FUNDING COMMUNITY POLICING TO REDUCE CRIME: HAVE COPS GRANTS MADE A DIFFERENCE FROM 1994 to 2000?*

Submitted to the Office of Community Oriented Policing Services,
U.S. Department of Justice

by

Jihong "Solomon" Zhao, Ph.D.
Department of Criminal Justice
University of Nebraska at Omaha
Omaha, NE 68182
(402) 554-3928

Quint Thurman, Ph.D.
Department of Criminal Justice
Texas State University - San Marcos
601 University Drive
San Marcos, TX 78666-4616
(512) 245-3341

July, 2004

*This project was supported by cooperative agreements #2001-CK-WX-K002, #2001-CK-WX-K053 and #2002-CK-WX-K010 awarded by the Office of Community Oriented Policing Services, U.S. Department of Justice. Points of view or opinions contained in this document are those of the authors and do not necessarily represent the official positions or policies of the U.S. Department of Justice. We would like to take this opportunity to thank the anonymous peer reviewers and the GAO review team for their helpful comments on earlier versions.

FUNDING COMMUNITY POLICING TO REDUCE CRIME:
HAVE COPS GRANTS MADE A DIFFERENCE FROM 1994-2000?

ABSTRACT

This research examines how funding from the U.S. Department of Justice, Office of Community Oriented Policing Services (COPS) from 1994-1999 has affected violent and property crime rates in the United States from 1995 to 2000. Drawing upon seven years of panel data, we examine the effects of three types of awards made by COPS to 5,659 law enforcement agencies serving more than 133 million citizens and 1,938 non-COPS funded agencies serving around 21 million citizens in order to assess the impact on crime reduction over time in jurisdictions receiving funding and controlling for baseline levels of crime, socioeconomic characteristics, city size, population diversity and mobility, and other unobserved control variables (through the use of dichotomous city level variables). Our analyses suggest that COPS hiring and innovative grant programs are related to significant reductions in local crime rates in cities with populations greater than 10,000 for both violent and non-violent offenses. Multivariate analysis shows that in cities with populations greater than 10,000 an increase in one dollar of hiring grants per resident contributed to a corresponding decline of 10.95 violent crimes and 27.88 property crimes per 100,000 residents. Similarly, an increase in one dollar of innovative grant funding per resident was found to contribute to a decline of 4.30 violent crimes and 10.07 property crimes per 100,000 persons. Furthermore, COPS MORE grants had a significant effect on property crime between 1995 and 2000. An increase in one dollar in MORE grant funding corresponded to a decline of 17.12 property crimes per 100,000 residents. In

addition, the findings suggest that COPS grants have had no significant negative effect on violent and property crime rates in cities with populations less than 10,000.

METHDOLOGICAL ABSTRACT

This study draws upon four existing data sources, the Uniform Crime Reports, the Bureau of Labor Statistics, the U.S. Census, and COPS Office data to create seven years of panel data (1994-2000) including all city level law enforcement agencies for which data could be obtained (both those who did and did not receive COPS funding). A two-factor fixed effect model was used to analyze the effects of COPS funding on crime reduction controlling for eight social disorganization variables. The "two-factors" model allows for the analysis to also attempt to control for unobserved systematic (non-random) variation. The "two-factors" approach accommodates a geographic component represented by the cities in which agencies reside, and a time-specific component represented by the six years of data. By including the "first-factor" (the geographic component) through the inclusion of a cross-sectional dummy variable for each city in which the agencies reside, the difference in crime rates caused by unobserved variance occurring in each city is estimated. This means that an attempt can be made to control for the bias caused by omitted variables. Similarly, the "second-factor" (the time-specific component) involves the inclusion of year dummy variables that attempts to control for those unknown factors impacting crime in the U.S. nationally that are not accounted for by the other independent and socioeconomic variables. This type of dummy variables in panel model designs is common and their benefits to model specification are well known (Wooldridge 2001). This panel data model attempts to provide a test for causality by: 1) establishing correlation between levels of COPS funding and crime rates the following year across the study period, 2) demonstrating time order of the variables through the longitudinal design, and 3) controlling for spuriousness (the

possible effect of third variables on the relationship) through the inclusion of control variables that account for both unobserved and observed variation. In doing so, this study attempts to provide evidence, given the available data, concerning the relationship between COPS funding and crime rates.

FUNDING COMMUNITY POLICING TO REDUCE CRIME: HAVE COPS GRANTS MADE A DIFFERENCE FROM 1994-2000?

Crime rates have dropped significantly across the United States in most large cities since the mid-1990s and continued into the early 21st century. While there are studies examining the relationship between demographic changes and this decline in crime at the national level (e.g., Blumstein 2001; Spelman 2001), little is known about the contribution of the recent implementation of community oriented policing funded principally through the U.S Department of Justice, Office of Community Oriented Policing Services (COPS). The extent of assistance provided by the COPS Office to local law enforcement is unprecedented in American history. Therefore, the activities of this Office may have significantly contributed to the drop in crime in jurisdictions receiving this Federal support. However, determining the extent to which COPS Office awards have made a difference in reducing crime has been problematic to date. On a national level, the impact of COPS funding on crime has been difficult to estimate due to the fact that much of the research designed to assess the effects of COPS programs is either limited to individual programs or cities (Rosenbaum 1994; Kartcoski and Dukes 1995; Silverman 1999; Sadd and Grinc 1994).

The purpose of this research is to extend a previous research study (Zhao and Thurman 2001) using a similar model to examine the overall impact of COPS funding nationally over a substantial period of time and controlling for likely confounding factors. Accordingly, we assembled a multi-wave panel data set featuring 7,597 COPS funded and non-funded cities serving more than 154 million people living in the U.S.[1] After familiarizing the reader with the

[1] The number of cities varied by year (from a high of 5,099 cities in 1995 to a low of 4,827 in 1997) due to the fact

COPS Office and its activities, we describe the data that was assembled for this analyses.

THE COPS OFFICE

Community policing has become a dominant force behind contemporary police innovations designed to reduce crime throughout the U.S. since the mid-1990s (for a review see Cordner 1997; Eck and Maguire 2001; Zhao at al. 1999). Perhaps the strongest driving force behind the implementation of community policing in recent years has been the steadfast endorsement of this concept by the federal government, and specifically, the passage of The Violent Crime Control and Law Enforcement Act (the Crime Act) in September, 1994. Title I of the Crime Act, known as the "Public Safety Partnership and Community Policing Act of 1994" authorized the use of $8.8 billion to fund local law enforcement agencies in the fight against crime through the enhancement of their community policing capabilities. To carry out this task, the U.S. Department of Justice created a new agency--the Office of Community Oriented Policing Services (the COPS Office)--to administer and supervise new grant programs resulting from the act (Roth and Ryan 2000).

Over the past eight years, the COPS Office has awarded grants to law enforcement agencies amounting to more than 8 billion dollars. These awards have included funds for the direct hiring of additional community policing officers, awards to support innovations, and those

---

that 12 months of crime information reporting to the FBI was a selection criterion while the number of non-funded cities varied from a high of 1,671 in 1995 to a low of 1,553 in 1997. There were 4,885 cities that received COPS grants during the entire time of study (1994 to 1999), the others only received grants at different times during the study period. Accordingly, the statistical modeling uses an unbalanced panel data design. The previous study results were re-run using this same unbalanced panel data design (Zhao and Thurman 2001). None of the substantive results changed based on this more rigorous model. 1994 census data was used to group cities into more than 10,000 population or less than 10,000 population groups in order to avoid double estimating caused by shifting of population above and below the 10,000 threshold by a small number of cities between 1994 and 1999.

for new technology (through the COPS MORE Program).[2] Through these award programs the COPS Office has provided funding for more than 118,000 additional community policing officers.

Hiring grants are designed to directly assist local law enforcement in the deployment of additional community police offices. While the Universal Hiring Program (UHP) has become the primary and best known initiative, smaller precursor hiring programs included PHASE 1, the Accelerated Hiring, Education, and Deployment Program (AHEAD), the Funding Accelerated for Smaller Towns Program (FAST), and the Police Hiring Supplement Program (PHS). Awards made in each of these programs stipulated that the COPS Office would contribute a maximum of 75 percent of the cost of hiring a law enforcement officer, up to $75,000 for a period of three years.[3] The purpose of hiring grants is to increase the number of law enforcement officers engaged in community policing activities in their communities. To date, the COPS Office has awarded approximately $5.5 billion dollars in hiring grants to law enforcement agencies.

The Making Officer Redeployment Effective (MORE) grant program represents a second award category. MORE grants provide funding for law enforcement agencies to acquire new technology and to add civilian personnel in order to increase officer effectiveness and efficiency.[4]

---

[2]The COPS Office also provides funding for a number of training and technical assistance grant programs designed to enhance the community policing abilities of local law enforcement. These grant programs include the funding of Regional Community Policing Institutes and the production of technical assistance guidebooks and evaluations of community policing programs. These programs are not examined here and account for a relatively small portion of the overall COPS budget.

[3] In certain rare circumstances, the COPS Office has provided agencies with waivers. In these cases, COPS covers all or a portion of the 25% local match. This does not influence the results because the total dollar amount of COPS funding is still the independent variable. Based on data collected by the COPS Office, 90% of grant funded officers have been hired, completed training and are on the street within 12 months. Therefore, we decided to use a one-year lag in the panel analysis.

[4] In 1995, the COPS Office provided a small portion of funds from the MORE program to fund officer overtime pay.

