagreement concerning the age when individuals reach their "prime" years for committing crime. Using the percentage of the national population under 25, Oliver finds a direct relationship between overall crime rates in America and age. As discussed, Cohen and Land find a statistically significant relationship between property crimes and age distribution as well. They, however, utilize an age bracket of 15 to 19, with the percentage of the population within that range acting as the independent variable. In this research, I will be following Cohen and Land and utilize the first difference of the percentage of the population between 15 and 19 years old.

Male Unemployment Rate

[5] First differencing was not used when Devine, et al. controlled for percentage of the population between 15 and 19

Discussion surrounding unemployment rates has usually ended with the agreement that it does have a statistically significant influence on most crimes. Curiously, results like Cohen and Felson (1979) show unemployment maintaining an inverse relationship while many more cite direct influences. While it is true that less have identified an inverse relationship, the possibility still exists[6]. Using a first-differencing approach employed by Cantor and Land (1985) and the measurement of Devine, et al., I will be using the first difference of males unemployed as a percentage of the total labor force.

Public Expenditures to the Poor

As Devine et al. discussed, citizens have embraced the view that government expenditures to the poor provide resources to those who suffer from economic distress. It is thought that if these individuals are provided with resources to help their situation, they may be inclined to not act out through criminal behavior. Again, there is a mixed opinion as to what influence these funds have on crime. While Devine et al. finds a direct relationship between public expenditures and crime, DeFronzo (1983) found that there was an inverse relationship between the two. To act as a measurement of public expenditures to the poor, the first difference of the annual expenditures for the Food Stamp Program per 100,000 in the US population is used (Devine et al. (1988)). These figures are corrected for inflation and appear in real 2004 dollars.

Prison Population Rate

[6] Cantor and Land (1985) provide an in depth explanation for direct/inverse relationships between crime and unemployment. In general, short run unemployment (measured by straight unemployment levels) will discourage crime (inc. in p) while long run unemployment (first-differenced unemployment levels) will encourage it (increase in b, decrease in o).

Many have cited that the increase in incarcerations have influenced crime rates to varying degrees. Levitt (2004) cites the prison population rate as one of the four actual components to the reduction of crime. Devine et al. also use the prison population rate as one of their two social-control variables. One problem that I will be addressing in this research is the current time table for the sentencing of criminals. At present the average lag time between offense and sentence is approximately 5.6 months[7]. With this in mind, comparing the prison population from time *t* with the crime rate from time *t* would miss almost half the criminals[8] Using a prison rate that is lagged one year would provide more of an influence on crime rates since the criminals from the year prior would be incarcerated and not have the opportunity to commit crimes in the current year. Using a lagged prison population rate also corrects the possible endogineity problem between crime and prison population. While the crime rates from the current year would most certainly have an influence on the current prison population, they would not have an influence on the prior year's. As stated, I will employ a first-differenced, lagged prison population rate per 100,000 in the US population.

Abortions

While Bouza (1990) may have made the first hypothesis of abortions influencing crime with, "Making abortion freely available to young poor women is an effective method of reducing the number of potential street criminals" the idea has gained more credibility from works such as Donohue and Levitt (2001), Levitt (2004), and Levitt Dubner (2005). As stated, the legalization of abortions in 1973 allowed women the opportunity to abort unwanted pregnancies. In most cases, women who chose this option

[7] Bureau of Justice Statistics

[8] Incarceration rates are tabulated at the end of the year, if a criminal commits a crime in the second half of the year, there is close to a 50% chance of not getting incarcerated until the following year.

were involved in situations and living conditions conducive to crime (Donohue and Levitt (2004)). Essentially, by "removing" this large piece of the population, those involved in criminal activity would drop due to a simple lack of bodies. In this case, I will be employing an abortion rate which is calculated by first-differencing abortions per 1,000 live births at a 20 year lag[9].

