

Demographic and Economic Factors as the Cause of the Decline of the Rate of Burglary

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Abstract

From 1981 to 1984 the United States rate of crime in general, and the rate of burglary in particular, declined. The purpose of this research is to find some possible determinants of the crime of burglary, and to investigate why its rate declined during those years. Using a polynomial distributed lag regression model, the findings suggest that a relatively smaller youth population between 16 to 24, a lower rate of unemployment, higher real economic growth, and an increase in the rate of growth of real expenditure on criminal justice may have resulted in a lower burglary rate. Furthermore, the results suggest that the reduction of the rate of burglary between 1981 to 1984 can be explained by past trends. These declines seem to be mostly due to the aging of the "baby boom" population.

Introduction

Between 1981 and 1984, the United States rate of crime as a whole, and the individual rates of most types of crimes, such as burglary, declined (see Figure 1). Policy makers, academics, and others have speculated as to the cause of the declines.¹

One of the earliest studies which related various measures of crimes with a measure of business conditions was the work of Dorothy Thomas (1927). She found a relative strong negative correlation (-.44) between business condition and burglary rates in Britain, and a weaker negative correlation (-.25) between business conditions and larceny. Other studies support Thomas' conclusions, although recent time-series findings are based on a multivariate explanation of trends in crime. For example, Phillip Cook and Gary Zarkin (1985) found that

burglary and robbery are sensitive to economic fluctuations. Their non-parametric analysis was also consistent with these results.

The contribution of economists to the study of crime began with a landmark theoretical model by Gary Becker in the late 1960's (Becker, 1968). The entry in this field by economists was partly due to the failure of government agencies to control rising crimes. Accordingly, and based on some debatable assumptions, Becker's model assumed that criminals choose rationally between crime and lawful work. Using a utility maximization model, Becker relied heavily on the choice between crime and non-crime activities and their corresponding costs and benefits. In his model, 24-hour time is regarded as scarce and is allocated to different activities, including crime.

Becker's model suggests that a person is subject to criminal activities if its benefits are greater than its costs and if one does not consider morals, ethics, or conscience. Therefore, private or public policy makers should control the costs (penalties) and benefits to diminish crime to the "optimum" rate. Specifically, Becker's conclusion suggests the probability of punishment and the use of fines as the most cost effective tools of punishment.

It should be emphasized that the "optimum" rate of crime, as economists argue, does not suggest the elimination of crime but rather the reduction of crime to the point where the marginal (additional) costs of controlling crime (expenditure) is equal to the marginal benefits associated with reducing crime. This is called the level of crime (safety) that society as a whole can tolerate.

This analysis of crime has also been applied to the areas such as the "optimum" level of water purity, highway congestion, and deaths in war. In this process, public and/or private expenditure on crime is a scarce resource which must compete with other needs of society. Implicit in this approach is that, after a certain level, the

marginal costs of crime control increase. That is, additional reduction of the rate of crime is subject to the law of diminishing return, and therefore is costlier.

Other economists used models similar to Becker's with a different choice of statistical methods. For example, Phillips and Votey (1981) used a model with simple assumptions that provides a comprehensive policy for different crime controls. Following the same line as Becker's, they made a value judgement by considering street crime to be more harmful and more controllable than some other crimes such as heroin use, prostitution, pornography, and gambling.

This normative consideration and other policy recommendations have been subject to criticism. The criticism of the economic approach to crime is based on the assumptions of the models, particularly the assumption of the rational behavior of individuals with regard to the costs and benefits of crime. Even though much crime may be explained by a rational model, certainly some criminal activities cannot be. Furthermore, some factors which contribute to crime are not quantifiable. Many critics also reject the economic approach because of its implication for public policy: deterrence can best be accomplished by swifter and surer apprehension and punishment. From the positive side, the economic approach to crime and criminal justice has been regarded as a great contributory factor for understanding a complex social and institutional area, sometimes in unintended ways (McGahey, 1984).