Civilians are hired to perform administrative and support tasks previously performed by officers. Both the procurement of technology and hiring of civilians are expected to save officer time so that they might be redeployed to the street to engage in community policing. These two facets of MORE grants (civilians and technology) differ significantly from one another in terms of the time it takes to implement and produce officer time-savings and, therefore, are treated somewhat differently in this analysis, as is discussed later. For the MORE 95, MORE 96 and MORE 98 programs, the COPS Office requires grantees to track "time-savings" resulting directly from the technology purchased or civilians hired through this grant program. The Office estimates that for every 1,824 hours per year that the grantee saves, one officer is redeployed into community policing efforts.[5] To date, COPS has awarded approximately 1.3 billion dollars in MORE grants.[6]

Innovative grants comprise the third and final group of awards offered by the COPS Office.[7] Overall, innovative grants make up a smaller portion of the COPS budget than either hiring or MORE grants. Innovative grants fund specialized programs targeted at specific jurisdictions and/or categories of crime and social disorder. The Distressed Neighborhoods Grant Program is one example of an innovative grant program targeted at specific jurisdictions. This program provided funds for eighteen jurisdictions that were identified by the COPS Office as having some of the most significant public order and economic challenges in the nation.

These funds are also included under MORE grants in this analysis.

[5] The COPS Office refers to this as an officer Full Time Equivalent (FTE).

[6] Note that MORE grants have not been awarded by the COPS Office since the year 2000.

[7] In this analysis, the following COPS programs are categorized as innovative grant programs 311, Advancing Community Policing Program, Organizational Change Demonstration Centers, Methamphetamine Initiative, Distressed Neighborhoods Program, Community Policing to Combat Domestic Violence, Anti-Gang Initiative, Problem Solving Partnerships, Youth Firearms Violence Initiative, Integrity Initiative, and the School Based

Cities were directed to analyze various sources of neighborhood level data in order to concentrate community police officers into a relatively small number of high problem areas within their city. The Community Policing to Combat Domestic Violence Program is an example of an innovative program that was designed to target a specific type of problem. Grantees submitted proposals regarding how they would employ community policing strategies to combat the problem of domestic violence. Innovative grants typically represent the most competitively determined awards, although some awards result from targeted solicitations by the COPS Office. To date, COPS has awarded approximately 661 million dollars for these specific innovative grants.

As of April 2004, the COPS Office estimates that approximately 101,962 of the more than 118,000 funded officers were on the street. This includes 69,124 officers hired from hiring and innovative grant programs, and 32,838 "redeployed officers" resulting from the MORE program. These figures are derived through a yearly "COPS Count" survey conducted by the COPS Office of its grantees. All active hiring grants and a stratified random sample of MORE grants are surveyed. In all, for the most recent count, COPS collected fax, telephone and web-based surveys from over 11,000 agencies who provided information regarding over 17,000 grants. The fact that officers are actually being hired and redeployed as a result of COPS funding is also supported by an analysis by the Urban Institute of hiring and redeployment (Koper et al. 2001). It is important to note that the Crime Act specifically dictates that grants are to be used only to hire *additional* law enforcement officers and the COPS Office attempts to be vigilant in this regard. The fact that COPS Office grants do not simply result in the funding of previously existing officers is supported through an independent evaluation (Koper et al. 2001).

THE RELATIONSHIP BETWEEN POLICING AND CRIME

After steady increase during 1970s and 80s, national crime data reported by law enforcement agencies indicate that crime rates, particularly those involving crimes of violence, have decreased significantly since 1994 (Uniform Crime Report, 1994-2000). Violent crime rates are at their lowest level in the past thirty years, particularly in large metropolitan areas. The timing of this crime decrease also coincides with increases in support from the COPS Office and increases in the number of community police officers and community policing programs across the country. The implementation of community policing activities, which has increased dramatically during the same period, may have played a role in this crime reduction. Evidence for an increase in the amount of community policing can be found in a comparison of the 1997 and 1999 LEMAS Surveys, a national survey of law enforcement agencies conducted by the Bureau of Justice Statistics (Hickman and Reaves 2001). These data indicate that the percentage of departments employing personnel designated as community police has risen from 34% to 64% and the absolute number of "community policing" officers rose from 21,000 to 113,000 from 1997 to 1999. In addition, numerous projects under the umbrella of community policing have been implemented in police agencies across the nation (for a review, please see Greene 2000).

Scholars have suggested that community policing in general may be partly responsible for this nationwide decrease in crime (Marvell and Moody 1996). The use of innovative strategies for crime prevention, problem solving, and community partnerships have been found to reduce local crime and social disorder problems in many jurisdictions where federal support has been received (for documented evaluations of the effect of community policing on social disorder,

crime, and fear of crime in American cities please see Rosenbaum 1994; Kartcoski and Dukes 1995; Skogan and Harnett 1997). Storefront stations and foot patrol in heavily populated residential neighborhoods or business districts have been shown to increase police knowledge of crime problems in addition to providing a greater police presence. Through the mobilization of local community residents and through problem solving projects, community policing has been observed to help reduce social disorder and crime incidents through information and resource sharing between law enforcement and the community (for a review of community policing strategies and innovative programs, please see Cordner 1997; Eck and Maguire 2001). The community policing philosophy has enjoyed widespread support among both academicians and practitioners, as well as a considerable amount of anecdotal evidence that suggests popularity among those who have tried it at differing levels. There have also been numerous scientific studies and evaluations on the effectiveness of community policing programs across the country, including longitudinal studies, cross-sectional studies, and multiple site evaluations (Sadd and Grinc 1994; Silverman 1999; Katz et al. 2001; Weisburd and Green 1995).

At the national level, Zhao and Thurman (2001) examined the effect of COPS funding on crime reduction in more than 6,000 cities and found COPS hiring and innovative grants were significantly related to declining violent and property crime rates between 1994 and 1999.[8]

[8] There is another national statistical study examining the effect of COPS grants on crime reduction (Muhlhausen 2001). However, this study had a serious problem concerning the dependent variable, county-level crime rate. First, in the data obtained from the Heritage Foundation, on average 40% of police agencies (usually small departments) included in their sample did not receive COPS grants during the period of study. However, their crime rates were included in the analysis as an aggregate dependent variable to assess the effect of COPS grants on crime decline at the county level. For example, this research assumes that the grants that COPS made to 7 law enforcement agencies in Galveston County, Texas over the study period will affect the crime rate for the entire 29 law enforcement agencies located in Galveston County. This introduces severe bias against finding an effect of COPS grants. Second, it is inaccurate to aggregate crime incidents of all police agencies located in the same county because not all of them

Similar research on the relationship between police strength and crime incidents also indicates that the number of police officers may have a significant impact. For example, in pooled time series-cross-sectional study on the relationship between police and crime in 56 cities, findings indicated that each additional officer at the city level results in approximately 24 fewer crimes, including 0.2 homicides, 0.7 robberies, and 3.2 burglaries (Marvell and Moody, 1996). The research on the relationship between police strength and crime rate is not conclusive. There have been studies that found a negative relationship (e.g., Ehrlich 1972) and there have been equal number of studies that have found an insignificant effect (for a review, see: Eck and Maguire 2000).

RESEARCH METHOD

DATA

The data used in this analysis were derived from four sources. The first source is the Uniform Crime Reports (UCR) published annually by the Federal Bureau of Investigation. UCR data reflect a nation-wide effort to collect data from approximately 17,000 state, county, and city law enforcement agencies voluntarily reporting crimes that have been brought to their attention. These data on "crimes known to police" contained in the UCR from 1994 to 2000 were downloaded from the ICPSR web site at the University of Michigan, a data collection warehouse which stores them. The Part I index crimes reported by the UCR includes eight categories of crime reported from 90 percent of law enforcement jurisdictions regularly providing such local crime data to the FBI and are typically thought to contain the most serious forms of criminal

---

may have reported their respective crime incidents for 12 consecutive months. This may lead to missing data in one or more agencies in a county, and can be more of a problem in panel data, which requires reporting of all agencies

activity. Part I crimes include four categories of violent crime (murder, rape, robbery, and aggravated assault) and four categories of property crime (burglary, larceny, auto theft and arson). All of these crimes with the exception of arson are included in this analysis. Arson was excluded because it was not available for all of the study years. Although it is well understood that the UCR underestimates the amount of crimes that actually occur, UCR Part I crimes are thought to provide generally reliable (consistent) underestimates of these rates and therefore provide an accurate measurement of changes in crime rates (the dependent variable of interest here). Use of UCR crime rates is common in criminological research and its benefits and limitations are well understood.

A second source of data was the dollar amount of grants awarded to individual law enforcement agencies from the COPS Office from 1994 to 1999. As stated earlier, COPS grants are broken down into three general categories--hiring grants, innovative grants, and MORE grants. In the original data provided by the COPS Office, there were 12,070 law enforcement agencies that received funding from 1994 to 1999. Because the other sources of data (UCR, Census, and Labor Statistics) are collected at the local level, and to avoid overlap between agency jurisdictions, only local police departments are included in the analysis; the following types of agencies were excluded: state police agencies, county police agencies and sheriff's offices, university/college police departments, and special purpose law enforcement agencies like court police, forest police, park police etc. This left 7,179 local city police agencies available (not yet the final sample for analysis).

There is no meaningful way to include these types of agencies in the model because of

---

for 12 months over the entire period of study.

overlapping jurisdictions. If they were to be included this would introduce a substantial amount of error into the analytical models. Thus, the analysis was limited to the defined boundaries of cities and both the COPS and crime variables were measured at this level. Any nested effect of other law enforcement agencies located in the city (e.g., school district police, university police, park police, sheriff office, etc.) theoretically may contribute to the crime decline in a city (usually big cities), however, these agencies report their own separate annual crime incidents to the FBI. Thus, it is reasonable to assume that any crossover due to reporting is minimal. Moreover, there is no clear census information on school district police, park police, etc. Lack of socioeconomic variables makes the estimate of the effect of these agencies extremely difficult, if not impossible at the national level. In the hundreds of studies on city crime rates in the past four decades we are unaware of a single study that attempts to measure this crossover by including school district police, court police, park police etc. in an analysis.

