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Title of Dissertation: THE DETERRENCE EFFECT OF POLICE PRESENCE: AN EMPIRICAL TEST

Name of Candidate: Stephen Eugene Brown
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Dissertation and Abstract Approved:

Dr. Bruce H. Johnson
Assistant Professor
Institute of Criminal Justice and Criminology

Date Approved: _____

CURRICULUM VITAE

Name: Stephen Eugene Brown.

Permanent Address: 1905 Rustic Road, Johnson City, Tennessee, 37601.

Degree and date to be conferred: Ph.D., 1979.

Date of birth: June 17, 1951.

Place of birth: Knoxville, Tennessee.

Secondary education: Farragut High School, Concord, Tennessee, 1969.

Collegiate institutions attended	Dates	Degree	Date of Degree
Cumberland College	1969-1970		
University of New Orleans	1970-1972		
Eastern Kentucky University	1972-1974	B.A.	1974
Eastern Kentucky University	1975-1976	M.S.	1976
University of Maryland	1976-1979	Ph.D.	1979

Major: Criminal Justice and Criminology.

Professional positions held: Instructor, University of Maryland, College Park, Maryland. 1978-1979.

Assistant Professor, East Tennessee State University, Johnson City, Tennessee. 1979-

ABSTRACT

Title of Dissertation: The Deterrent Effect of Police Presence: An Empirical Test

Stephen Eugene Brown, Doctor of Philosophy, 1979

Dissertation directed by: Dr. Bruce H. Johnson, Assistant Professor, Institute of Criminal Justice and Criminology

A theoretical model of the deterrent effect of police presence is proposed and tested in this dissertation. It is important to have a historical perspective on deterrence theory as it relates to the police. It is an issue which has been seriously plagued by ideological bias. Until recent years there was an unquestioned assumption in police circles that police presence does have a deterrent effect on crime. American criminologists on the other hand, assumed until very recent years that deterrence in general does not work. The unfortunate effect of these assumptions was a repression of scientific inquiry. Thus deterrence theory in general is relatively unsophisticated and the empirical evidence reflecting on it sparse, while the specific issue of the deterrent effect of police presence is even less refined.

The model presented in this research assimilates theoretical and empirical contributions from three major

perspectives: criminological deterrence research, police evaluation research, and that of econometricians. The criminological research has consistently found negative relationships between crime and various indicators of certainty of punishment, which is consistent with a deterrence hypothesis. On numerous occasions, variations in police presence have been introduced by police organizations. Evaluations of these changes suggest that police presence has a differential deterrent impact dependent upon several other factors. The major contributions of econometricians have been methodological. Among the most important of these is their recognition of simultaneous relationships in deterrence models and the development of appropriate statistical techniques for dealing with this.

In the present research, city data were used to test a model which consists of five endogenous and 11 exogenous variables. It was necessary to employ a two-tier population sample since data for all variables were not available for the larger sample. Since the model is nonrecursive, the data were analyzed using two-stage-least-squares regression.

A crime-specific analysis was employed and predictions of their fit to the model were made based on the assumption that crimes which are more rational and those which are more visible would be most deterrable.

The offenses which fitted the model most consistently were rape and auto theft. Aside from the fit of specific crimes to the full model, several important findings emerged in the estimation of individual equations. One of the most interesting was that per capita police are a strong positive function of rates of murder, rape, robbery, and auto theft. It was argued that these crimes generate political demand for more police. Another finding with major implications was the lack of any substantial relationship between levels of police presence and rates of clearance.

Recommendations for future research call for study of the dynamics of clearance rates, the relationship between police presence and clearance rates, and of perceptions of police presence. The complexities of deterrence are beginning to be recognized.

THE DETERRENT EFFECT OF POLICE PRESENCE:

AN EMPIRICAL TEST

by
Stephen Eugene Brown

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CHAPTER I

HISTORICAL BACKGROUND OF THE POLICE AND DETERRENCE THEORY

A central issue in the organization of any criminal justice system is the concept of deterrence. Any system for dealing with crime must rest on either the premise that crime can or that it cannot be affected through the application of punitive sanctions. If it is concluded that crime can be controlled by these means then it becomes necessary to identify the parameters of that presumed deterrent effect. Neither the importance nor the complexity of this issue can be overstated. However, a historical review reveals a remarkable failure to address it objectively. Instead, the issue is one that has been plagued by ideological bias. Johannes Andenaes (1966:953) was one of the first to draw attention to this, pointing out that "statements about general prevention are often dogmatic and emotional. They are proclamations of faith which are used as arguments either in favor or in opposition to the prevailing system."

This bias becomes particularly evident when we focus on deterrence in the context of the police. Historical literature reveals that there was an obvious assumption in police circles that deterrence <u>does</u> work from the time of

the Peelian Reform until very recent years. An equally obvious assumption that deterrence does not work is evident in the writings of criminologists for most of this century. This chapter briefly reviews the history of deterrence theory in both police and criminological circles, suggesting why we have relatively little evidence reflecting on the issue of the deterrent effect of police presence.

Deterrence Theory and the Police

The history of the police shows that they have been viewed primarily as crime fighters with the assumption that they can bring about a reduction in crime primarily through the deterrent effect of their presence. Several of the times that crime has been perceived as being at crisis proportions, attention has been turned to the police in hopes that adjusting their operations would remedy the problem.[1] This section reviews three periods during which such reforms were undertaken: the Peelian Reform, the first war on crime, and the second war on crime.

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[1] It should be clear that major reform movements other than those focusing on the police have been activated in response to real or perceived crime problems. However, the focus here is on the consistent underlying assumption of police reforms.

The Peelian Reform

If the origin of our contemporary system of policing were traced to a single event, it clearly would be the Metropolitan Police Act of 1829 in England. The act is commonly referred to as the "Peelian Reform" since it was the fruit of several years of labor by Sir Robert Peel while he was serving in the position of Home Secretary. The Peelian Reform fostered several major changes in the English police system which were later adopted in the United States and have persisted as basic principles in our system.

The principle on which it is important to focus is that of the police as a preventive force.[2] The English citizenry and Americans have historically had a tradition of suspicion of centralized power (Damaska, 1975; Richardson, 1974). This made it difficult for Peel to acquire the political support necessary to implement the police reforms he envisioned. Such support was secured by emphasizing that the primary function of his new police would be the prevention of crime by patrolling the streets in uniform (Critchley, 1972; Lyman, 1964). Peel's

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[2]Crime prevention was not the only factor contributing to the Peelian Reform, but was the major officially recognized theme. Other major themes include relieving citizens of responsibility for policing, the control of the "dangerous classes" (Silver, 1967; Richardson, 1974), and mitigation of the harshness of punishments (Lyman, 1964).

philosophy is reflected in the original instructions issued by his first two Commissioners:

> It should be understood, at the outset, that the principal object to be attained is the prevention of crime.
>
> The absence of crime will be considered the best proof of the complete efficiency of the Police (Lyman, 1964:153).