As early as 1974, some sociologists predicted that crime would drop in the 1980's due to the changing demographic structure of the population.² However, the prediction of the rates of crime 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 other causes in addition to the demographic factor, of the recent declines in the rates of burglary. 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 burglary was specified and its parameters were estimated. It is compared with the two other models to answer the question of why the rates of burglary declined during the 1981-1984 period. The findings suggest that this reduction is explained by the traditional variables, mostly age of the population, and follow the past paths, and is not due to any new factors.

A Model Explaining Burglary

To investigate the possibility of a new factor contributing to the reduction of the rates of burglary, a model explaining the behavior of this crime has been specified. The theoretical basis of such a model relies on the literature on crimes in general and on burglary in particular.

First, the plots of burglary crime suggest that their index has an upward trend. Therefore, a time trend as a variable is introduced to the model. Obviously the sign for this variable is expected to be positive.³ Second, the age composition of the population has a significant impact on the rate of burglary. The age distribution of crimes indicates that crimes are committed mostly by people between the ages of 16 to 24. A smaller percentage of the population in this youth group could have

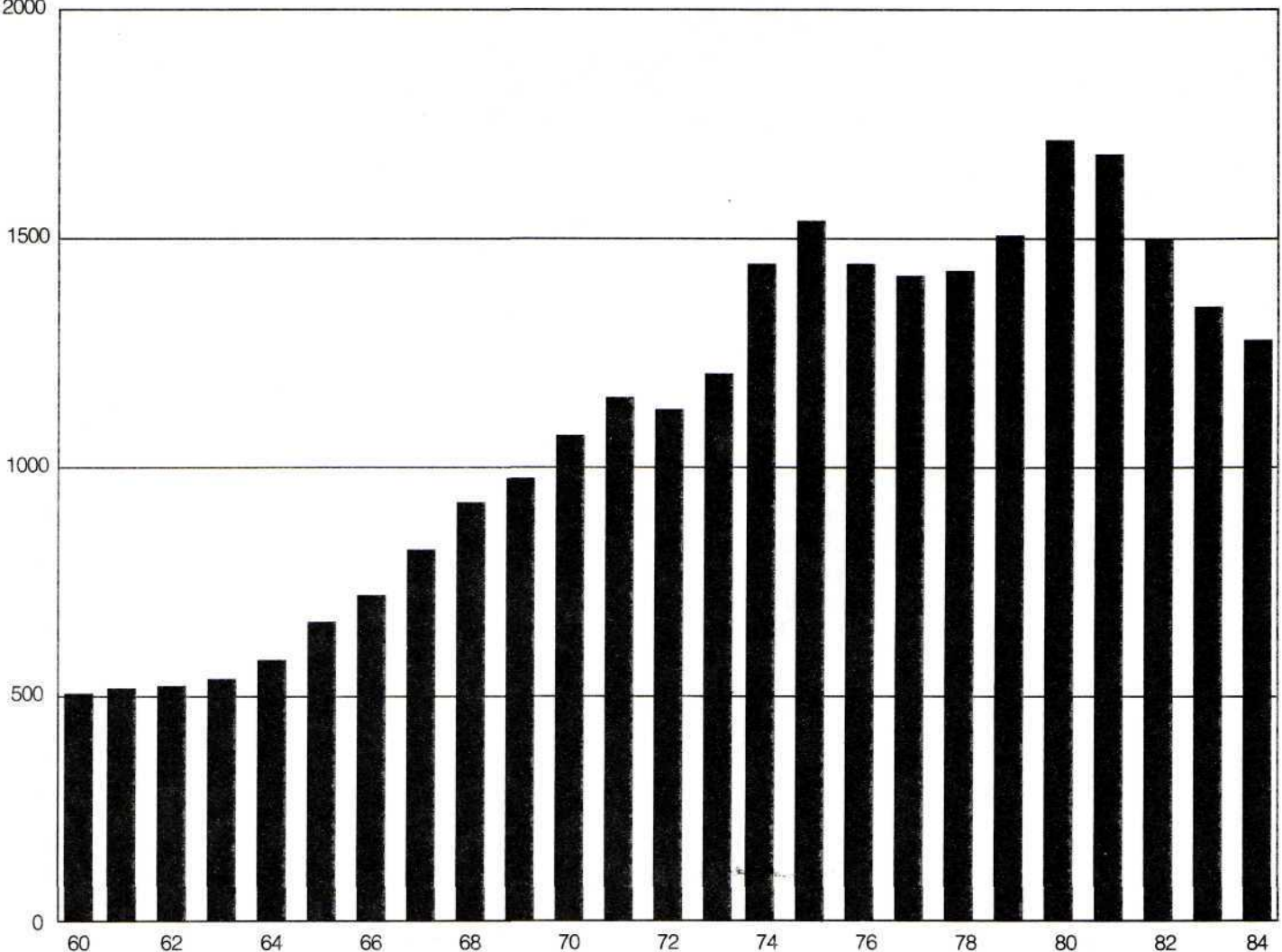
contributed to these declines.