Demographic information at the city level was also included from the 1990 and the 2000 U.S. Census. 1990 Census data were obtained from the CD disk and 2000 from DVD disk published by the U.S. Bureau of Census. Finally, unemployment information (1994 to 1999) was obtained from the Department of Labor Statistics. The Labor Department collects annual employment data in cities with populations greater than 25,000. County level unemployment data from the same source was used for cities with populations less than 25,000, because for these small cities, unemployment data is not available at the city level.

VARIABLES IN THE ANALYSIS

Dependent Variables. The two dependent variables employed in the analysis are derived

from Uniform Crime Report data for violent crimes and property crimes per 100,000 population. Consistent with the UCR format, the violent crime rate reflects the sum of the incidences of four crimes (murder, rape, robbery, and aggravated assault) divided by each city's population and multiplied by 100,000. Similarly, the property crime rate reflects the sum of the incidences per 100,000 for three crimes--burglary, larceny, and auto theft.

Independent Variables. Three independent variables were used in the analysis to represent the type of award made (hiring grant, innovative grant, or MORE grant). The total amount of each type of grant funding received by a city in each calendar year (1994-1999) was divided by the city's population so that the total for each type of grant program was standardized to indicate the dollar amount received per year, per resident for each city. In addition, the total dollar amount of COPS funding was adjusted to 1994 dollars using the Consumer Price Index. There were a total of 7,179 local city police departments that were funded by the COPS Office from 1994 to 1999. Of this number, 535 cities with populations less than 1,000 were excluded from the analysis since the data for these smallest of cities were often inaccurate and tended to fluctuate widely to the extent that these variations made the results difficult to assess with much confidence over time.

Additionally, we excluded another 985 COPS funded cities from the data due to the lack of complete UCR crime data over the six-year period or/and lack of census data, leaving 5,659 COPS funded cases for analysis (including 2,306 cases with population over 10k and 3,353 cases with population less than 10k). At the same time, there were 1,938 local city law enforcement departments included in the study that did not receive COPS grants during the period of study

and had the complete UCR and census data. These 1,938 non-funded cities are used as control group in the analysis (including 354 cases with population over 10k and 1,584 cases with population less than 10k). All the police agencies in the analysis reported 12 months of UCR data in a given year. In addition, cities in four states (Delaware, Illinois, Kansas, and Montana) were not included in the analysis due to missing UCR data, except for the following cities: Dover, Delaware; Havre, Montana, and Wichita, Kansas. We are well aware of the limitations of using UCR data due to the presence of these missing cases, however, the use of UCR data is widely accepted in criminological work. Moreover, in the analyses presented here there is no specific theoretical reason to suspect that the effect of COPS funding on crime would be any greater or any less in the cities that are omitted from the analyses due to this missing data, thus making it unlikely that their inclusion would alter the results.[9]

There are three additional specifications for the independent variables. First, the three COPS grant independent variables (hiring grants, MORE grants, and innovative grants) were lagged by one year when their impact on crime was analyzed. This one-year lag provides implementation time to hire officers, procure technology, and initiate innovative programs. This one year lag was based on internal COPS Office tracking systems that indicate on average it takes 12 months to hire, train and deploy an officer from the award start date.[10] Accordingly, data concerning COPS Office funding coincides with grants awarded from 1994-1999 and UCR crime

[9] There is another issue related to the missing UCR data: whether estimates should be used to replace the missing UCR values at the city level. In UCR data, these missing values are systematic and usually concentrated in several states (e.g., Illinois, Florida, etc), thus, the use of estimates may lead to more bias than not using such estimates. Consequently, missing values of UCR data are excluded from the current analysis.

[10] This is based on an analysis conducted by the COPS Office of its yearly "COPS Count" data, an annual survey of all of its hiring grants.

data were included for 1995-2000. Second, because hiring grants are intended to hire officers over a three-year period, hiring grants awarded to police departments are allocated over that period in a declining rate according to the following factors: 38 percent for the first year, 34 percent for the second year, and 28 percent for the third year.[11]

Finally, although MORE grants are designed as one-year grants, agencies typically take a longer period of time in order to procure the technology, make it operational, and train officers in its use. Therefore, the technology portion of the MORE grants was spread out over a period of three years to compensate for this fact according to the following allocation: 36 percent for the first year, 36 percent for the second year, and 28 percent for the third year.[12] In addition, analysis of COPS Office tracking systems (COPS Count) indicated that civilians are typically hired within one year of the grant. Thus, the MORE funding variable used in this analysis was calculated for the first year as the sum of the civilian portion of the grant plus 36 percent of the technology portion of the grant. In the second year, 36 percent of the technology portion of the grant was used, with the remaining 28 percent of the technology portion allocated to the final year.

Control Variables. The 1994 crime rate was included as a control variable in this analysis. Inclusion of the 1994 crime rate allows for the analysis to be standardized to examine the change in crime rates since 1994. Also, 1994 was the point at which communities began receiving federal funds from the COPS Office and controlling for the crime rate at this time enables the

[11]These numbers are based on COPS Office recommendations regarding how agencies spend money over the three-year period. The adjusted allocation of COPS hiring grant over a three-year period is used for panel data analysis.
[12] This allocation method was based on an analysis of the average actual spending patterns of police departments who have received COPS MORE grants. The adjusted allocation of COPS MORE grant over a three-year period is used for panel data analysis.

analysis to focus on the period after the creation of the Office. The inclusion of the 1994 crime rate reflects the ability of police agencies to control the level of crime incidents given "typical" resources including budget and personnel levels without COPS funding. It should be noted that the inclusion of city dummy variables also attempts to compensate for these factors (also see Appendix A for a discussion of unbiased estimates concerning independent variables).

Eight other control variables designed to account for the socioeconomic health of communities also were included. Social disorganization theory developed by Shaw and McKay provides a theoretical framework for the inclusion of these variables in this analysis (for a discussion and testing of social disorganization theory see Shaw and McKay, 1972; Bursik, 1988; Sampson, 1985; Sampson and Groves, 1989; Smith and Jarjoura, 1989). Scholars of social disorganization theory argue that unique socioeconomic characteristics of communities are closely associated with local crime problems. Specifically, there are three primary socioeconomic dimensions that merit empirical scrutiny (Osgood and Chambers 2000). The first dimension is community heterogeneity. In this study, heterogeneity is represented by the percentage of minority residents and percent male in a community. The second dimension is a community's socioeconomic status, measured here by five variables: the percentage of unemployment, percentage of single parent households, percentage of young people between the ages of 15 to 24, percentage of home ownership and per capita income. The final dimension we control for is community mobility as indicated by the percentage of people having lived at the same address since 1985. Since the census data are available for every decade we created a measure, estimating the change in socioeconomic characteristics from 1994 to 1999. That is, the

time-varying socioeconomic variables are measured via linear trend (Kovandzic et al. 2002).[13]

Ideally a researcher would like to include all of the variables of interest in the analytic equation to say with absolute confidence that every potential control variable is included. In reality, however, for all social science research, there will always be variables that are unavailable for inclusion or cannot be included due to issues with multicollinearity and lack of available data. However, a special statistical advantage of panel data analysis (as compared to more common cross-sectional data analysis) is that it is able to capture unobserved variance through the use of dummy variables. By using dichotomous variables (in this case city and time dummy variables and in other models county dummy variables) we were able to control for unobserved systematic variance across the time period studied. Thus, these variables attempt to control for other factors such as police expenditures, changes in the national economy, and access to local and federal grant funding. The effect of these variables accounts for the most significant effects in the entire equations and results in an exceptionally large amount of explained variance. In addition, the use of this type of dummy variables in panel model designs is common and their benefits to model specification are well known (Wooldridge 2001).

One specific control variable to mention is police expenditures; that is the amount of funding local departments use to address crime issues. We were unable to include this specific

[13] Time-varying variables can be defined as variables that have annual observations during the period of study (e.g., the annual change in single mother household between 1994 and 2000 based on 1990 and 2000 Census data). The fixed effect panel model means it uses time and city level dummy to control for unobserved variation in the panel data. There is also possibility that the fluctuation of drug market may correlated with the crime rate in cities. However, a careful search on the available drug related data reveals that there has been no annual collection of data concerning the nature of local drug market at city level except a few dozens of large cities included in the drug forecasting project nationwide.

variable due to the fact that it does not exist in a properly specified form at the city level.[14] However, we addressed this issue in multiple ways. First, as mentioned above, we included the 1994 crime rate to standardize for these effects. Second, the city level dummy variables used in the model attempt to take such a variable into account. Third, it is unlikely that the inclusion of this variable, if it were possible, would result in much additional explained variance in the statistical model. This is due to the fact that the R^2 for the models that we report are already exceptionally high. Finally, we completed a separate follow-up study in which we collected original police expenditure data (minus COPS funding) from 55 of the largest police departments in the United States across the study period. We included these data in statistical models very similar to those reported here. The findings showed that the inclusion of police expenditures had virtually no effect on COPS funding. A brief description of this study can be found in Appendix E. Because of all of these factors we find it unlikely that the inclusion of this control variable (even if it were possible to include in the full sample analysis) would alter the substantive findings of this report.[15]

[14] There is some limited data on police expenditures, however, it is not for all of the cities included in this analysis, and perhaps more importantly, it does not explicitly exclude COPS Grant funding from its estimates. If COPS grant funding is not explicitly excluded from these estimates, researchers have no way of knowing which agencies included and excluded COPS funding in their data. In addition, some may argue that the drop in crime rate might have happened or begun earlier than 1994 in some cities. In this analysis, the crime drop is examined in two different ways. First, the annual crime rate in each city is investigated in the panel data analysis. Second, a comparison of crime rates is made between the COPS funded cities and the non-funded cities between 1994 and 2000. Therefore, the focus of this project is not on the initiation of the crime drop (prior to 1994) but on the rate of the crime drop (change in rate over time) within the group (funded) and between groups (funded vs. non-funded) from 1994 to 2000.