The First War on Crime

This conception of the police as a preventive or deterrent force persisted for nearly a century and a half after the Peelian Reform without being seriously questioned. Crime again emerged as a leading public concern in the 1920's and 1930's and the police were thrust into the forefront of this debate. Two national commissions studied the problem as well as state and local groups, resulting in the evolvement of a "war against crime" mentality (Douthit, 1975).[3] The implicit assumption of most of those involved in these inquiries was that the criminal justice system could do something about crime and that the police in particular could reduce crime by becoming more efficient in their deterrent and

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[3]The two national commissions were the National Crime Commission (1925) and the National Commission on Law Observance and Enforcement, also referred to as the Wickersham Commission (1929). The Illinois Association for Criminal Justice (1929) and the Missouri Association for Criminal Justice (1926) are two state groups which produced reports. The Cleveland Foundation (1922) and the Citizen's Police Committee in Chicago (1931) produced well-known local reports.

apprehension roles. This theme is reflected in August Vollmer's (1936) classic book on the police which delineated the improvements he thought necessary to provide efficient police service. Regarding patrol, he said that it "is society's best defense against the criminal. The mere sight of uniformed officials diligently patrolling beats is often sufficient to deter the community's weaker members from committing legal infractions" (1936:217). The report of The Citizens Police Committee in Chicago (1931) reflected similar views which are representative of those taken by the many commissions which studied the crime problem in that era. They concluded that reforms which "do not strike at the root of the police problem" will be inadequate and that major changes are necessary to remedy police inefficiency and corruption (1931:273). As for the place of patrol in achieving crime reduction, they argued the following:

> Uniformed patrol is fundamental to successful police work. . . . Robberies, burglaries, and felonious assaults are almost never knowingly committed in the full view and presence of a policeman, nor even in the immediate neighborhood of the spot where he happens for the moment to be. . . . In other words, the uniformed patrolman exercises a repressive influence . . . (1931:87).

The conventional wisdom that the police can reduce crime if honest and efficiently deployed, primarily through the provision of conspicuous patrol, was rarely questioned.

Bruce Smith (1940) was the only leading figure of the time to point out that this was an untested assumption:[4]

> Police are agreed that the presence of uniformed patrols operates to discourage the commission of certain types of criminal acts, but even this elementary proposition, upon which all modern police work is founded, lacks as yet any form of scientific demonstration. So until we have a whole series of controlled experiments which show with some degree of conclusiveness the effect of uniformed patrols upon the crime rate, and the point where additional increments of patrol strength result in diminishing returns, police service . . . will continue to hinge upon expert opinion . . . (1940:153, emphasis added).

It was some 30 years before Smith's cautions were appreciated. In the meantime leading authorites in American police administration continued to espouse the idea of a deterrent effect of police presence and began to elaborate such a theory in a more comprehensive fashion. The leading spokesman became O. W. Wilson, who based his theory on the classic equation that the motivation or desire to commit a criminal act combined with the perceived opportunity to do so, will in fact produce a criminal act. He saw the basic police function as the prevention of crime by circumventing the opportunity side of the equation. This was to be achieved by the patrol force, which he viewed as the backbone of all police agencies. He described the impact of police patrol on opportunity for crime in the following way:

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[4]Even Smith had not raised these questions nine years earlier when he was serving as Director of the Citizen's Police Committee in Chicago.

> The elimination of the actual opportunity, or the belief in opportunity, for successful misconduct is the basic purpose of patrol. A thief's desire to steal is not diminished by the presence of a patrolman, but the opportunity for successful theft is.
>
> The apparent likelihood of arrest influences the degree to which the potential offender is convinced that the opportunity for successful misconduct is absent. Patrol provides this favorable influence more completely than any other branch of police service. An impression of omnipresence is created by frequent and conspicuous patrol at every hour and in all sections of the community. Suitable patrol succeeds in effecting immediate apprehensions; and since nothing succeeds like success, a reputation for quick and certain apprehension is spread by press, radio, and word of mouth. The potential offender is thus persuaded without the necessity of personal experience that the patrol is invulnerable (Wilson and McLaren, 1972:320).

The Second War on Crime

In the 1960's crime emerged as a leading public concern for the first time since the 1930's. A review of the Gallup Opinion Index reveals that crime had not even appeared as a significant public issue since that time. In 1965 it became a major issue and continued as the leading domestic issue through 1968. This is not to deny the concern of many politicians and citizens prior to this time nor to overlook major programs that were implemented to deal with crime and delinquency. Rather, the point is to draw attention to a major shift in public opinion and the impact that this had. As a result of this widespread public concern most politicians incorporated a "law and order" theme in their campaigns. The issue was dominated

by the more conservative candidates subscribing to a position that government can do little about crime except to deter it (Finckenauer, 1978). Thus, again there was an implicit assumption that our criminal justice system could reduce crime if only its efficiency were maximized.

Important legislation was passed and numerous commissions were established on the federal level to address the crime problem.[5] Two important themes dominated the reports of these commissions and the positions taken by leading authorities in the field of criminal justice. One of these themes was the need for a systemic approach to criminal justice. A systems approach has been defined as a rational framework for solving problems (Nillsson, 1972) and is therefore oriented towards efficiency. The second major theme was the identification of the police as the weakest link in the criminal justice system. As a result of these two dominant views, massive efforts were undertaken to improve police efficiency on the assumption that more efficient policing leads to less crime. Thus, 80 percent of the funds allocated to the Law Enforcement

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[5]The two most important pieces of legislation were the Law Enforcement Assistance Act of 1965 and the Omnibus Crime Control and Safe Streets Act of 1968. Among the more noteworthy national commissions were the President's Commission on Law Enforcement and Administration of Justice, the National Advisory Commission on Criminal Justice Standards and Goals, the National Commission on the Causes and Prevention of Violence, the Commission on Campus Unrest, and the National Advisory Commission on Civil Disorders.

Assistance Administration by The Omnibus Crime Control and Safe Streets Act of 1968 were earmarked for the police.

To a large extent, the conventional wisdom concerning police and deterrence was uncritically accepted by leading authorities during the early part of this most recent reform movement. The President's Commission on Law Enforcement and Administration of Justice reflected the views of O. W. Wilson:

> The heart of the police effort against crime is patrol--moving on foot or by vehicle around an assigned area, stopping to check buildings, to survey possible incidents, to question suspicious persons, or simply to converse with residents who may provide intelligence as to occurrences in the neighborhood.
>
> The object of patrol is to disperse policemen in a way that will eliminate or reduce the opportunity for misconduct and to increase the likelihood that a criminal will be apprehended while he is committing a crime or immediately thereafter. The strong likelihood of apprehension will presumably have a strong deterrent effect on potential criminals (Task Force Report: The Police, 1967:1).

Questioning the Deterrence Premise

Nevertheless, this was the beginning of a new era in which the deterrent effects of police presence (as well as many other criminal justice issues) came to be viewed as a research issue which could be stated in the form of testable hypotheses. Thus the President's Commission also stated:

> It is probably true that an aggressive program of preventive patrol does reduce the amount of crime on the street, <u>although there has been no</u>

> careful effort to measure the effectiveness of this technique (Task Force Report: The Police, 1967:43, emphasis added).

Although the idea of a deterrent effect of police presence seems intuitively reasonable, some began to express skepticism. To a large extent, the questioning of the deterrence assumption originated as part of a more general questioning of the impact of police on crime. Early research on the role of the police indicated that they spend less than 20 percent of their time on tasks directly related to crime (e.g., Cumming et al., 1965; Webster, 1973). This raised questions about how much impact the police actually have on crime. For example, Peter Manning (1971) argued that the public's expectation for the police to prevent crime and apprehend offenders is an "impossible mandate."

Conclusion

In this section it has been shown that for many years the police operated on an assumption that deterrence does work. In recent years, however, the opposite position has been taken by some, claiming that they have no discernible impact on crime. This skepticism along with the general increase in criminal justice research has stimulated research on the deterrent effect of police presence. Contemporary preventive patrol theorists have begun to present their ideas as testable theories rather than as a priori assumptions (see for example Larson, 1972).

Chapter II will review the research that has been undertaken to evaluate preventive patrol.