Cocaine/Heroin Arrests

In his research, Levitt cites the waning drug problem in the United States as a key factor in helping to explain why crime dropped during the 1990s. Fadaei-Tehrani and Green concur with this and include cocaine seizures as an independent variable. While Fadaei-Tehrani and Green conclude that seizures of cocaine maintain an inverse relationship with crime rates, they also advise that their results not be trusted. They explain that illegal drug confiscations are a proxy for drug availability. As such, a direct relationship would not be surprising and in fact, easier to comprehend.

Due to the lack of available data, physical weights of seized illegal drugs-specifically cocaine and heroin-have not been released by the Drug Enforcement Agency's Federal Drug Seizure System for years before 1975. While this enabled Fadaei-Tehrani and Green to continue with their examination of the years 1980 to 1997, the time span used in this research will not be able to utilize it for obvious reasons. As such, the first-difference of cocaine/heroin arrests per 100,000 individuals in the US population will be used as a proxy (Shepard and Blackley (2005)).

Model

[9] In an attempt to capture the influence that abortions have on crime rates, a dummy variable was used initially. While results showed a statistically significant relationship between abortions and robberies, the variable could have been measuring any number of other factors. Thus, the dummy variable was replaced to avoid a spurious output.

I update a social-indicators model originally proposed by Cohen and Land and designed by Devine, et al. As described, the foundation of a social-indicators model resides in its inclusion of both macroeconomic and social-control variables. The general form of the model is:

(4.1)

$$CRC_{it} = a + \beta_1 CBP_t + \beta_2 CPP_t + \beta_3 CMU_t + \beta_4 CPE_t + \beta_5 CIR_t + \beta_6 CAB_t + \beta_7 CNS_t + \varepsilon_t$$

Where, CRC_{it} denotes the first difference of crime rate i in year t; CBP_t is the first difference of the rate of individuals below the poverty threshold in year t; CPP_t denotes the first difference of the percentage of the population between 15 and 19 in year t; CMU_t is the first difference of male unemployment as a percentage of the labor force in year t; CPE_t is the first difference of the rate of public expenditures to the poor via the Food Stamp Program in year t; CIR_t represents the first difference of the lagged prison population rate in year t ; CAB_t denotes the first difference of the abortion rate at a 20 year lag; CNS_t represents the first difference of the number of arrests due to cocaine and heroin per 100,000 in the US population; and ε_t represents the error term.

In attempts to explain changes in crime, the problems of multicollinearity are well documented (Devine et al. (1988), Fadaei-Tehrani and Green (2002), Oliver (2002)). In testing for highly correlated variables, it was found that changes in the rate of those below the poverty line and changes in the rate of public expenditures both had significant problems.[10] Following Devine at al., Fadaei-Tehrani and Green, and Oliver, both variables are dropped from the model to avoid the problems associated with collinearity. The new regression has a general form of:

$$CRC_{it} = a + \beta_1 CPP_t + \beta_2 CMU_t + \beta_3 CIR_t + \beta_4 CAB_t + \beta_5 CNS_t + \varepsilon_t \qquad (4.2)$$

[10] See Appendix 1 for multicollinearity detection.

5. Results

Results of the three regressions are shown in Table 3:

[Table 3 Here]

The results in Table 3 show that the model explains 37.8%, 39.4%, and 34.1% of the variation in robberies, burglaries, and homicides, respectively. Like Devine, et al., the results also show that the updated social-indicators model fits homicide rates the worst with two of the five explanatory variables maintaining statistically significant relationships. With the exception of one variable within the test of robbery rates, all coefficient postulations were accurate.

In comparison to the findings of Donohue and Levitt, the rate of legal abortions per live birth in the United States is found to have an inverse relationship with crime rates though none have a statistically significant influence. The difference in results can be explained however, and corresponds with the findings of Joyce (2001). Donohue and Levitt's empirical study looks primarily at the years 1985 through 1997. While the results of the regression do show a statistically significant relationship to abortion rates, they mention that earlier time periods show no connection. Closer to my own research, Joyce looks at state level crime rates and abortion rates over a 6 year span from 1985 to 1990 and similarly sees no influence. Generally, while the relationship has been shown to exist in the years following 1991, the previous years show no correlation as cohorts were not "of age".