Third, as studies showed, burglary is sensitive to the business cycles and the state of the economy: A higher rate of unemployment and a lower economic growth contributes to a higher rate of this category of crime.⁴

Fourth, dollar spending on the prevention of crime can reduce crimes. Thus, a higher growth of real expenditure on the criminal justice system could result in more and better law enforcement and a subsequent decline in crimes, including burglary. This variable is assumed to be dynamic, influencing this crime at the present and in the future. That is, in addition to current expenditure, past expenditures on the criminal justice system have impacts on burglary, and the expected signs for both current and past ex-

Figure 1
Rates of Burglary

Rates of Burglary 60-84
2000



penditure are expected to be negative.

In sum, the influence of these variables on the rates of burglary can be explained by an equation as follows:

$$CR_t = \beta_0 + \beta_1 T_t + \beta_2 Y_t + \beta_3 U_t + \beta_4 G_t + \sum_{i=0}^1 \beta_{5i} E_{t-i} + e_t \quad (1)$$

CR = Rate of burglary crime per population.

T = A secular trend measure, 1960 to 1984.

Y = The number of persons between 16-24 years of age/population.

U = Rate of Unemployment.

G = Rate of growth of real GNP.

E = Annual percentage changes in real expenditure on criminal justice by public sector.

The equation states that the rate of burglary depends on the secular trend, T; relative portion of the youth population, Y; the rate of unemployment, U; the rate of economic growth, G; and current and past annual rates of growth of real dollar expenditure on the criminal justice system by all three levels of governments, E.

The β 's are the parameters of the model. Specifically, β_{50} and β_{51} are the parameters for the current and past growth of the real expenditure on the criminal justice system respectively. The effect of this variable, current as well as lagged, is assumed to increase, reach a peak and declines, like a U inverse.

Estimated Results of the Model

Annual data from 1960 to 1984 and the first order autocorrelation correction method were used to estimate the parameters in equation 1. To find the impact of the rising and falling business cycles and high economic growth, the data were selected as early as 1960. The last year that all data were available was 1984. The estimated parameters of the rate of burglary are presented in the left portion of Table 1.

The Hildreth-Lu method (1960) was used to reduce the autocorrelation problem association with the time-series data. Accordingly, a set of "grid" guesses for the value of Rho on a first order autocorrelation correction equation are tested. The transformed model for each value of Rho is estimated, and the equation with the minimum sum of squared residuals (SSR) is chosen as the best equation.

For the growth of expenditure on the

criminal justice system variable, Almon's second degree polynomial distributed lag technique (1965) with the zero tail restriction on the lag variable was used. This is based on the assumption of the U-inverse shape of the effect of the expenditure on the criminal justice system and on the burglary rate.

The results in Table 1 indicate that all of the variables have the expected signs, and evaluated by the 't' tests and overall 'F' ratio, are statistically significant. Furthermore, the equation fits the data well, and there is no indication of serial correlation.