Deterrence Theory and Criminologists

The concept of deterrence had been relied upon for hundreds of years when it was first formally expressed as a key component of the classical school of criminal law in the latter part of the eighteenth and early nineteenth centuries by writers such as Beccaria (1764) and Bentham (1823). The classical school was actually a reform movement reacting to the inconsistencies and arbitrariness of criminal procedures in Europe at that time. These reformers attempted to delineate rational and consistent penalties which could be included in a hedonistic calculation of benefits and losses to be derived from a criminal act. It was assumed that men had free will in making this choice and that if the pain of punishment exceeded the pleasure of the crime, while the certainty of punishment was high, the crime would be deterred. Thus the theory was based on some important assumptions (rationality and free will) and had the dual goals of insuring fairness and preventing crime through deterrence. However, it was not tested in any scientific fashion.

The classical school of criminal law remained in vogue with those who were concerned with crime until the latter part of the nineteenth century and clearly had a major impact on police reformers such as Peel. At this

time though, the positive school of criminology was ushered in under the influence of Lombroso and his students. The focus then was on the removal of the causes of crime. The positivists made no attempt to fuse their cause removing ideas for crime control with the punitive crime control (deterrence) of the classicists. Instead, they strove to totally displace it, coming to view punitive crime control as an obstacle and enemy to be overcome (Lejins, 1974). Criminological literature is replete with examples of this view. Enrico Ferri, a leader of the positivist school, reflected this view in a statement in 1901:

> And we have but to look about us in the realities of contemporaneous life in order to see that the criminal code is far from being a remedy against crime, that it remedies nothing, because either premeditation or passion in the person of the criminal deprive the criminal law of all prohibitory power (1901:231).

Such statements are not limited to the early positivists. An unqualified statement to the same effect was made in one of the leading criminology texts in the middle of the century:

> The claim for deterrence is belied by both history and logic. History shows that severe punishments have never reduced criminality to any marked degree (Barnes and Teeters, 1951:338).

Nor have such biased assessments of deterrence subsided entirely. A discussion of deterrence in a major contemporary criminology text reads as though it were a continuation of Barnes and Teeters' theme:

> We can draw some striking parallels between the punitive sentiments of eighteenth-century England and those insistent demands heard in the United States today for more repressive responses to offenders as a way of turning back the tide of lawlessness. . . . The sense of all these recommendations is that, if the responses to criminality are harsh enough, individuals will be deterred from such behavior. European experience suggests that the application of brutal punishments to large numbers of law-breakers did little to curtail this behavior. Thus, the chances are not great that these measures will prevent those who have long-standing grievances against society from expressing them in militant and sometimes criminal ways (Gibbons, 1977:34).

The long-standing opposition of deterrence and cause-removing theories has retarded our knowledge of crime control. For most of this century criminologists limited their research to attempting to identify the causes of crime and ways of removing those causes, to the complete neglect of deterrence research (Andenaes, 1966; Lejins, 1974; Martinson, 1974; Tittle and Logan, 1973; Waldo and Chiricos, 1970; Wilson, 1975). American criminologists for most of this century were simply operating on an assumption that deterrence <u>does not work</u> without any empirical evidence one way or the other.[6] However, in the last decade research on deterrence by criminologists and others has proliferated, largely as a result of the skepticism that has emerged concerning the

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[6]The only empirical evidence available addressed the issue of capital punishment (e.g., Savitz, 1958; Schuessler, 1952). However, this research was relatively unsophisticated and the findings could not appropriately be generalized to the issue of the deterrent effect of police presence.

treatment model (Lejins, 1975; Martinson, 1974). Chapter II will review the research on general deterrence which has accumulated.

Summary

This chapter has provided a historical overview of the police and criminology as they relate to deterrence theory. The dominant theme emerging from this literature was the predisposition of the police to assume that conspicuous patrol does deter crime, while criminologists assumed that the threat of punishment does not deter crime. The result was the complete neglect of deterrence as an issue for policy evaluation or scientific inquiry. Although the last decade has witnessed a flurry of deterrence research, this is a very late start. Thus deterrence theory in general is relatively crude and the empirical evidence reflecting on it sparse, while the specific issue of the deterrent effect of police presence is even less refined.

CHAPTER II

DETERRENCE RESEARCH

The focus of the present research falls within the topic of general deterrence which has been defined as "the inhibiting effect of sanctions on the criminal activity of people other than the sanctioned offender" (Blumstein et al., 1978:3). Interest is also limited to the certainty of the application of sanctions. It is certainty of punishment (whether real or perceived) that relates police presence to deterrence. The police are not involved in the official punishment of offenders but have been thought to increase the certainty of that punishment through their apprehension activities. It has also been argued that an arrest by the police is perceived by the arrestee as punishment, even if not followed by official processing (Tittle and Rowe, 1974). Celerity may be related to both the certainty of punishment and any deterrent effects that it might have. However, it was not feasible to include celerity in the present research since it could not be measured. Severity of punishment may also be related to deterrence, but is not directly relevant to the present study because, while police presence may be related to the certainty of punishment it does not appear to be directly related to its severity. Thus the literature review will

not be concerned with the issue of special (individual) deterrence or with the severity or celerity of sanction application.

This chapter reviews three distinct bodies of literature with implications for the analysis of the deterrent effect of police presence. They will be referred to as criminological research, police evaluation research, and econometric research. Researchers in the first two areas have almost entirely ignored one another, resulting in inadequate theory in police evaluation research and inferior data in the case of criminological research. There is some overlap and mutual recognition between criminologists and economists involved in deterrence research, but they generally have strong differences. Criminologists tend to view the work of economists as atheoretical or with a simplistic theoretical basis (Gibbs, 1973), while economists view the research of criminologists as relatively primitive in terms of statistical methods (Tullock, 1974).

Each of these three distinct bodies of literature provide insight for building a theoretical model of the deterrent effect of police presence. The objective of the present research is to postulate such a model based on a synthesis of this literature and to test the adequacy of that model. The review of deterrence research presented in this chapter provides the framework for the model to be proposed.

Criminological Research

The research efforts of criminologists concerning the deterrent effect of certainty of punishment have employed three types of methodologies: aggregate data analysis, survey research, and experimental research.

Aggregate Data Analysis

The earliest studies employed aggregate data to construct indexes of crime and of certainty of punishment. A number of studies of this nature have accumulated and have consistently revealed a negative relationship between crime rates and the various indicators of certainty of punishment (e.g., clearance and imprisonment rates). These findings have generally been interpreted as support for deterrence theory and are at least consistent with it. However, the finding is also consistent with some alternative interpretations. Most importantly, the possibility of an incapacitative effect accounting for part or all of the inverse relationship and the possibility of reversed causal order must be considered. Some recent publications have explored these alternative interpretations in detail (e.g., Blumstein et al., 1978; Geerken and Gove, 1977; Nagin, 1978; Pontell, 1978).

Among the studies relying on aggregate data, those which have utilized clearance rates as the indicator of certainty of punishment are most relevant to the issue of

the deterrent effect of police presence (e.g., Brown, 1978; Geerken and Gove, 1977; Logan, 1975; Tittle and Rowe, 1974).[1] These studies reflect on the deterrent effect of police activities insofar as manipulation of police variables (e.g., number of patrol units) can be shown to affect clearance rates. Tittle and Rowe (1974) found a negative correlation between clearance rates and total index crime rates in all Florida counties (-.65) and in all Florida cities of populations 2500 or greater (-.19). Brown's (1978) analysis of California counties revealed a correlation of -.39 between clearance rates and index crime rates. Logan (1975) took an important theoretical step by undertaking a crime-specific analysis. Using states as the unit of analysis he found significant negative correlations between clearance rates and rates of rape (-.37), robbery (-.48), burglary (-.32), larceny (-.45), and auto theft (-.64). The relationship for assault was nonsignificant but negative in sign (-.09) while the relationship for homicide was nonsignificant and positive (.25), therefore being consistent with the deterrence hypothesis. Geerken and Gove (1977) found

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[1]The official clearance rate is the percentage of crimes known to and recorded by the police which have been solved to their satisfaction. See Skolnick (1975) for a discussion of the validity of this statistic. Some of these studies improve upon the validity of this measure by calculating the percentage of officially recorded crimes which result in arrests rather than using the official clearance rate.

similar correlations using Standard Metropolitan Statistical Areas as the unit of analysis.