[15] One possible way to control for police budget is the use of the measure, number of sworn officers as reported by the FBI annually. However, it is difficult to distinguish if the annual increase in the number of police officers is due to COPS Office grants, due to an increase in departmental budget, or due to both. Consequently, we decided to use two variables to control for that effect, the 1994 crime rate as a baseline and the fixed effect (dummy variables). Similarly, the Law Enforcement Management and Administrative Statistics (LEMAS) offers survey data of large police agencies with more than 100 sworn officers concerning operation, organization structure, calls for service, etc.

DATA ANALYSIS

A two-factor fixed effect model was used to analyze the effects of COPS funding on crime reduction. The "two-factors" model allows for the analysis to attempt to control for unobserved systematic (non-random) variation. The "two-factors" approach accommodates a geographic component represented by the cities in which agencies reside, and a time-specific component represented by the six years of data. By including the "first-factor" (the geographic component) through the inclusion of a cross-sectional dummy variable for each city in which the agencies reside, the difference in crime rates caused by unobserved variance occurring in each city is estimated. This means that the bias caused by such omitted variables can then be estimated and an attempt made to control for in the panel data we analyze. Similarly, the "second-factor" (the time-specific component) involves the inclusion of year dummy variables that attempts to control for those unknown factors impacting crime in the U.S. that are not accounted for by the other independent and socioeconomic variables. The current study covers almost the entire population of large cities in the United States.[16] Please see Appendix A for a discussion of statistical model specification, Appendix B for a discussion on the differencing issue, Appendix C for an analysis using city dummies removing percent male and per capita income, Appendix D for an analysis using county dummy variables and removing percent male

---

However, the LEMAS surveys have been conducted irregularly (1990, 1993, 1997, 1999, and 2000). There were no surveys administered between 1994 and 1996, which is crucial for assessing the initial effect of COPS Office grants. Therefore, we decided not to use LEMAS data in the analysis.

[16] All cities greater than 150,000 population received COPS grants between 1994 and 1999 except for Jacksonville, Florida which received COPS funding in 2002. Therefore, Jacksonville, Florida, was used as the only non-funded agency in cities greater than 150,000 population. In addition, about 87% of cities greater than 10,000 population were funded by the COPS Office during the same period.

and per capita income, as was reported in a the previous version of this study. [17]

The total number of variables on the right side of the equation in each analysis includes 3 independent variables (hiring grant funding, innovative grant funding, and MORE grant funding), the 1994 crime rate, 8 time varying socioeconomic (demographic) variables modeled after social disorganization theory, 6 year dummy variables to control for time variance, and 7,596 city dummies to control for geographically located unobserved systematic variation in the panel model.[18]

FINDINGS

DESCRIPTIVE STATISTICS

Descriptive statistics for the full sample appear in Table 1. As might be expected, the means for both violent and property crime rates show that the property crime rate per 100,000 population is much higher than the violent crime rate in the cities studied. Similarly, hiring grant programs were the largest programs funded by the COPS Office with a mean of $2.65 per person during the six-year period, followed by MORE grants ($0.76) and innovative grants ($0.49). The

[17] Appendices C and D were run so that the current study model could be compared to those reported in the pervious report (Zhao and Thurman, 2001). Note that in both of these models, percent male and per capita income were both removed (as was the case in the previous version of the report). The inclusion of these variables came at the recommendation of outside reviewers. Also, the analyses presented in Appendices C and D are for COPS Funded agencies only and do not include non-funded agencies as was the case in the previous version of this report. The results showed that the coefficients of the three COPS grant categories remain very stable regarding the directions of sign and magnitudes of coefficients.

[18] The explanatory and control variables are chosen based on a review of literature (social disorganization theory) and recommendations from the GAO review team (percentage of male and per capital income). Multicollinearity is a potential problem in panel data analysis. Accordingly, the variance inflation factor (VIF) often is used to detect whether high collinearity exists between any variables. Some researchers use a VIF score of 4 or greater as an indication of severe mulicollinearity (Fisher and Mason, 1981). Our initial collinearity statistics showed that none of the VIF values exceeded 4. Initially, the variable, percentage of people below poverty, was included in the analysis. However, the correlation between variable, percentage of unemployment, and percentage of people below poverty line was very high. Therefore, only percentage of unemployment is included in the current analysis.

demographic variables are based on Census data, using the mean from 1994-1999. The demographic variables show that the six-year average of unemployment in the sample was 4.75 percent. About one-third of the residents living in these cities identified themselves as minority (37.56%), and single parent households comprised 11.89 percent of the population. The percentage of young people was 14.94. In addition, 57.24 percent of the residents were homeowners, about one-half of the residents (51.13%) lived at the same address during the five years prior to the survey, 48.21% of residents were male, and the average per capita income was $18,947.

----- Table 1 About Here -----

ANALYSIS BY POPULATION SIZE

We also examined crime reduction attributable to COPS grants according to city size. There has been considerable discussion suggesting that the recent decline in crime rates across the U.S. primarily is a large city phenomenon, perhaps even a trend heavily influenced by enormous drops in crime in America's largest metropolitan areas (for reviews see Eck and Maguire, 2000; Silverman, 1999). Conversely, few studies specifically have examined crime rates in very small cities and rural areas where the literature suggests that styles of policing and patterns of crime problems differ significantly from those found in more urban locales (for research on crime and policing in rural and small towns, see Weisheit and Wells 1999; Thurman and McGarrell 1997; Weisheit et al. 1995).

Previous research has not enjoyed the luxury of having such a large sample of police agencies in their analysis as is the case here. Consequently, the effect of changes in policing on

crime in small towns has largely been overlooked. Langworthy and Travis (1999) argue that policing research has traditionally focused on large cities. In the present study, the same criteria used by the UCR were followed such that cities were grouped into two categories: cities with populations greater than 10,000 and those with populations less than 10,000 inhabitants. The crime rate patterns for both of these groups are found in Table 2.

----- Table 2 About Here -----

It is evident that the drop in crime in the U.S. between 1994 and 2000 varies greatly by city size. The pattern for violent crime rates among cities with populations greater than 10,000 dropped substantially (-32.7%). In contrast, small cities (with populations less than 10,000) had a much lower drop in their violent crime rate (-9.1%). A closer look at the crime rate in these small cities reveals that the decline in violent crime primarily took place between 1994 and 1996. These small cities actually experienced an increase in their violent crime rate from 1996 to 1998. The decline in property crime rates reveals a similar overall pattern.

Moreover, very small cities made up a disproportionate amount of the sample. There were 3,353 cities with population less than 10,000 and 2,306 cities with population greater than 10,000 in the COPS funded final sample. However, despite having a much larger number of cities, the total population for the small cities included in the sample was 21,062,834 (both funded and non-funded) and for large cities it was 133,001,630 (both funded and non-funded). Therefore, the population of cities that received COPS funding with greater than 10,000 residents is more than 10 times that in the small cities. The skewed nature of the relationship between the number of cities in the sample and the total population size makes the possibility of an interaction effect

between COPS funding and population size a possibility that should be examined further and thus dictates the analysis by population size. It should however be noted that the effect of city size itself is standardized and controlled for in the models through the examination of crime and COPS funding *rates*.

Analysis of Cities with Populations Greater than 10,000. Results from the multivariate analysis of violent and property crime rates are displayed in Tables 3 and 4, respectively. The findings suggest that both hiring grants and innovative grants have had a significant effect on crime reduction in this group, after controlling for previous crime rates (the 1994 crime rate), demographic variables, and unobserved systematic variation. The R^2 of the model predicting the violent crime rate is 92.96% indicating that the independent and control variables are able to explain a very high percentage of variance in the model; similarly, the R^2 for the property crime rate model is 93.6%.[19]

----- Tables 3 and 4 About Here -----

Our analyses indicates that an increase of one dollar in grant funding spent for hiring purposes resulted in a corresponding decline of 10.95 violent crime incidents per 100,000 residents. A dollar increase for hiring community police officers contributed to a decline of 27.88 property crime incidents per 100,000 population. Similarly, regarding innovative grant programs the coefficients indicate that a one dollar increase in innovative grant funding contributed to 4.30 fewer violent crime incidents per 100,000 population and 10.07 property crime incidents per 100,000 population between 1995 and 2000. MORE grants did not have an

[19] The R^2 for all the models increased noticeably from the previous analysis that was based on the data from 1994 to 1999. Also, it is important to note that the city and time dummy variables contributed significantly to the high level

effect on violent crime rates in these cities, but was related to a decrease in property crime rates of 17.12 per 100,000 persons.[20]

The effects of demographic variables on violent and property crime rates in the two models are similar. For example, the percentage of unemployment and percentage of male are negatively associated with violent crime rates, while per capita income are positive correlated with violent crime rates. Similar patterns of effects of demographic variables can be found in the analysis of property crime rates. In addition, the magnitude of coefficients of demographic variables in predicting property crime rate is much higher than in predicting violent crime rate since the number of property crime incidents are higher than the number of violent crime incidents in American cities.

Analysis of Cities with Populations Less than 10,000. Tables 5 and 6 show the effects of COPS grants on violent and property crime rates in very small cities. Unlike the results observed in large cities, these findings do not show that the hiring grants are negatively correlated with reported violent and property crime rates. The influence of hiring grants on both violent and property crime rates were small and insignificant. In addition, the analysis shown in Tables 5 and 6 indicate that innovative and MORE grants are also not significant predictors of violent and property crime rates in the sample. At the same time, demographic variables and dummy variables (not reported) contributed to the explained variance of the models with 72.79% for

---

of R^2 in these statistical models.