The fact that my study looks at the years 1969 to 2003 suggests that abortion rates would most likely not have had a significant influence on crime rates and the results

support this. As mentioned, the coefficients on abortion rates for each crime rate are negative so any positive change in the number of aborted pregnancies from year to year would result in a decline of burglary, robbery, and homicide rates, *ceteris paribus*.

Concerning the results of changes in male unemployment rates, my findings support those of Devine et al. While the change in male unemployment has a direct influence on all three crime rates, it is statistically insignificant for homicides. The fact that the majority of homicides are "crimes of passion" is offered as a possible explanation for this difference by Devine et al. As hypothesized by Ehrlich, an increase in unemployment may cause a decrease in the individual's opportunity cost to take part in legitimate work. To recoup lost wages, the individual would engage in felonies such as robbery and burglary, whose gains are primarily financial. The financial gains realized by homicide, however, are most likely outweighed by the degree and probability of punishment, explaining the lack of significance. If the change in male unemployment as a percentage of the labor force were to increase by 1, then changes in burglary rates would increase by 21.42 per 100,000 and robbery rates would increase by 5.08 per 100,000, *ceteris paribus*.

Unexpectedly, the results show that the change in percentage of the population between 15 and 19 maintains a direct and statistically significant relationship with burglaries, an *inverse* and statistically insignificant relationship with robberies, and a direct and statistically insignificant relationship with homicides. While the results for burglaries and homicides fall in line with previous research into age brackets, the

influence that 15 to 19 year olds have on robberies was never encountered[11]. One possible explanation for what is seen involves looking at the ages of the victims as well as the ages of the criminals. According to the National Crime Victims Report, the average age of a robbery victim is middle to late 30's, while the offender is anywhere from 14 to 24. Due to population migration to the suburbs and non-metropolitan areas[12], individuals of the 30 to 40 year old age bracket now make up a smaller proportion of those who dwell in cities where robberies occur most[13]. Assuming that robbery criminals see a specific benefit from attacking a person of that age (financial gain, ease of process, etc.), they may forego a robbery and instead perform a crime that would yield a higher reward-to-risk ratio, such as a burglary[14]. As the population of 15 to 19 year olds increases, more of that population would be moving away from robbery crime and towards burglary. As a result, the overall number of robberies would decrease as that percentage of the population grows, holding everything else constant.

Since it maintains the only statistically significant relationship, an increase of .1 in the change of the percentage of the population between 15 and 19 would lead to an increase of 14.7 in the change in burglary rates, *ceteris paribus*.

The research of Levitt and Fadaei-Tehrani and Green are both supported by the results of the cocaine/heroin arrest rate. As hypothesized, the coefficient for the rate of cocaine/heroin arrests is positive for all three rates of crime. While not significant for

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[11] This result may be due to first differencing which was never undertaken in any study examined. The growth rate of the percentage change in population between 15 and 19 was also tested as well as age brackets of 15-24, 10-24, and even 15-29, but results remained the same.

[12] U.S. Census Bureau, Migration of Young Single and College Educated: 1995 to 2000. Migration to suburbs and non-metropolitan areas outweighs migration to central cities in every category except young, unmarried, college-educated—usually by 46.3%

[13] FBI Uniform Crime Reports

[14] FBI Uniform Crime Reports estimates average payoff from robberies and burglaries at $100 and $1000, respectively

burglaries, the rate is statistically significant in explaining the variation in robberies and homicides. This makes intuitive sense after citing the work done by Venkatesh (2002).

Following his research on the inner workings of the illegal drug market in Chicago, Venkatesh estimated the probability of being murdered while trafficking drugs at close to 1in 4 while the average number of violent injuries sustained per person rests at approximately 2.4. These figures suggest an extremely close relationship between the illegal drug world and the violent crime and homicide world. Assuming that an increased availability of cocaine and heroin correlates to an increased arrest rate for the two (Fadaei-Tehrani and Green (2002)), one would expect that violent crimes and homicides would increase as well. If the change in the cocaine and heroin arrest rate were to increase by 10 then changes in robberies and homicides would increase by 2.6 and .09 respectively, *ceteris paribus*.