Another finding from Tittle and Rowe's (1974) research may have important implications for the deterrent effect of police presence. Their analysis suggested that a critical tipping level must be reached before any deterrent effect of certainty of punishment becomes evident. They identified a clearance rate of 30 percent as that critical level. However, clearance rates above this level are extremely rare in metropolitan jurisdictions. Thus, their findings suggest that the negative relationship between crime and clearance rates is primarily in smaller towns. Bailey (1976) subjected the tipping hypothesis to a crime-specific analysis and found both the deterrent and tipping effects to vary by crime type.

Survey Research

Criminological deterrence research which has analyzed aggregate data has measured only the objective certainty of punishment. However, survey research has been undertaken as a means of measuring perceived rather than objective certainty of punishment. The earliest studies were conducted by Jensen (1969) and by Waldo and Chiricos (1972), but have been followed by numerous others. Anderson (1978) reviewed 21 studies which collected perceptual data of this nature to address in part the question of the deterrent effect of certainty of

punishment. Her review revealed highly consistent support for the deterrence hypothesis that perceived certainty of punishment is negatively related to rates of offenses. However, the studies are inconsistent with regard to the strength of those relationships and even the same studies have found widely varying associations by offense type. For example, Jensen's (1969) study found a weak negative relationship between perceived probability of punishment and self-reported delinquency (gamma= -.22) while the survey data that Waldo and Chiricos (1972) collected revealed a very strong negative association (gamma= -.84) between self-reported marijuana use and perceived probability of arrest. However, they found only a moderate association (gamma= .31) for the offense of petty theft.

Experimental Research

Finally, experimental designs have been infrequently used by criminologists to draw inferences concerning the relationship between certainty of punishment and crime. A classroom experiment reported by Tittle and Rowe (1973) exemplifies this approach. Their study contrasted the relative effects of moral appeal and threat of punishment on classroom cheating among college students. By allowing the students to grade their own quizzes after surreptitious grading by the instructors, an index of cheating was established. It was then found that implementing a strategy of moral appeal as an experimental

condition resulted in increased cheating, while later use of a threat of punishment strategy was associated with a decline in cheating. While such experiments have several implications for deterrence theory, a questionable inferential leap is required to apply them to different populations and to legal norms.

Conclusion

Considering the evidence emerging from the three types of criminological deterrence research reviewed in this section, the general conclusion of many criminologists has been that punishment does appear to deter crime under some circumstances and that the task of future research is the specification of those circumstances (Anderson, 1978; Geerken and Gove, 1975; Minor, 1978; Tittle and Logan, 1973; Zimring and Hawkins, 1973). Before more decisive conclusions can be drawn it will be necessary to contend with several problems that have plagued deterrence research. In developing the theoretical model of the deterrent effect of police presence which is the focus of this research, it will be necessary to return to this point in order to avoid some of the deficiencies of criminological research.

Police Evaluation Research

Major policy changes in manpower allocation have been implemented within police agencies on several occasions and evaluated by experimental or quasi-experimental

designs. Although relatively few studies of this nature have been conducted and they have been hindered by serious methodological deficiencies, some clear implications for postulating a theoretical model of the deterrent effect of police presence emerge.

Early Experiments

Five experiments are discussed under the label of early experiments. They are labeled as such because they preceded the Kansas City Preventive Patrol Experiment (KCPPE), a study which has had a major impact and served as a turning point for the issue of the deterrent effect of police presence.

Operation 25. An experiment referred to as Operation 25 was undertaken for a four month period in 1954 in the 25th Precinct of New York City (New York City Police Department, 1955). The 25th Precinct comprises an area just under one square mile located at the northeastern tip of Manhattan Island. The area has traditionally been characterized by overcrowding, poverty, a predominantly minority population, and high crime rates. The feeling of the police department was that the area was grossly undermanned; it was divided into 55 foot posts (beats) with an average length of about ten straight blocks. However, manpower levels were insufficient to allow coverage of all posts at any given time. When the experiment was

implemented the number of posts was increased to 89, reducing their average length to approximately five blocks. At the same time manpower was more than doubled within the area, allowing all posts to be covered for all shifts. The experiment was:

> . . .based upon the premise that if a patrol post is limited in length and under the constant observation of the assigned patrolman, the patrolman should properly have knowledge of everything that occurs on his post. He thus could be held responsible for failing to prevent certain types of crime or failing to arrest perpetrators (New York City Police Department, 1955:209).

The New York City Police Department concluded that Operation 25 was an "unqualified success" and that the "results were dramatic." These results included a 55.6 percent decrease in reported felonies compared to a 4.7 percent decrease for the city as a whole during that period. There was also an increase in the felony clearance rate from 20.2 percent to 65.6 percent. At the same time several crime types which are of such a nature that they become known only if the police intervene (e.g., possession of narcotics) showed dramatic increases. Thus the experiment seemed to provide evidence that increases in police presence leads to increases in both deterrence and in apprehension rates. However, there were clearly some deficiencies in the evaluation of this experiment, including the failure to measure crime independent of the official rate reported by the police and the failure to test for displacement effects by measuring crime in contiguous

areas. Moreover, police officials were clearly not occupying a role of disinterested scientific observers. One of their stated goals in conducting the experiment was "to demonstrate to the public what adequate police service and protection could mean in terms of reduced crime and swifter and more effective apprehension of criminals" (New York City Police Department, 1955:207).

Beat patrol experiment. An experiment conducted in England referred to as the "Beat Patrol Experiment" produced somewhat different results (Wilson, 1975). The number of officers assigned to foot patrol beats was varied from zero to four over successive four-week periods in four English cities. The number of reported crimes was significantly lower when one officer was assigned to each beat than it was when zero officers were assigned. However, no additional decrease occurred when a second officer was added and there was only slight evidence that adding a third or fourth officer would achieve further decreases. Thus the experiment supports a conclusion that police presence has an absolute deterrent effect, but questions the marginal deterrent effect that might be achieved through increases in police presence. Again though, there are issues of validity that must be raised. Most important are the questions raised by Wilson; were the experimental areas large enough and were the experimental treatments

long enough to affect the perceived certainty of apprehension in those areas?

20th precinct experiment. Another study involved analysis of crime statistics collected over a five-year period (1963-1967) in the 20th Precinct of New York City following a 40 percent increase in the level of police presence (Press, 1971). The increase was primarily in foot patrols since the area is a densely populated section on Manhattan's West Side, described by Press as populated by "the very rich and the very poor" and by "many ethnic minorities." The analysis revealed a significant net reduction in crimes visible from the street after adjustments were made for displacement to contiguous areas and for non police-related changes in crime within control areas. For example, outdoor robberies declined 33 percent; outdoor grand larcency dropped 49 percent; auto theft also was reduced by 49 percent. Although this study was far more sophisticated than earlier efforts to evaluate the deterrent effect of police presence, it still had major deficiencies. It suffered from being quasi-experimental in the sense that the manpower increase was not designed or implemented with evaluation as a primary objective. Thus the analysts were not able to monitor the experiment and some relevant factors were undoubtedly changed during its course. For example, reporting procedures were altered with an unknown effect. Likewise, some major variables

were not measured adequately. Crime, for example, was only measured as the officially reported rate.