[20] Two reviewers recommended the use of log transformation of the dependent variables because the dependent variables, crime rates, might be skewed. We decided not to use log transformation for the following two reasons. First, in our analysis, the dependent variable is the crime rate, which is defined as the crime incidents known to the police divided by city population, as a common practice, the dependent variables times 100,000, the crime rate. In addition, the regression models are estimated by using the population variable as weights. The standardization of crime rate adjusted the problem of a skewed dependent variable (the presumed reason for using a log

violent crime model and 84.46% for property crime model. Thus, the analyses for cities with more than 10,000 population fit the models better than cities with population between 1,000 to 10,000.

----- Tables 5 and 6 About Here -----

Analysis of the Full Sample. The impact of COPS grants on violent crime for the full sample appears in Table 7. Here we see the effects of COPS grants on the rate of violent crimes reported to the police, using a two factor fixed effect panel model for the entire sample. The results show that hiring and innovative grants are significant predictors of violent crime rates. The coefficient for hiring grants showed that a one dollar increase in hiring grant funding lead to a decrease in 10.95 violent crime incidents. Similarly, the coefficient of innovative grants indicates that a one dollar increase in innovative grant funding contributed to a decline of 3.78 violent crime incidents per 100,000 residents. Receiving MORE grant funding was not significantly associated with a declining violent crime rate for the entire sample.

-----Tables 7 and 8 About Here -----

The effects of COPS grants on property crime rates for the full sample are shown in Table 8. All three categories of COPS are shown to significantly reduce property crime rates in the analysis. Each dollar spent per person on hiring grants produces a reduction of 19 property crimes per 100,000 residents. Similarly, both innovative (-15.76) and MORE grants (-9.85) were significant predictors of property crime reduction in these cities. However, it is important to point out that the significant effects found in cities over 10,000 population obviously influence

---

transformation). Second, since many smaller cities have zero crime incidents, the log transformation is not feasible.

the significance of the full model. For the control variables, the percentage of single parent households does not have an appreciable influence on the property crime rate while the other control variables prove statistically significant.

DISCUSSION AND CONCLUSION

We conclude that crime reduction in the U.S. due to COPS grants likely varies by city size. The differences observed between cities with populations of less than 10,000 people and larger cities is apparent with respect to crime patterns over the seven-year period of time when national crime rates overall dropped substantially (Table 2). In addition, these data indicate that COPS hiring, innovative and MORE grants contributed significantly to decreasing crime in U.S. cities with populations greater than 10,000 people. According to the FBI, approximately 89 percent of people in the U.S. reside in jurisdictions with police departments that serve populations greater than 10,000.[21] Therefore, it appears that the significant crime reducing effect of COPS grants are concentrated in areas affecting the majority of the U.S. population. It should be noted that we do not feel that we are in a position to judge the relative size of this impact (in terms of program effectiveness regarding crime rates). This is because the effect likely varies across cities and it is difficult to assign a relative worth or value of a specific amount of crime reduction. Because there are inherent limitations of social science research, because it is difficult to determine how much a specific amount of crime prevention is worth to society, and because other stated program outcomes (enhancing trust in police, reducing fear of crime, producing a more technologically advanced and efficient police force, building community relationships etc.) are not examined here, we leave discussion of this issue to others.

The findings are in line with our previous report examining a very similar statistical model that did not include 2000 Census data and contained one less year of analysis (COPS Grants 1994-1998 on reported crime from 1995-1999) (Zhao and Thurman 2001). The inclusion of 2000 Census data allowing for time-varying demographic data, an additional year of analysis and the focus on the use of city level dummy variables are the primary improvements and central differences between the studies. In the previous study, county dummy variables were used instead of city dummy variables because the use of city dummy variables would have wiped out the effects of the other control variables, because only 1990 Census data was available. The lack of variation in this Census data made it so that the contribution of these variables would be eliminated if city dummy variables were used. However, when conducting this previous study, to ensure the reliability of the results, these previous models were also run using city level dummy variables and the substantive results were the same, however these results were not fully reported as is the case in the present study. In addition, the present study includes both funded and non-funded agencies at the request of external reviewers. We believe that this inclusion may result in slightly biased estimates towards finding an effect for COPS Grants (at least in small cities where non-funded agencies are of significant size) because virtually all of the non-funded agencies are small and have experienced smaller declines in crime. To assure ourselves that this was not the case, we ran the models reported here without the inclusion of non-funded agencies and these results were substantively the same. Finally, at the request of external reviewers we also included two additional control variables in the present study, percent male and per capita income.

[21] This figure is also 89% in the sample.

Comparing the previous results from the December 2001 report to the results that are reported in this report reveals very consistent findings. For example, in both studies, hiring and innovative grants both had a significant negative effect on violent and property crime in cities with populations greater than 10,000. In addition, in the previous study, MORE grants failed to reach significance in either model, however, in this more recent study, MORE grants demonstrated a significant negative effect on property crime rates in these cities.

This paper examined the effect that COPS Office grants awarded between 1994 and 1999 had on crime rates in 7,597 U.S. cities between 1995 and 2000 (both funded and non-funded cities). It was found that cities with populations greater than 10,000 who receive greater amounts of COPS Office innovative and hiring grant funding have experienced significantly greater decreases in violent crime the following year than those who have received less funding, over the seven-year period controlling for a wide range of time varying observed and unobserved city level socio-demographic variables. In addition, this relationship holds for all three grant programs with respect to property crime. As with all social science research, the extent to which this means that COPS grants have contributed in a "causal" way to these reductions is an open question. However, this study provides evidence that is in-line with accepted criminological practice that attempts to satisfy the conditions for causal statements (addressing causal order, spuriousness, and correlation) to the best extent practicable given the available data. In doing so, it demonstrates that there is a significant relationship between COPS funding and property and violent crime reductions in cities with populations greater than 10,000. This study should not be viewed as definitive, but rather as an addition to the literature regarding the effectiveness of

COPS programs and understood and interpreted within that context.

Table 1: Descriptive Statistics of the Full Sample (The Mean from 1994 to 2000)*

Variables	Mean	Standard Deviation
Dependent variables (1995-2000)		
Violent crime rate (per 100,000 population)	769.63	674.50
Property crime rate (per 100,000 population)	5016.39	2820.74
Independent variables (1994-1999)		
Hiring grants (per resident)	$2.65	3.76
Innovative grants (per resident)	$0.49	2.56
MORE grants (per resident)	$0.76	1.52
Control variables (1994-1999)		
% of unemployment	4.75	2.11
% of minority	37.56	24.44
% of single parent households	11.89	4.34
% of young people	14.94	4.70
% of home owners	57.24	14.77
% of people in the same house	51.13	8.73
% male	48.21	2.19
per capita income	$18.947[a]	8.85
Number of cities =5,659		

* The weighted average method is used to estimate the means of COPS grants and control variables.
[a] in thousands.

Table 2: City Size and Crime Rates per 100,000 Population (1994 to 2000)

	94	95	96	97	98	99	2000	% Change 1994 to 2000
Violent Crime Rate								
Cities between 1k to 10k	384	377	355	379	385	349	349	- 9.1%
Cities 10k and up	1027	971	902	856	786	710	691	-32.7%
Property Crime Rate								
Cities between 1k to 10k	3651	3757	3742	3763	3635	3420	3323	-9.0%
Cities 10k and up	6032	5950	5706	5513	5134	4716	4545	-24.7%

Table 3: The Effect COPS Grants (1994-1999) on Violent Crime Rates (1995-2000) in Cities with Populations Greater than 10,000 (Both COPS Funded and Non-funded): Two Factor Fixed Effect Panel Model (City Dummy Variables) [a b]

Variables	Coefficient	Robust Standard Error
Hiring grants	-10.95*	2.85
Innovative grants	-4.30*	1.33
MORE grants	-4.44	3.22
1994 Violent crime rate	0.42*	0.20
Percentage of minority	-5.54	3.37
Percentage of unemployment	-8.92*	3.90
Percentage of single parent households	32.28	17.68
Percentage of young people	15.63	8.68
Percentage of home owners	-14.18*	7.20
Mobility	7.51	4.28
Percentage of male	-57.46*	13.26
Per Capita Income	77.07*	14.71
Adjusted R^2	92.96.	
F Values= 73.56*		

* p <.05

[a] COPS dollar amounts are per person and crime rates are per 100,000. A total of 2,659 city dummy variables and 6 time-variance dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table 4: The Effect of COPS Grants (1994-1999) on Property Crime Rates (1995-2000) in Cities with Populations Greater than 10,000 (Both COPS Funded and Non-funded): Two Factor Fixed Effect Panel Model (City Dummy Variables) [a] [b]

Variables	Coefficient	Robust Standard Error
Hiring grants	-27.88*	7.56
Innovative grants	- 10.07*	4.90
MORE grants	-17.12*	5.77
1994 Property crime rate	2.59*	0.56
Percentage of minority	- 85.42*	11.62
Percentage of unemployment	- 16.79	9.11
Percentage of single parent households	151.06*	68.32
Percentage of young people	- 1.61	29.06
Percentage of home owners	-134.66*	19.90
Mobility	- 34.50*	10.34
Percentage of male	-273.81*	52.73
Per Capita Income	178.31*	39.95
Adjusted R^2	93.6	
F Value= 81.4*		