According to the table, the rate of burglary appears to have an upward trend of an average annual rate of over 16 percent. Also, the rate of burglary crime seems to be highly and positively related to the relative number of persons between 16 to 24 years of age. The estimated coefficient for this variable suggests that a one percent reduction in the number of youths can reduce the rate of burglary index by almost 162 percent.

Similarly, a one percent increase in the rate of growth of GNP can lead to a reduction of the rate of burglary by 14 percent. The results further suggest that a one percent change in the rate of unemployment or a one percent change in the growth of real expenditure on the criminal justice system results in a less than one percent change in the rate of burglary.

To find the relative importance of these variables in influencing the crime of burglary, their 'Beta' coefficients were calculated and are shown in Table 1. The 'Beta' measure adjusts the parameters of the equation for the variation of their units of measurement. Based on these findings, the 'Beta' for the youth population of .6701 is the highest; and after the time trend, the rate of unemployment and the rate of economic growth are the most influential on the rate of burglary. The current and the past rate of growth of real expenditure on the criminal justice system are the least important factors.

Investigation of the Reduction of the Burglary Rate

Attempts to find whether the reduction of burglary from 1981 to 1984 is due to the current reduction of the youth population or some other new element(s) were made by three different approaches.

First, assuming unknown factors influenced the reduction of burglary rate for

four consecutive years, a dummy variable was added to equation (1) as follows:

$$CR_t = \beta_0 + \beta_1 T_t + \beta_2 Y_t + \beta_3 U_t + \beta_4 G_t + \sum_{i=0}^1 \beta_{5i} E_{t-i} + \beta_6 D_t + e_t \quad (2)$$

Here D is the dummy variable and its values are given as follow

D = 0 for 1960 to 1984, and

D = 1 for 1981 to 1984.

Again the Hildreth-Lu approach was applied to estimate the parameters of equation (2), and the results are shown in the right side of Table 1. The coefficient for the dummy variable verifies the reduction in the rate of the burglary, but implies by its 't' ratio that the decline is not statistically significant. Thus, adjusting for other factors influencing the rate of burglary, including the reduction of the youth population, the reduction in the burglary rate is not significant.

Second, the results of equation (1) as a reduced model, with those of equation (2) as a complete one, are compared and tested. This is a null hypothesis that the complete model does contribute more information for the prediction of the rate of burglary. The test is an 'F' statistic as follows:

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

Where SSR_r and SSR_c are the sum square residuals from the reduced and complete model respectively; k is the number of parameters in the complete model, g is the number of parameters in the reduced model, and n is the number of observations.

The finding of this statistic is shown in Table 2. Accordingly, the 'F' ratio of 0.485 does not reject the null hypothesis, and thus the complete model with the dummy variable does not predict the behavior of burglary crime any better than the reduced model. Again, this test appears to suggest that the current reduction of the rate of burglary is explained by the traditional variables, mostly by the changes in the composition of the age population.

Third, a test comparing equation 1 with two sets of data, one with 1960-84 as the full model and the other with 1960-80 as the restricted model, was conducted. Because the rate of burglary declined between 1981 to 1984, if the reduction cannot be explained by variables in the model, the results of the restricted model

Table 1
Polynomial Distributed
Lag Hildreth-Lu First-Order
Autocorrelation Correction Ordinary
Least Squares Estimated
Results of the
Rate of Burglary Crime

Variables ¹	Equation (1)			Equation (2)- With Dummy Variable, D		
	Coefficient of β	't' Value	Coefficient of Beta	Coefficient of β	't' Value	Coefficient of Beta
Constant	-2685.2	22.21*	na ²	-2667.0	16.48*	na ²
T	16.44	6.36*	.3112	12.18	1.89	.2307
Y	161.92	16.31*	.6701	180.47	7.57*	.7469
U	0.03	3.76*	.1315	0.03	3.25*	.1222
G	14.08	4.79*	.1026	- 13.76	4.56*	.1003
E ₀	0.01	4.17*	.0805	- 0.01	3.28*	.0961
E ₋₁	0.01	4.11*	.0783	- 0.01	2.41*	.0636
Sum E	0.02	6.37*	.1222	- 0.02	6.01*	.1152
D	—	—	—	57.73	0.80	.0588
No. of Observation	22					22
Adjusted R ²	0.9893					0.9858
Standard Error	31.4954					32.0088
Durbin-Watson	2.0419					2.0689
Sum Square Error	14879.4					14343.9

¹T = Time, represents the trend factor, 1960 to 1984.