Subway experiment. Another quasi-experimental evaluation of an increase in police presence was conducted by Chaiken et al. (1974). In 1965 a decision was made in New York City to increase police presence on the subways and in the subway stations by a factor of approximately 2.6. The results of this manpower increase were analyzed for the period 1965-1973. It revealed that there was a short-term reduction in the overall crime rate for the subway system, but that within a year it had surpassed the pre-experimental rate. However, as Wilson (1975) explains it, focusing on the overall crime rate hides a remarkable success story. Virtually all of the increased police coverage was between the time of 8 P.M. and 4 A.M. and analyzing the crime rate for just this period shows that the reduction was a permanent one. Thus the subway study suggests that increased police presence does have a deterrent effect, but that any such effect extending beyond the actual time period for which the increase is implemented will be ephemeral.

Generalizing from the early foot patrol experiments. The evidence emerging from these early experiments clearly seems to support the existence of some deterrent effect of police presence, although a number of caveats are in order.

Most importantly they all involved similar circumstances: saturation of densely populated high-crime areas with foot patrols. The explicit rationale behind Operation 25 was to reduce the area of beats enough to keep them under observation in their entirety and to increase manpower sufficiently to cover them at all times. The circumstances in the subway study were even more extreme, involving enclosed and semi-enclosed areas with police presence increased to a level that resulted in police visibility at virtually all exits. Such environments are clearly atypical and thus these findings cannot be generalized to police operations in general.

Washington D.C. experiment. An experiment involving the more typical situation of car-patrolled beats was undertaken in Washington, D.C. in 1970 (Budnick, 1973). Levels of patrol were increased for three one-month periods in three high-crime areas by augmenting the usual patrol force with officers from the Special Operations Division (SOD). Officers from the SOD did not receive calls for service and therefore spent their time primarily on preventive patrol. Police presence was measured as the percent increase in unit and man-tours per day and as the percent increase in unit and man-tours per day assigned strictly to preventive patrol activities. However, the increase was limited to the day and evening shifts; none of the SOD officers were on duty during the 12 midnight to

8 A.M. tour. Table 1 shows the measured increases in police presence for the three experimental periods.

TABLE 1

PERCENT INCREASES IN POLICE PRESENCE BY EXPERIMENTAL PERIOD (Budnick, 1973)

Police Presence	August	September	November
Unit-Tours	72	130	63
Man-Tours	92	137	71
Preventive Patrol Unit-Tours	139	350	145
Preventive Patrol Man-Tours	232	400	210

Budnick's evaluation of the Washington experiment provides modest support for a conclusion that some deterrent effect was achieved. However, he found considerable variation between the three months. The explanation for this variation in deterrent effects may be simply the fact that there was also variation in the level of manpower increases. The greatest deterrent effect appeared in the September experiment which involved a substantially larger increase in manpower. However, the changes implemented in August and November involved approximately the same levels of manpower increases, but only the November experiment

revealed significant deterrent effects. Observing this, the inference was drawn "that other factors, aside from the experimental condition, have influenced the response of crime within each area" (Budnick, 1973:146). Specifically, it was suggested that any deterrent effect of the increased police patrol may have been circumvented in the August test zone by environmental features that enable offenders to more easily evade contact with the police. That area was described as being less open and containing many more narrow streets, alleys, and other features that restrict visibility.

Within the two locations experiencing deterrent effects, variations were also found by crime type. Both the September and November experiments were accompanied by lower rates of robbery, burglary, and auto theft. However, in the September experiment a significant <u>increase</u> in the reporting of aggravated assault was experienced. In offering an explanation for this, it was pointed out that assault frequently involves previously acquainted victims and assailants leading to a lower report rate than the other offenses. Thus, the factor of police officer availability for reporting crimes might lead to a proportionately greater increase in reporting of this offense. As a result, any deterrent effect that police presence might have on the crime of assault could have been masked by an increase in the rate of reporting crime.

The Kansas City Preventive Patrol Experiment

The Kansas City Preventive Patrol Experiment (Kelling et al., 1974) is the most comprehensive effort undertaken to date attempting to evaluate the deterrent effect of police presence. It was a 12-month experiment in which levels of automobile patrol in an urban-suburban environment were varied in three areas, each consisting of five beats. The three areas were matched on population characteristics thought to be relevant to crime. Each of the three was then assigned a different treatment (level of patrol) which were referred to as reactive, proactive, and control. In the reactive beats no preventive patrol was supposed to be undertaken; patrol cars were only to respond to calls for service. Patrol was to be increased between two to three times the normal level in proactive beats, while the control beats were to maintain the usual level of patrol.

A wide range of variables were measured to determine the impact of the variations in patrol. Most important for the issue of the deterrent effect of police presence is that crime was measured not only by official reported rates, but also through victimization surveys. The findings of the experiment were no significant differences among the three experimental areas in crime or any of the other measured variables. Thus the KCPPE has raised serious doubts about the efficacy of the police in deterring crime

through their presence. However, the validity of the experiment and some of the conclusions that have been drawn from it have been tenaciously rebutted. Criticisms of the experiment can be subsumed under three categories: theoretical deficiencies, failure to achieve experimental conditions, and failure to control and/or monitor extraneous variables.

Theoretical deficiencies. One area of concern with the KCPPE is the adequacy of its theoretical conceptualizations. The most important issue here is the failure to give sufficient attention to the distinction between objective police presence and perceived police presence. Although an effort was made to measure perception of police presence, the hypotheses and analyses showed little sensitivity to the pivotal position of perception in the larger theoretical framework. Essential to deterrence theory is the proposition that the perception of potential offenders must be affected in order for deterrence to operate (Andenaes, 1966; Gibbs, 1975; Henshel, 1978; Minor, 1978; Tittle and Logan, 1973; Zimring and Hawkins, 1973). Thus unless changes in patrol levels result in a measurable change in the perception of the population, no measurable change in crime rates should be expected. In fact, no significant difference was found in perception of police presence among the three experimental areas in the KCPPE. However, the importance of this key issue was not recognized or discussed in the analysis or conclusions of the study

Failure to achieve experimental conditions. Critics have argued that the treatment or experimental conditions were not achieved in the experiment. It has been suggested that, for a number of reasons, there was not a substantial reduction of police presence in the reactive beats. Davis and Knowles (1975) pointed to the significantly larger mean number of officers who responded to incidents in the reactive beats (1.58) as opposed to control (1.29) and proactive beats (1.15). While Kelling and Pate (1975) responded that this difference does not connote a violation of experimental guidelines, it clearly does indicate a significant increase in police visibility due to the additional miles driven by cars responding to calls for service in the reactive beats. By taking into consideration the increased number of units responding to calls, the additional mileage accumulated in returning to the perimeter of the beat, and adjustments for peak activity periods (summer evening tours when visibility should be higher) Larson (1975; 1976) has derived estimates which suggest that police visibility was not reduced nearly as much as intended in the reactive beats. In addition, he pointed to the 400 to 500 percent increase in the use of lights and/or sirens which almost certainly had some influence on citizen perception of police presence. Adding further to these suspicions is the fact that there was actually an increase in patrol-initiated contacts in the reactive beats during the experimental period.