* p <.05

[a] COPS dollar amounts are per person and crime rates are per 100,000. A total of 2,659 city dummy variables and 6 time-variance dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table 5: The Effect of COPS Grants (1994-1999) on Violent Crime Rates (1995-2000) in Cities with Populations Between 1,000 and 10,000 (Both COPS Funded and Non-funded): Two Factor Fixed Effect Panel Model (City Dummy Variables) [a b]

Variables	Coefficient	Robust Standard Error
Hiring grants	- 0.39	0.40
Innovative grants	0.64	0.66
MORE grants	0.92	1.66
1994 Violent crime rate	-1.68	1.01
Percentage of minority	-9.26*	2.22
Percentage of unemployment	- 2.41	1.81
Percentage of single parent households	10.65	6.53
Percentage of young people	- 7.70*	3.25
Percentage of home owners	- 6.75*	2.17
Mobility	3.97*	1.18
Percentage of male	- 9.84	5.37
Per Capita Income	- 4.66	3.15
Adjusted R^2	.72.79	
F Value= 14.31*		

* $p < .05$

[a] COPS dollar amounts are per person and crime rates are per 100,000. A total of 4,936 city dummy variables and 6 time-variance dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table 6: The Effect of COPS Grants (1994-1999) on Property Crime Rates (1995-2000) in Cities with Populations Between 1,000 and 10,000 (Both COPS Funded and Non-funded): Two Factor Fixed Effect Panel Model (City Dummy Variables) [a b]

Variables	Coefficient	Robust Standard Error
Hiring grants	- 0.78	2.69
Innovative grants	- 2.86	3.06
MORE grants	9.58	16.08
1994 Property crime rate	0.82*	0.30
Percentage of minority	-89.51*	12.18
Percentage of unemployment	6.22	6.99
Percentage of single parent households	181.68*	32.01
Percentage of young people	-124.61*	17.75
Percentage of home owners	-123.80*	15.72
Mobility	23.58*	8.01
Percentage of male	- 31.00	21.14
Per Capita Income	- 77.78*	19.73
Adjusted R^2	.84.46	
F Value= 81.41*		

* p <.05

[a] COPS dollar amounts are per person and crime rates are per 100,000. A total of 4,936 city dummy variables and 6 time-variance dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table 7: The Effect of COPS Grants (1994-1999) on Violent Crime Rates (1995-2000) in Cities with Populations Greater than 1,000 (Both COPS Funded and Non-funded): Two Factor Fixed Effect Panel Model (City Dummy Variables) [a] [b]

Variables	Coefficient	Robust Standard Error
Hiring grants	- 10.95*	2.19
Innovative grants	- 3.78*	1.38
MORE grants	- 3.89	3.70
1994 Violent crime rate	- 2.04*	1.03
Percentage of minority	- 13.02*	2.67
Percentage of unemployment	- 7.67*	3.56
Percentage of single parent households	39.42*	15.40
Percentage of young people	9.03	7.31
Percentage of home owners	- 13.92*	5.63
Mobility	7.07*	3.38
Percent Male	- 27.56*	7.76
Per Capita Income	61.34*	12.95
Adjusted R^2= .92*		
F Value= 58.55		

* p <.05

[a] COPS dollar amounts are per person and crime rates are per 100,000. A total of 7,596 city dummy variables and 6 time-variance dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table 8: The Effect of COPS Grants (1994-1999) on Property Crime Rates (1995-2000) in Cities with Populations Greater than 1,000 (Both COPS Funded and Non-funded): Two Factor Fixed Effect Panel Model (City Dummy Variables) [a] [b]

Variables	Coefficient	Robust Standard Error
Hiring grants	- 19.01*	5.65
Innovative grants	- 9.85*	4.10
MORE grants	- 15.76*	6.51
1994 Property crime rate	- 2.83*	1.04
Percentage of minority	-107.74*	9.77
Percentage of unemployment	- 12.62	8.19
Percentage of single parent households	184.68*	60.90
Percentage of young people	- 34.15	23.93
Percentage of home owners	-139.77*	15.98
Mobility	- 15.77	8.12
Percent Male	-124.57*	30.43
Per Capita Income	126.99*	34.41
Adjusted R^2=.93* F Value=64.37		

*p <.05

[a] COPS dollar amounts are per person and crime rates are per 100,000. A total of 7,596 city dummy variables and 6 time-variance dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

REFERENCES

Bahl, Roy, Richard D. Gustely, and Michael J. Wasylenko.
2001 The Determinants of Local Government Police Expenditure: A Public Employment Approach. National Tax Journal 31:67-79.

Blumstein, Alfred.
2001 Disaggregating the violence trends. In Alfred Blumstein and Joel Wallman (Eds.) The Crime Drop in America. New York: University of Cambridge Press.

Bursik, Robert.
1988 Social Disorganization and Theory of Crime and Delinquency: Problems and Prospects. Criminology 26:519-551.

Cao, Jian, Ernst W. Stromsdorfer and Gregory Weeks.
1996 The Human Captial effect of General Education Development Certificates on Low Income Women. The Journal of Human Resources 31(1): 206-228.

Cordner, Garry.
1997 Community Policing: Elements and Effects. In D. Dunham, and G.Alpert (Eds.) Critical Issues in Policing. 3rd Edition. Prospect Heights, IL: Waveland. Pp.451-68.

Corman, Hope and Theodore Joyce.
1990 Urban crime control: Violent crimes in New York City. Social Science Quarterly 71:567-584.

Eck, John and Edward Maguire.
2000 Have Changes in Policing Reducing Violent Crime? An Assessment of the Evidence. In Alfred Blumstein and Joel Wallman (Eds.) The Crime Drop in America. New York, NY: Cambridge University Press.

Ehrlich, Isaac.
1972 The Deterrent Effect of Criminal Law Enforcement. Journal of Legal Studies 1:259-276.

Fisher, J.E., and R.L. Mason
1981 The Analysis of Multicollinearity Data in Criminology. In J.A. Fox (Ed.) Methods in Quantitative Criminology. New York: Academic Press. Pp.99-125.

Greene, Jack. R.
2000 Community Policing in America: Changing the Nature, Structure, and Function of the Police. In Julie Horney (Ed.) Criminal Justice 2000. Washington, DC.: National

Institute of Justice. Pp.299-370.

Greenberg, David, Ronald Kessler, and Colin Loftin.
1983 The Effect of Police Employment on Crime. Criminology 21:375-394.

Greenwood, Michael and Walter J. Wadycki
2001 Crime Rates and Public Expenditures for Police Protection: their Interaction. Review of Social Economy 31:138-152.

Hickman, M. and B. Reaves.
2001 "Community Policing in Local Police Departments 1997 and 1999." Bureau of Justice Statistics Special Report. Washington DC: Office of Justice Programs, U.S. Department of Justice.

Kartcoski, Peter. and D. Dukes (Eds.)
1995 Issues in Community Policing. Cinicinnati, OH: Anderson Publishing.

Katz, C.M., V.J. Webb, and D.R. Schaefer.
2001 "An Assessment of The Impact of Quality-Of-Life Policing on Crime and Social Disorder." Justice Quarterly 18:825-876.

Koper, Christopher S., Edward Maguire, Gretchen E. Moore, and David E. Huffer.
2001 "Hiring and Retention Issues in Police Agencies: Readings on the Determinants of Police Strength, Hiring and Retention of Officers, and the Federal COPS Program. Washington, DC: Urban Institute, Justice Police Center.

Kovandzic, Tomislav, John Sloan, and Lynne Vieraitis.
2002. "Unintended Consequences of Politically Popular Sentencing Policy: the Homicide Promoting Effects of 'Three Strikes' in U.S. Cities (1980-1990)' Criminology and Public Policy 1:399-424.

Langworthy, Robert. and Lawrence Travis.
1999 Policing in America: A Balance of Forces. 2nd edition. Upper Saddle River, NJ: Prentice Hall.

Marvell, Thomas and Carlisle Moody.
1996 Specification Problems, Police Levels, and Crime Rates. Criminology 34:609-646.

MacKinnon, James G. and Halbert White.
1985 Some Heteroskedaticity-Consistent Covariance Matrix Estimators with Improved Sample Properties. Journal of Econometrics 29: 305-25.

Muhlhausen, David.
2001 Do Community Oriented Policing Services Grants Affect Violent Crime Rates.? Washington, DC: The Heritage Foundation.

Osgood, D. and J. Chambers.
2000 Social Disorganization Outside the Metropolis: An Analysis of Rural Youth Violence. Criminology 38:81-115.

Robsenbaum, Denis. (Ed.).
1994 The Challenge of Community Policing: Testing the Promises. Thousand Oaks, CA: Sage Publications.

Roth, Jeffrey and Joseph Ryan.
2000 Overview. In Jeffrey Roth et al. (Eds.) National Evaluation of the COPS Program Title I of the 1994 Crime Act. Washington, DC: U.S. Department of Justice.

Sadd, Susan and Randolph Grnic.
1994 Innovative neighborhood oriented policing: An evaluation of community policing programs in eight cities. In Dennis P. Rosenbaum (Ed.) The challenge of community poling: Testing the promises. Thousand Oaks, CA.: Sage.

Sampson, Robert.
1985 Neighborhood and Crime: The Structural Determinants of Personal Victimization. Journal of Research in Crime and Delinquency 22:7-40.

Sampson, Robert. and W. Groves.
1989 Community Structure and Crime: Testing Social Disorganization Theory. American Journal of Sociology 94:774-802.

Silverman, Eli B.

1999 NYPD battles crime. Boston: Northeastern University Press.

Shaw, C., and H. McKay.

1972 Juvenile Delinquency and Urban Areas. 3rd ed. Chicago, IL: University of Chicago Press.

Skogan, Wesley. and Susan. Hartnett.
1997 Community Policing, Chicago Style. New York, NY: Oxford University Press.