Finally, the only variable that maintained a statistically significant relationship across all three crime rates was the change in the lagged prison population rate. This provides support for Levitt's recent explanation of the decrease in overall crime rates following 1991. Additionally, Oliver and Becker both come to the conclusion that prison population effectively functions as a deterrent to crime, resulting in lower crime rates as the prison population rate increases. An increase of 1 in the change of the lagged prison population rate would lead to a decrease of 4.86 in the change of the burglary rate, .022 in the change of the homicide rate, and .737 in the change in the robbery rate, *ceteris paribus*.

6. Conclusion

The purpose of this research was to apply Becker's rational choice model to three crime rates from 1969 to 2003 through a social-indicators model. In this process, I included the variable of arrests due to cocaine and heroin which has never been used in an analysis of this sort and proved to be statistically significant for two of the chosen crime rates. Additionally, the future research posed by Oliver was undertaken as the national crime rate was split into burglaries, robberies, and murder-the generally accepted proxies for property crime, violent crime, and homicide, respectively.

The model developed reveals that across all three crime rates, the change in the lagged prison population rate has the only consistent statistically significant influence. This shows that the increased probability of being caught carries considerable influence in a criminal's rational choice equation, no matter what type of crime they are considering. Another important result was that the change in the male unemployment rate was shown to be statistically significant for both burglaries and robberies. From this, it can safely be assumed that an increase in the benefit of committing a crime and a decrease in the opportunity cost of legal work also weighs heavily on a criminal's mind if the crime has the possibility of providing a reasonable financial gain[15].

This model suggests that efforts to stop property and violent crime should be devoted to revitalizing economic conditions and continuing to expend resources for the incarceration of criminals. These two acts result in increases in the criminal's opportunity cost, his perceived probability of incarceration, and the cost associated with that sentence. Further, a possible method for the reduction of more violent crimes would again involve increasing the probability of being caught, but also enacting more controls

[15] FBI Uniform Crime Reports estimates average payoff from robberies and burglaries at $100 and $1000, respectively

for illegal drugs such as cocaine and heroin. Efforts aimed at the seizure of these drugs or educational programs showing their true nature may help to reduce the problem before it even needs to be addressed through sentences and jail time.

If the amount of crime analysis undertaken in the past five decades provides a reasonable estimate of the research to come, there is no question that crime will continue to be a popular topic. Keeping this in mind, the model developed in this work reveals two major possibilities for future research. While it has been proven that the United States experienced a dramatic drop in crime rates during the early 1990's, it was not the only country to do so. Using this model to examine nations that have experienced similar crime trends such as Canada, England, and Scotland may prove to be useful and informative. Another beneficial area of expansion would be to apply this model to future years. As new crime-reducing techniques are developed, it would be valuable to measure the few factors that have shown proven and significant influences on a criminal's decision to commit felonies and gauge how their pressure changes.

Table 1

Postulated Model of Macroeconomic and Societal –Control Policies on the Rate of Crime

	Variable	Expected Relationship
Macroeconomic Conditions	Ch. Individuals below poverty line	+
	Ch. Percentage of the pop. between 15 and 19	+
	Ch. Male unemployment rate	+
Societal – Control Policies	Ch. Public expenditures for the poor	-
	Ch. Prison population rate	-
	Ch. Abortion rate*	-
	Ch. Cocaine/Heroin seizures	+

* This is not meant to imply that abortions are obtained solely for the purpose of reducing crime rates, nor should it be inferred that this supports the practice in any way.