There are three major faults that reflect on the success of the experiment in creating the treatment effect in the proactive beats. One of the major points raised by those who have reviewed the KCPPE is that any deterrent effect of preventive patrol might be contingent upon what it is that the police are doing (Davis and Knowles, 1975; Fineberg et al., 1976; Goldstein, 1977; Wilson, 1975). An implicit assumption of the experimenters was that routine preventive patrol would increase concomitantly with the increase in noncommitted time in the proactive beats. However, this was an untested assumption since no baseline data on the use of noncommitted time were collected. Thus the extent to which the additional noncommitted time in the proactive beats was translated into routine preventive patrol rather than nonpolice-related activities is unknown. A second problem was the equal manning of beats over a 24-hour period which resulted in the largest amount of noncommitted time being available for patrol when most people are asleep and therefore least likely to perceive increases in patrol levels (Larson, 1976; Fineberg et al., 1976). The final point is that, according to Larson's (1975; 1976) estimates, the number of patrol passings experienced in the proactive beats were less than is typical of many large American cities. Thus, there is some question as to whether the level of saturation in the proactive beats was great enough to generalize the findings.

Failure to control and/or monitor extraneous variables. A number of relevant variables were not controlled and in some cases not even monitored in the KCPPE. Some of them were related to the central issue of police visibility. For example, Davis and Knowles (1975) raised the issue of visibility being affected by a supplementary park police in two of the beats and similarly, the fact that specialized units were deployed as usual throughout the experiment. Neither factor was controlled for and only the latter was monitored. Likewise, no quantitative estimates of police presence in the reactive beats resulting from the violation of experimental guidelines are available. Other issues concerning inadequate controls include debate over the adequacy of demographic data for the 15 experimental beats and the characteristics of personnel manning those beats (Davis and Knowles, 1975).

Generalizing the findings. Great caution is in order in attempting to draw generalizations from the KCPPE. The level of analysis in the experiment should be kept in mind. It involved variations in the level of police presence in 15 beats that averaged approximately 2.5 square miles, while the level of police presence for the experimental area as a whole was increased. In view of this, Larson (1975; 1976) argues that the study provides support for spatial redistribution of patrol forces rather than manipulation of overall patrol levels. In addition, any

generalization must include several qualifications taking the circumstances of the experiment into account. Thus an appropriate conclusion might suggest that those levels of variation in random patrol, which were actually achieved in the experiment, probably have no significantly different impact on levels of crime in an environment such as that of the South Patrol District of Kansas City.

There has been some tendency to overstep the bounds of scientific principles in generalizing from the KCPPE. It has often been cited as the definitive work when its appropriate role should be that of a foundation and catalyst for further research (Zimring, 1978). Replications of the experiment are needed to contend with the usual problems of risking a type II error and of correcting deficiencies in design and experimental procedures such as those discussed above. However, it may be more important to develop a general theory of the deterrent effect of police presence that can assimulate the findings of the KCPPE with a wide range of other studies (Blumstein et al., 1978). Such is the objective of the present research.

Post-Kansas City Experiments

Despite the need for additional experimentation to replicate and build upon the KCPPE, few studies have been undertaken since it was reported. However, three short-term experiments carried out by the Nashville Metropolitan Police Department have been evaluated by Schnelle and his

colleagues with somewhat mixed findings. The first experiment (Schnelle et al., 1975) involved a five-week saturation of three residential areas with specialized burglary patrols. The program involved deployment of plainclothes officers in unmarked cars during the day shift (8 A.M. to 4 P.M.), thus differing from the KCPPE in several ways. One result of the program was an increase in burglary arrests. There was also a reduction in home burglaries in all three areas as compared to rates just before and just after the intervention, but the analysts argued that this was a regression artifact. Specifically, their conclusion was that "the police intervened near a time period when burglaries were near a peak in all treated zones, and thus a statistical shift downward can be predicted" (1975:360).

The second experiment reported by Schnelle et al. (1975) concerned the implementation of foot patrols in two government housing projects. Time-series analysis revealed a significant increase in the reporting of crimes such as theft, assault, public drunkenness, and disorderly conduct. However, the reporting of serious crimes (e.g., murder, rape, and burglarly) was not affected nor was there a significant change in arrest frequencies for any categories of crime. The experiment then, had the clear implication that citizens are likely to report relatively minor offenses directly to a police officer already present in

the area even if they would not telephone the report to the police agency. This could be due simply to a convenience factor, but may also be related to a citizen belief that if the police are not in close proximity, they will not arrive in time to intervene and will not be concerned with the apprehension of minor offenders. We know very little about crime reporting, but this experiment indicates that it may be related to police presence under some circumstances.

The most recent experiment (Schnelle et al., 1977) incorporated several innovative features. Four high-crime patrol zones were each assigned four tactical squad cars in addition to their regular patrol car. The treatments were limited to one shift and remained intact for 10 days in each zone. The additional units were instructed to spend their time patrolling at slow speeds and not to respond to routine radio calls. Quantitative measures of patrol movement in the experimental zones were obtained from tachnographs installed in the patrol cars.[2] An average increase of 398 percent in total moving time was recorded and a 3040 percent increase in moving time under 20 mph. In addition, supervisors made random checks to determine if patrol units were leaving their assigned zones.

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[2]The tachnograph is an instrument which can be attached to the transmission of a vehicle in order to record time data on engine operation, vehicle speed, distance travelled, and use of emergency equipment.

The analysis revealed no significant change in arrest rates in the experimental zones. It did show a significant decline in the rate of index crimes in the two zones receiving increased patrol at night, but not in the two zones which were saturated during day shifts. An explanation proposed for the differential deterrent effect of police patrol during day and night hours focused on the offense of burglary. It was pointed out that most household burglaries occur during the day, while most business burglaries take place at night. It was suggested that crime could have been reduced at night due to a greater deterrability of business burglaries attributable to the greater density of businesses, fewer physical obstructions in the environment, and the reduced number of people abroad at night. The data were consistent with this interpretation since there was a decline in business burglaries but no change in the rate of home burglaries.

The final conclusions offered by the authors may be a reflection of the ideological burden that has so often interfered with research efforts on the topic of preventive patrol. It seems that they shifted to a different level in drawing generalizations from the study. In previous research which revealed evidence basically consistent with the KCPPE (i.e., inconsistent with a deterrence hypothesis), very general conclusions were drawn such as "that various commonly used patrol strategies have little if any effect on crime" (Schnelle et al., 1975:360). However, in this

study the results were basically consistent with a deterrence hypothesis (suggesting differential deterrent effects) but were brushed aside by arguing that prohibitive costs would prevent the experiment from having any "practical importance." Thus a conclusion was drawn which completely contradicted their empirical findings: "In summary, the present results indicate that police departments should try alternatives to saturation patrolling in attempts to reduce crime levels" (Schnelle et al., 1977:39). Sounder conclusions could have been arrived at by attempting a theoretical integration of the findings with those of previous research. This is not to deny the importance of the issue of cost-effectiveness. The authors should have noted the unlikelihood of public support for sustained expenditures of that level throughout the city. Rather, the objection is the shift from a general theoretical to a specific policy level.

Conclusion

The evidence found in reviewing evaluations of variations in levels of police presence supports a conclusion similar to that derived from the review of criminological deterrence research. It suggests that the police do have an impact on crime rates under certain circumstances, a conclusion also drawn by others who have surveyed the results of experimental and quasi-experimental studies (Blumstein et al., 1978; Chaiken, 1978; O'Connor

and Gilman, 1978; Zimring, 1978). This conclusion was stated most succinctly by Chaiken:

> Research has answered several questions about the deterrent effects of police activity, yet more remains to be done. It now seems very likely that arrest probability has a deterrent effect for at least some types of crimes. We need a much firmer indication of the particular crimes for which the effect operates. Moreover, the magnitude of the effect has not yet been adequately explored (1978:130).

Moreover, there are several implications for the development of a theoretical model of the deterrent effect of police presence and the specification of the empirical contingencies for such a theory. The theoretical model proposed in this research and the interpretation of the data incorporate the findings of this evaluation research.