Smith, D., and R. Jarjoura.
1989 Social Structure and Criminal Victimization. Journal of Research in Crime and Delinquency 25:27-52.

Spelman, William.
2001 The limited importance of prison expansion. . In Alfred Blumstein and Joel Wallman (Eds.) The Crime Drop in America. New York: University of Cambridge Press.

Thurman, Quint. and Edward McGarrell.
1997 Community Policing in Rural Setting. Cincinnati, OH: Anderson Publishing Co.

Uniform Crime Reports.
1994 [to 1999]. Washington, DC: Federal Bureau of Investigation.

Weisburd, D. and L. Green.
1995 Policing Drug Hot Spots: The Jersey City Drug Market Analysis Experiment." Justice Quarterly 12: 711-735

Weisheit, Ralph, E. Wells, and D. Falcone.

1995 Crime and Policing in Rural and Small-Town America: An Overview of the Issues Washington, DC: National Institute of Justice.

Weisheit, Ralph., D. Falcone, and L. Wells.

1999 Crime and Policing in Rural and Small-Town America. Prospect Heights, IL. Waveland Press, Inc.

Wooldridge, Jeffrey M.

2001 *Econometric Analysis of Cross Section and Panel Data*. Boston: MIT Press.

Zhao, Jihong, Nicholas Lovrich, and Quint Thurman.
1999 The Status of Community Policing in American Cities: Facilitators and Impediments Revisited. Policing: An International Journal of Police Strategies and Management 22: 74-92.

Zhao, Jihong and Quint Thurman.
2001 A National Evaluation of the Effect of COPS Grants on Crime from 1994 to 1999. University of Nebraska at Omaha.

APPENDIX A: STATISTICAL MODEL SPECIFICATION

The two-way fixed effect model has the following form:

(1) $$y_{it} = \mu_i + \gamma_t + \alpha_1 HIRE_{it} + \alpha_2 MORE_{it} + \alpha_3 INOV_{it} + \beta' x_{it} + \varepsilon_{it}$$

where y_{it} is the number of crime incidents per 100,000 resident for city i at year t. μ_i is the fixed effect for city i to be estimated. γ_t is the fixed effect for year t. $HIRE_{it}$, $MORE_{it}$ and $INOV_{it}$ are the three COPS funding variables hiring, MORE and innovative grants, measured as per resident in 1994 dollars, for city i at year t. α_i ($i=1,2,3$) are the associated coefficients to be estimated. Their values, together with the estimated standard errors, will determine whether COPS grants have measurable impact on crime reduction. x_{it} is a set of control variables (e.g., the city level unemployment rate) and β are the associated coefficients. Finally, ε_{it} is the error term.

MacKinnon and White (1985 p. 309) propose a modified heteroskedascity-consistent covariance matrix estimator for the linear regression models on cross-sectional data. This estimator has better finite sample properties than what White suggested previously. Cao, Stromsdorfer and Weeks (1996, p. 215) extend the MacKinnon and White estimator to panel data, where as Cao *et al* note that there exists within-unit correlations in panel data, i.e., $E(\varepsilon_{it}\,\varepsilon_{jt}) \neq 0,$ for $i \neq j$.

Let Z be the design matrix containing all the right-hand-side variables in (1), T_i be the number of repeated observations for I, N be the total number of observations across all i, and $u_{it}^{*} = \hat{\varepsilon}_{it} \big/ (1 - k_{it})$, where k_{it} is the ixt^{th} diagonal element of the matrix $Z(Z'Z)^{-1}Z'$, the panel data version of the MacKinnon and White estimator is

(2) $$(N-1/N)(Z'Z)^{-1}[Z'\Omega^{*}Z-(1/N)(Z'u^{*}u^{*'}Z)](Z'Z)^{-1}$$

where the $k\,x\,m^{th}$ of the Ω^{*} is

(3) $$\sum_{i=1}^{N}((\sum_{t=1}^{T_i}x_{itk}u_{it}^{*})(\sum_{t=1}^{T_i}x_{itm}u_{it}^{*}))$$

Thus, (2) and (3) correct for not only the heteroskedasic errors across units, but also the correlated errors within units over different time periods. It also allows for the number of observations to be different by *i*. All our t-tests and F-tests in this report are based on the corrected variance and co-variance estimates.

APPENDIX B: DIFFERENCING ISSUE

There is little difference between the model used in the current report and using the differencing technique. In addition, using the differencing technique will lead to a loss of one-year of observation in the analysis. The regression models that we estimated have the following general form: $y_{it} = \beta' x_{it} + \varepsilon_{it}$. This specification is equivalent to the double-differencing model: $\Delta y_{it} = \beta' \Delta x_{it} + \Delta \varepsilon_{it}$, where both the dependent variable and the explanatory variables are differenced. However, one observation per unit will be lost due to differencing. Note that in the above model specifications, the coefficients associated with three COPS funding variables are the same, although the models look different.

In addition, let's also consider another model specification in which the dependent variable is first-order differenced but not the explanatory variables. That is, the model looks like this: $\Delta y_{it} = \beta' x_{it} + \mu_{it}$. Since the change in crime rate, Δy_{it}, can be positive, zero or negative, and the funding variables are always non-negative, the interpretation of the coefficients on these funding variables cannot be made.

APPENDIX C: ANALYSIS OF COPS FUNDED AGENCIES USING CITY DUMMY VARIABLES AND EXCLUDING % OF MALE AND PER CAPITA INCOME

Table C1: The Effect COPS Grants (1994-1999) on Violent Crime Rates (1995-2000) in Cities with Populations Greater than 10,000 (COPS Funded Cities Only): Two Factor Fixed Effect Panel Model (City Dummy Variables) [a] [b]

Variables	Coefficient	Robust Standard Error
Hiring grants	-11.40*	3.10
Innovative grants	-4.30*	1.41
MORE grants	-4.21	3.41
1994 Violent crime rate	0.49*	0.16
Percentage of minority	-16.27*	3.13
Percentage of unemployment	-10.04*	4.17
Percentage of single parent households	49.58*	16.01
Percentage of young people	-8.79	8.82
Percentage of home owners	-0.48	8.12
Mobility	10.71*	4.61
Adjusted R^2	.93	
F Values=67.5*		

* p <.05

[a] COPS dollar amounts are per person and crime rates are per 100,000. 6 time-variance dummy variables and 2,305 city dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table C2: The Effect of COPS Grants (1994-1999) on Property Crime Rates (1995-2000) in Cities with Populations Greater than 10,000 (COPS Funded Cities Only): Two Factor Fixed Effect Panel Model (City Dummy Variables) [a] [b]

Variables	Coefficient	Robust Standard Error
Hiring grants	-27.90*	7.88
Innovative grants	-10.18*	4.94
MORE grants	-16.58*	5.98
1994 Property crime rate	-0.06	0.17
Percentage of minority	-121.70*	11.65
Percentage of unemployment	- 20.10*	9.65
Percentage of single parent households	297.87*	51.33
Percentage of young people	-94.15*	29.36
Percentage of home owners	-98.14*	21.83
Mobility	-20.99*	11.34
Adjusted R^2 F Value=76.05*	.94	

* $p < .05$

[a] COPS dollar amounts are per person and crime rates are per 100,000. 6 time-variance dummy variables and 2,305 city dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table C3: The Effect of COPS Grants (1994-1999) on Violent Crime Rates (1995-2000) in Cities with Populations Between 1,000 and 10,000 (COPS Funded Cities Only): Two Factor Fixed Effect Panel Model (City Dummy Variables) [a] [b]

Variables	Coefficient	Robust Standard Error
Hiring grants	-.17	0.39
Innovative grants	-0.44	0.65
MORE grants	0.28	1.71
1994 Violent crime rate	-2.40*	1.14
Percentage of minority	-10.00*	2.52
Percentage of unemployment	-2.89	2.22
Percentage of single parent households	17.84*	7.82
Percentage of young people	-12.85*	3.79
Percentage of home owners	- 3.34	2.69
Mobility	- 3.50*	1.48
Adjusted R^2 F Value= 16.9*	.77	

* p <.05

[a] COPS dollar amounts are per person and crime rates are per 100,000. 6 time-variance dummy variables and 3,352 city dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table C4: The Effect of COPS Grants (1994-1999) on Property Crime Rates (1995-2000) in Cities with Populations Between 1,000 and 10,000 (COPS Funded Cities Only): Two Factor Fixed Effect Panel Model (City Dummy Variables) [a] [b]

Variables	Coefficient	Robust Standard Error
Hiring grants	1.30	2.39
Innovative grants	-1.04	3.03
MORE grants	7.35	16.93
1994 Property crime rate	0.70*	0.06
Percentage of minority	-93.21*	15.37
Percentage of unemployment	9.24	8.33
Percentage of single parent households	207.40*	38.81
Percentage of young people	-132.20*	20.53
Percentage of home owners	-76.55*	14.91
Mobility	2.89	8.01
Adjusted R^2 F Value= 32.60*	.87	

* $p < .05$

[a] COPS dollar amounts are per person and crime rates are per 100,000. 6 time-variance dummy variables and 3,352 city dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table C5: The Effect of COPS Grants (1994-1999) on Violent Crime Rates (1995-2000) in Cities with Populations Greater than 1,000(COPS Funded Cities Only): Two Factor Fixed Effect Panel Model (City Dummy Variables) [a b]

Variables	Coefficient	Robust Standard Error
Hiring grants	-7.64*	2.38
Innovative grants	-3.64*	1.46
MORE grants	-3.60	3.81
1994 Violent crime rate	- 2.43*	1.20
Percentage of minority	- 21.53*	2.57
Percentage of unemployment	-8.70*	3.90
Percentage of single parent households	55.35*	13.36
Percentage of young people	-7.52	7.85
Percentage of home owners	-3.12	6.67
Mobility	8.11*	3.89
Adjusted R^2	.92	
F Value= 61.1*		