Y = The number of persons between 16-24 years of age/population.

U = Rate of unemployment in the economy.

G = Rate of growth of real GNP.

E₀ = Real expenditure on criminal justice system, current year.

E₋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.

²na = Not applicable.

* = Significant at least by 5 percent.

Table 2
ANOVA for Testing the
Similarity of Two Models

Source of Variation	Sum of Squares Resid	D.F. Regression	'F' Ratio
Reduced Model			
Equation (1)	SSR _r = 14,879.4	g = 7	$\frac{(SSR_r - SSR_c) / (k-g)}{SSR_c / (n-1-1)}$
Complete Model			
Equation (2)	SSR _c = 14,343.9	k = 8	F = 0.485

should be different from those of the full one. Thus, a null hypothesis that these two models with two sets of data are structurally similar should be tested. The null hypothesis is an 'F' statistic as follows:

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

Here, SSR_r and SSR_c are the sum square residuals for the full model (with 1960-84 data) and the restricted one (with 1960-80 data) respectively; n₁ is the number of observation in the restricted model and n₂ is the difference between the number of observation in the full model and those of the restricted one; and k is the number of parameters in the model.

The analysis of variance and the result of the 'F' test are shown in Table 3. Accordingly, the 'F' ratio of 0.413 is far lower than the critical value of five percent level. Therefore, the finding of this test suggests that the null hypothesis that the two models are structurally similar cannot be rejected. In other words, the variables in the equation can explain these four consecutive reductions of burglary crime; and the test does not indicate that the declines are due to some new explanatory variable.

Summary and Conclusions

The rate of crime in general, and the rates of burglary in particular, decreased from 1981 to 1984. The purpose of this paper was foremost to find determinants of the rate of burglary crime and to investigate whether the causes of these declines are due to some fundamental changes in the structure of society, or can be explained by the traditional variables.

A multiple regression distributed lag model with two 1960-84 and 1960-80 annual data were used for these purposes. The findings suggest that the relative number of individuals between 16 to 24 strongly and positively influences the rate of burglary. Higher real economic growth, a lower rate of unemployment, and higher growth of real expenditure on the criminal justice system can also result in a lower rate of burglary.

The findings of this study further suggest that the reduction of the rate of burglary is mainly due to the aging population from the "baby boom" as the most contributory variable to these crimes, and not to any new structural influence or change.

Table 3
F-Test for the Null Hypothesis:
Two Equations Are Structurally Similar

Source of Variation	Sum of Squares Resid	D.F. Regression	'F' Ratio
Reduced Model ($n_1 = 18$)	$SSR_r = 12,472.1$	$g = 7$	$(SSR_f - SSR_r) / n_2$
Full Model ($N = n_1 + n_2$ $= 18 + 4 = 22$)	$SSR_f = 14,343.9$	$k = 7$	$SSR_r / (n_1 - k)$ $F = 0.413$

Notes

1. 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 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 the crime rate declining during the Carter presidency, when the UCR shows otherwise (see Steffensmeier, et al). 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.

2. For example, see Wolfgang.

3. 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.

4. 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.

5. 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

$$\beta_{*i} = \beta_i (S_{xi} / S_{CR}), \quad i = 1, 2, \dots, 6$$

for each of the six independent variables.

6. The residual refers to the difference

between the actual and the predicted measure by the equation. For our measure of burglary, residuals for each year are the algebraic difference between the predicted value by the estimated equation and the actual rate of burglary in that year.

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