Econometric Research

The statistical techniques subsumed under the category of econometric research were originated by econometricians and have been predominantly used by them. However, the research discussed within this section is similar to the criminological deterrence research which has utilized aggregate data. In reality the techniques used in the analysis of aggregate data fall on a continuum and some criminologists have recently used approaches categorized as econometric in the present review (e.g., Decker, 1978, Rowe and Tittle, 1974). The distinction is made primarily to provide a means of focusing on some key

issues addressed in earlier research which have implications for the present study. These issues are (1) the focus on police resources and (2) the issue of simultaneity.

The Focus on Police Resources

Econometric deterrence research has frequently analyzed the relationship between police resources and deterrence. The probable reason for such a focus is its inherent policy implications, which is consistent with the approach of that discipline. Criminologists on the other hand, have limited themselves to a higher theoretical plane by addressing the relationship between probability (or perceived probability) of punishment and crime rates. They have provided insight into the relationship between clearance rates and rates of crime, but such findings can only take on policy implications if the relationship between other police variables and their rate of clearing crimes is understood. Reviewing the findings of econometric research which examines the relationship between police variables and clearance rates, as well as that between clearance and crime rates, provides some framework for postulating a complete theoretical model of the deterrent effect of police presence.

Numerous variables which can be viewed as indicators of police presence have been examined. They have included per capita police expenditures, total

personnel, sworn personnel, full time equivalents, and in one case which involved a small purposive sample (35) the number of patrol units on the street was obtained. Similarly, there has been wide variation in the units of analysis employed in these studies. As a result of these differences and the problems associated with reciprocal relationships between variables, the findings have conflicted.

Using the SMSA as the unit of analysis, Pogue (1975) conducted a crime specific analysis and consistently found a negative relationship between clearance rates and the reported rates of each of the index offenses. However, he found no relationship between police presence, which he measured as per capita expenditures and as full time equivalent personnel, and clearance rates. Wilson and Boland (1978) also found a negative relation between clearance and robbery rates. In addition they found a positive relationship between police presence, measured as the total number of patrol units on the street, and robbery clearance rates. However, their study was based on an N of only 35 large cities. Chapman's (1976) study analyzed 147 California cities between 20,000 and 100,000 population and found a negative relationship between clearance rates and property crimes as well as a positive relationship between police presence (measured as per capita sworn personnel) and clearance rates. In addition,

another equation separated the positive influence of crime on the level of police presence from the deterrent effect of police presence on crime.

The Issue of Simultaneity

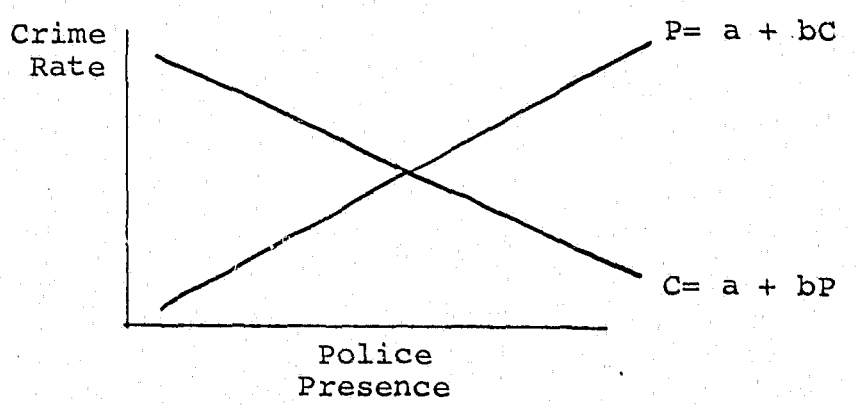
The second key issue in the econometric deterrence research is that of simultaneity. Econometric research almost invariably employs causal analysis and frequently recognizes two-way causation, while criminologists analyzing cross-sectional data have usually avoided that approach, relying instead on simple and partial correlations. This methodological difference has important theoretical implications since the causal modeling approach is useful for developing theory while simple prediction equations are not (Blalock, 1969). At the same time however, the technique requires sufficient understanding of the substantive issues to support causal assumptions in building the theoretical model to be tested; if those assumptions are faulty the findings may be erroneous. The assumptions necessary to solve simultaneous equations have been particularly problematic for deterrence research.

Most recent econometric deterrence research has recognized the simultaneous relationship between crime and police presence. That is, each variable is thought to have a causal influence on the other. While police presence should have a deterrent impact on crime and therefore be

negatively related, the level of crime is expected to have a positive influence on police presence since rising crime rates generate political demand for increased police presence. Figure 1 illustrates the two equations underlying the assumed relationship between crime (C) and police presence (P). A regression of C on P or of P on C will not separate the two effects because there is simply not enough information available to obtain unique solutions. Thus it becomes necessary to write two independent equations which incorporate additional variables. Specifically, in order for these equations to be identifiable it is necessary to omit one or more exogenous and/or predetermined variables from one of the equations. These identification restrictions cannot be justified empirically; they are causal assumptions which, if faulty may result in erroneous estimates.

Figure 1

Simultaneous Relationship of Crime and Police Presence



Several analysts have attempted to separate the presumed deterrent effect of police presence from the effect of crime on police presence (e.g., McPheters and Stronge, 1974; Swimmer, 1974a, 1974b; Wilson and Boland, 1978). However, the findings of some of these studies are in question because of the manner in which they solved their equations. For example, the rationale for imposing the identification restriction relied upon in Swimmer's (1974a, 1974b) research is not clear. He omitted city area from his crime equation, but retained it in the equation for police expenditures. On the other hand, the identification restrictions used by McPheters and Stronge (1974) have been generally praised (Blumstein et al., 1978). They omitted six demographic factors that were included in their crime equation (central city decay, central city affluence, minority presence, education, housing quality, and youth presence) from their equation for police expenditures. Wilson and Boland (1978) used similar identification restrictions.

Other studies have failed to detect a simultaneous relationship between crime and the police and have attributed this to various factors (e.g., Greenwood and Wadycki, 1973; Morris and Tweeten, 1971). One argument has been that an increase in the number of police officers leads to an increase in the number of crimes reported to or detected by the police. Thus, increases in police presence could be positively related to <u>official</u> crime

rates. Decker's (1978) findings provide support for such an argument since he found property crime to have a stronger negative relationship with police per capita sworn personnel and expenditures where victimization survey crime rates are used rather than official measures. Morris and Tweeten (1971) offered a second explanation, suggesting that there has historically been such a strong positive correlation between police and crime that the simultaneous influence cannot be readily separated. Third, and probably most important, the identification restrictions employed in many studies which have failed to differentiate between the two causal relationships have been inadequate. For example, Greenwood and Wadycki (1973) omitted median income from the crime equation to achieve identification but it is very doubtful that median income can be assumed to affect police presence and not to affect crime.

Conclusion

Review of the econometric deterrence literature has drawn attention to some central theoretical and methodological issues which must be addressed in the present research. In constructing a theory of the deterrent effect of police presence it is essential that the linkage between police presence and the certainty of apprehension (objective or perceived) be established. This relationship has been explored almost exclusively by econometricians.

It seems unlikely that the relationship between the police and crime or the relationship between apprehension and crime are nonsimultaneous. These simultaneous relationships introduce complex methodological problems. Also, the analyses of economists have frequently conflicted due to some indefensible assumptions concerning underlying relationships in their models. Nevertheless, their basic analytic techniques were extremely useful for conceptualizing the theoretical model and testing it with cross-sectional data.

Summary

This chapter has presented a review of three distinct bodies of deterrence literature, which provide the foundation for the theoretical model of the deterrent effect of police presence proposed in Chapter III. Previous criminological research and police evaluation research have addressed different components of the model and utilized different methods. However, the two are similar in that they both support a conclusion that deterrence does operate under some circumstances and that there is a need for further research to specify those circumstances. The third category of previous research reviewed was econometric research, which provides the methodological orientation for the present study.