* $p < .05$

[a] COPS dollar amounts are per person and crime rates are per 100,000. 6 time-variance dummy variables and 5,658 city dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table C6: The Effect of COPS Grants (1994-1999) on Property Crime Rates (1995-2000) in Cities with Populations Greater than 1,000(COPS Funded Cities Only): Two Factor Fixed Effect Panel Model (City Dummy Variables) [a] [b]

Variables	Coefficient	Robust Standard Error
Hiring grants	-18.32*	5.90
Innovative grants	-9.41*	4.15
MORE grants	-14.84*	6.49
1994 Property crime rate	0.70*	0.06
Percentage of minority	-135.60*	9.84
Percentage of unemployment	-16.17	8.84
Percentage of single parent households	321.93*	42.93
Percentage of young people	-88.98*	25.46
Percentage of home owners	-102.60*	18.04
Mobility	- 13.71	9.47
Adjusted R^2	.94	
F Value=84.7*		

*p <.05

[a] COPS dollar amounts are per person and crime rates are per 100,000. 6 time-variance dummy variables and 5,658 city dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

APPENDIX D: ANALYSIS OF COPS FUNDED AGENCIES USING COUNTY DUMMY VARIABLES AND EXCLUDING % OF MALE AND PER CAPITA INCOME

Table D1: The Effect COPS Grants (1994-1999) on Violent Crime Rates (1995-2000) in Cities with Populations Greater than 10,000 (COPS Funded Cities Only): Two Factor Fixed Effect Panel Model (County Dummy Variables)[a b]

Variables	Coefficient	Robust Standard Error
Hiring grants	-5.49*	2.10
Innovative grants	-5.31*	1.67
MORE grants	-2.00	3.24
1994 Violent crime rate	0.59*	0.02
Percentage of minority	1.94*	0.45
Percentage of unemployment	5.14	3.80
Percentage of single parent households	11.76*	2.44
Percentage of young people	-1.80	0.73
Percentage of home owners	-4.75*	0.39
Mobility	1.94*	0.45
Adjusted R^2	.89	
F Values=114.6*		

* p <.05

[a] COPS dollar amounts are per person and crime rates are per 100,000. A total of 970 county dummy variables and 6 time-variance dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table D2: The Effect of COPS Grants (1994-1999) on Property Crime Rates (1995-2000) in Cities with Populations Greater than 10,000(COPS Funded Cities Only): Two Factor Fixed Effect Panel Model (County Dummy Variables) [a] [b]

Variables	Coefficient	Robust Standard Error
Hiring grants	-25.22*	6.01
Innovative grants	-20.65*	7.24
MORE grants	-21.47*	8.08
1994 Property crime rate	0.44*	0.04
Percentage of minority	11.34*	2.00
Percentage of unemployment	32.93*	11.14
Percentage of single parent households	18.52*	7.18
Percentage of young people	-12.02*	3.96
Percentage of home owners	-40.91*	4.26
Mobility	22.81*	3.78
Adjusted R^2	.87	
F Value=87.82*		

* $p < .05$

[a] COPS dollar amounts are per person and crime rates are per 100,000. A total of 970 county dummy variables and 6 time-variance dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table D3: The Effect of COPS Grants (1994-1999) on Violent Crime Rates (1995-2000) in Cities with Populations Between 1,000 and 10,000 (COPS Funded Cities Only): Two Factor Fixed Effect Panel Model (County Dummy Variables) [a] [b]

Variables	Coefficient	Robust Standard Error
Hiring grants	1.47*	0.42
Innovative grants	0.60	0.85
MORE grants	2.92	1.46
1994 Violent crime rate	0.43*	0.02
Percentage of minority	1.57	0.42
Percentage of unemployment	- 0.73	2.25
Percentage of single parent households	13.55*	1.51
Percentage of young people	- 1.30*	0.55
Percentage of home owners	- 2.41*	0.33
Mobility	- 0.15	0.53
Adjusted R^2	.68	
F Value= 23.10*		

* $p < .05$

[a] COPS dollar amounts are per person and crime rates are per 100,000. A total of 1,532 county dummy variables and 6 time-variance dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table D4: The Effect of COPS Grants (1994-1999) on Property Crime Rates (1995-2000) in Cities with Populations Between 1,000 and 10,000 (COPS Funded Cities Only): Two Factor Fixed Effect Panel Model (County Dummy Variables) [a] [b]

Variables	Coefficient	Robust Standard Error
Hiring grants	7.91*	2.58
Innovative grants	1.30	3.57
MORE grants	30.51*	15.24
1994 Property crime rate	0.70*	0.02
Percentage of minority	8.00*	2.15
Percentage of unemployment	3.51	9.26
Percentage of single parent households	12.69	7.87
Percentage of young people	-20.18*	3.12
Percentage of home owners	-19.69*	2.44
Mobility	- 3.55	2.26
Adjusted R^2	.79	
F Value= 41.38*		

* p <.05

[a] COPS dollar amounts are per person and crime rates are per 100,000. A total of 1,532 county dummy variables and 6 time-variance dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table D5: The Effect of COPS Grants (1994-1999) on Violent Crime Rates (1995-2000) in Cities with Populations Greater than 1,000(COPS Funded Cities Only): Two Factor Fixed Effect Panel Model (County Dummy Variables) [a] [b]

Variables	Coefficient	Robust Standard Error
Hiring grants	-2.51	1.43
Innovative grants	-4.20*	1.74
MORE grants	-1.37	3.46
1994 Violent crime rate	0.57*	0.02
Percentage of minority	2.13*	0.39
Percentage of unemployment	6.06	3.65
Percentage of single parent households	11.50*	2.06
Percentage of young people	-1.82*	0.56
Percentage of home owners	-4.41*	0.32
Mobility	3.63*	0.55
Adjusted R^2	.88	
F Value= 116.16*		

* $p < .05$

[a] COPS dollar amounts are per person and crime rates are per 100,000. A total of 1,884 county dummy variables and 6 time-variance dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

Table D6: The Effect of COPS Grants (1994-1999) on Property Crime Rates (1995-2000) in Cities with Populations Greater than 1,000(COPS Funded Cities Only): Two Factor Fixed Effect Panel Model (County Dummy Variables)[a b]

Variables	Coefficient	Robust Standard Error
Hiring grants	-14.67*	4.46
Innovative grants	-19.30*	7.54
MORE grants	-19.01*	9.03
1994 Property crime rate	0.50*	0.04
Percentage of minority	11.22*	1.89
Percentage of unemployment	32.00*	10.44
Percentage of single parent households	9.49	6.16
Percentage of young people	-16.73*	3.00
Percentage of home owners	-35.10*	3.67
Mobility	12.31*	2.82
Adjusted R^2	.84	
F Value=88.72*		

*p <.05

[a] COPS dollar amounts are per person and crime rates are per 100,000. A total of 1,884 county dummy variables and 6 time-variance dummy variables are not reported.

[b] The coefficients shown in the tables are unstandardized.

APPENDIX E. THE POSSIBLE INFLUENCE OF THE EFFECT OF POLICE EXPENDITURES ON THE EFFECT OF COPS GRANTS ON CRIME RATES FROM 1994-2000

One possibly important omitted variable in this analysis is an indicator of police expenditures minus COPS funding. Other studies (the Heritage Foundation) attempted to control for this variable by including budgetary figures for law enforcement expenditures at the county level. This is inaccurate for two reasons. First, it does not account for agencies in a county that did not report crime data (the dependent variable) for all of the study years in question. Secondly, it does not explicitly exclude COPS funding from these estimates. This is important to avoid issues of multicollinearity and to ensure relative independence between the independent variable of interest and the control variables. However, because there may be some negative relationship between police expenditure and crime rate in cities and their willingness to pursue COPS funding it is an important variable to consider. Since it is impossible to collect information on police expenditures (minus COPS funding) in the over 7,500 agencies examined between 1994 and 1999, this analysis used 1994 crime rates to measure the level of crime rate in a city prior to the inception of COPS grants, thus standardizing for budgetary funding at this point in time. After 1994, minor increases (or decreases) in budgetary funding may have occurred in individual agencies, but it is very unlikely that these changes could account for a large amount of the variation in crime rates in the cities in question. In addition, because of the panel nature of this design, this study was able to include city dummy variables to account for such unobserved factors as police expenditures.

To address this issue further, in the spring of 2002, we conducted a survey of the 70 largest municipal police agencies in the country. The purpose of the survey was to collect the annual budgetary expenditure information of these law enforcement departments (minus COPS funding) from 1990 to 2000. 55 police agencies completed and returned the survey.

With the information on police annual expenditure in these 55 largest departments, we are able to test the effect of police expenditure on crime rates, controlling for COPS hiring, innovative, and MORE grants. The same dependent, independent, and controlled variables are used to estimate the relationship among police expenditure, COPS grants, and crime rates between 1994 and 2000. Our results indicate that COPS grants are independent of the departmental annual expenditure. That is, the magnitudes of coefficients of COPS grants remain relatively stable with or without police annual expenditure variable.

COPS funding variables are relatively independent of police expenditure and city demographics (comparison between city dummy results and county dummy results). We make this case because it is reasonable to postulate that the funding decisions made by COPS Office were free from considering police expenditure in a particular department between 1994 and 1999. There is no evidence to suggest that COPS officials made funding decision based on the increase or decrease of annual expenditure in a municipal police agency, and the vast majority of agencies

applied for and received funding indicating that the agencies themselves did not consider this variable fully in their decision making process. As long as the coefficients of COPS grants are, to a large degree, independent, the estimates are generally unbiased.