Table 2

Data Explanation and Sources

Variable	***Description***	***Source***
Robberies	Change in robberies rates per 100,000 individuals in the U.S. population	*Statistical Abstract of the United States*
Burglaries	Change in burglaries rates per 100,000 individuals in the U.S. population	*Statistical Abstract of the United States*
Homicides	Change in homicides per 100,000 individuals in the U.S. population	*Statistical Abstract of the United States*
Abortions	Change in abortions per 1,000 live births, lagged 20 years	*Center for Disease Control and Prevention Statistics*
Male Unemployment Rate	Change in males unemployed as a percentage of the total labor force	*U.S. Bureau of Labor Statistics*
Percentage of the Population Between 15 and 19	Change in the percentage of the population between 15 and 19	*U.S. Census Bureau*
Lagged Prison Population Rate	Change in the number of individuals in prison per 100,000 in the U.S. population, lagged 1 year	*Uniform Crime Reports*
Cocaine/Heroin Arrests	Change in number of cocaine and heroin arrests per 100,000 in the U.S. population	*Uniform Crime Reports*
Public Expenditures to the Poor	Change in Food Stamp expenditures per 100,000 in the U.S. population ($2004)	*U.S. Office of Management and Budget*
Number of Persons Below the Poverty Line	Change in the number of persons below the poverty line	*Statistical Abstract of the United States*

TABLE 3
Effects of an Updated Social-Indicators Model on Crime Rates (1969-2003)

	Equation 1	Equation 2	Equation 3
Dependent Var.	Robberies	Burglaries	Homicides†
Constant	7.093695 (1.829115)*	56.41552 (2.885191)***	.188676 (1.020588)
Independent Var.			
Ch. Lagged Abortion Rates	-.048635 (-1.228678)	-.031424 (-.131569)	-.000531 (-415334)
Ch. Male Unemployment Rates	5.086839 (2.277797)**	21.42131 (1.945936)*	.064608 (.839420)
Ch. Percentage of Population Between 15 and 19	-15.42579 (-.870249)	147.1488 (1.809907)*	.096127 (.119071)
Ch. Lagged Prison Population Rate	-.737458 (-2.773462)***	-4.868830 (-3.249978)***	-.022957 (-2.043053)**
Ch. Cocaine/Heroin Arrests	.261949 (2.610768)**	.805790 (1.280420)	.007815 (2.352909)**
Adjusted R^2	.378	.394	.341

() *t* statistic
* *p* value (two-tail) ≤ .1
** *p* value (two-tail) ≤ .05
*** *p* value (two-tail) ≤ .01
† Cohen and Land (1987) and Sagi and Wellford (1968) encountered problems of first-order autoregressive error processes in their studies of homicide rates. Unfortunately, the causes of this "oscillatory pattern" have yet to be understood and is a suggestion for future research by Cohen and Land. The problem of serial correlation and homicides was also encountered in this research and was corrected when an AR(1) process was added to the homicide rate model. Serial correlation was not found in either robberies or burglaries.

Appendix 1

Detection of multicollinearity across independent variables:

Variable	*Variance Inflation Factor Statistic**
Change in Abortion Rate	1.065603
Change in Male Unemployment Rates	2.071672
Change in Perc. of Pop. Between 15 and 19	1.863770
Change in Lagged Prison Population Rate	1.002870
Change in Cocaine/Heroin Arrests	1.014771
Change in Public Expenditures to the Poor	1.397187
Change in Perc. of Pop. Below Poverty Line	3.730647

*VIF Statistics > 10 indicate a problem

Detection of pair-wise correlation across independent variables:

Correlation Matrix							
	CHABORTION	CHLAGPRISO	CHMALEUNE	CHPERCPOP	CHPOPBELO	CHPUBEX	CHCHARREST
CHABORTION	1.000000	0.141390	-0.134390	-0.407712	-0.001940	-0.030550	0.139361
CHLAGPRISO	0.141390	1.000000	-0.210487	-0.183537	-0.068757	-0.331840	0.214637
CHMALEUNE	-0.134390	-0.210487	1.000000	-0.136000	0.720545	0.540854	-0.105903
CHPERCPOP	-0.407712	-0.183537	-0.136000	1.000000	-0.490180	-0.050199	-0.298815
CHPOPBELO	-0.001940	-0.068757	0.720545	-0.490180	1.000000	0.508464	-0.075213
CHPUBEX	-0.030550	-0.331840	0.540854	-0.050199	0.508464	1.000000	-0.034149
CHCHARREST	0.139361	0.214637	-0.105903	-0.298815	-0.075213	-0.034149	1.000000

-Evidence of strong linear correlation forces the removal of change in public expenditures to the poor and change in percentage of the population below the poverty line.

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