The present research builds on this previous work by synthesizing theoretical and empirical advances in a model of the deterrent effect of police presence. The major departure from earlier research is the incorporation of theoretical relationships neglected previously (e.g., between police presence and clearance rates) and the use of some indicators of greater validity (e.g., per capita patrol units for police presence).

Several commendable features were adopted from a group of key references in the tradition of ecological deterrence research (Geerken and Gove, 1977; Tittle and Rowe, 1974; Wilson and Boland, 1978). At the same time, an effort was made to avoid their deficiencies. All of these major studies were weak in terms of the generalization they could support due to the nature of their samples. The sample used by Tittle and Rowe was confined to one state, while that employed by Wilson and Boland was a small purposive sample of 35, and Geerken and Gove's used Standard Metropolitan Statistical Areas as the unit of analysis. Secondly, the important issue of the differential effect of deterrence by crime type was not included in Tittle and Rowe's study or reported in Wilson and Boland's. Tittle and Rowe's analysis had the additional shortcoming of relying on police calculations for clearance rates rather than doing their own. The most important deficiency that this study attempts to address however, is

the limited theoretical focus of the earlier research. Both Tittle and Rowe and Geerken and Gove focused only on the relationship between crime and certainty of apprehension as measured by official crime and clearance rates. The model proposed by Wilson and Boland was a major theoretical improvement but still failed to consider the relationship between police presence and the objective certainty of apprehension or to empirically address the perceived certainty of apprehension.

CHAPTER III

A THEORETICAL MODEL OF THE DETERRENT EFFECT OF POLICE PRESENCE

Although much research has focused on the issue of deterrence in the last decade, relatively few studies have attempted to integrate the resulting theoretical and empirical advances in order to generate and test a general theory (Gibbs, 1975; Silberman, 1976). The objective of the present effort is to postulate a theory of deterrence related specifically to police presence and to test that theory utilizing cross-sectional data. This chapter proposes a theoretical model of the deterrent effect of police presence based largely on a synthesis of the three bodies of literature reviewed in Chapter II.

The model is presented in its general form in Figure 2. It is comprised of five endogenous and 11 exogenous variables which are elaborated in this chapter.[1] Cities are the unit of analysis and the model is tested using a two-tier population sample. The larger sample (N = 382) is referred to as Sample A and includes indicators for all variables except citizen perception of

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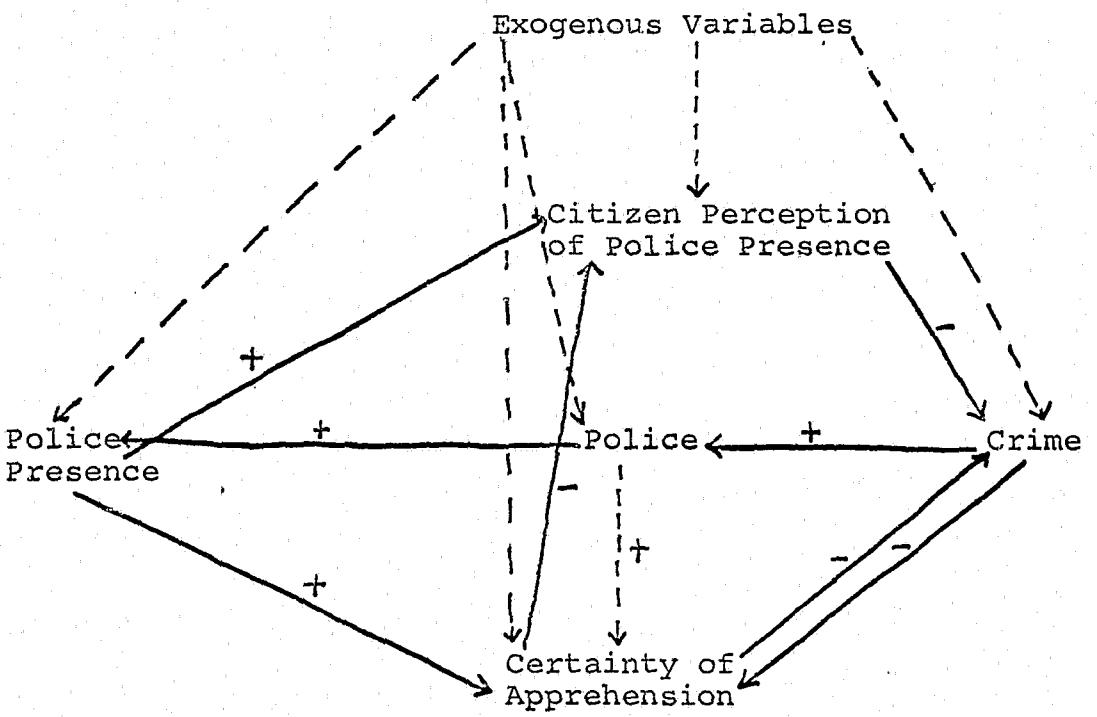
[1]Endogenous variables can be defined as those whose interrelationships the model seeks to explain. Exogenous variables are taken as given in the model without focusing on their origin and are necessary to solve the structural equations.

police presence. The smaller sample referred to as Sample B, is that used in the National Crime Survey (NCS) program and includes 26 cities. Sample B includes indicators for citizen perception of police presence which were collected in the NCS surveys and additional measures of crime.

Figure 2

General Form of the Theoretical Model of the Deterrent Effect of Police Presence



Elaboration of the Model

The indicators used to operationalize all variables in the model are defined in Table 2 and their relationships elaborated in the remaining sections of this chapter.

TABLE 2

INDICATORS FOR VARIABLES IN THE MODEL

A. Exogenous Variables

POPU-	total number of residents
DENSITY-	number of residents per square mile
PERM-	percent male
PERNW-	percent nonwhite
PERLOED-	percent with less than five years education
PERUNEM-	percent unemployed
CITYREV-	per capita city government finances
SALARY-	entry salary for patrolmen
REGION-	dummy coded by four sections
CRPPU-	annual number of index or survey crimes per patrol unit
TWOCOP-	percent of two-officer patrol units

B. Endogenous Variables

POLICE-	per capita sworn police officers
PATROL-	per capita patrol units
PERCEP-	percent of population sample stating that more police are needed[a]
CRIME-	annual reported rate of index crimes per 100,000 population[b]
MURDER-	annual reported rate of murders and non-negligent manslaughters per 100,000 population[b]
RAPE-	annual reported rate of forcible rapes per 100,000 population[c]
ROBBERY-	annual reported rate of robberies per 100,000 population[c]
ASSAULT-	annual reported rate of aggravated assaults per 100,000 population[c]
BURGLARY-	annual reported rate of burglaries per 100,000 population[c]
LARCENY-	annual reported rate of larcenies $50 and over per 100,000 population
LARCENY2-	annual reported rate of larcenies under $50 per 100,000 population
AT-	annual reported rate of auto thefts per 100,000 population[c]
VCRIME-	annual victimization rate for six selected offenses per 1000 resident population age 12 and over[a]
VRAPE-	annual victimization rate of rape per 1000 resident population age 12 and over[a]

TABLE 2 (Continued)

B. Endogenous Variables (Continued)

TVROB- combined annual victimization rate of robbery per 1000 resident population age 12 and over and of commercial establishments[a]

VASSAULT- annual victimization rate of assault per 1000 resident population age 12 and over[a]

TVBURG- combined annual victimization rate of burglary per 1000 resident population age 12 and over and of commercial establishments[a]

VTHEFT- annual victimization rate of theft per 1000 resident population age 12 and over[a]

VAT- annual victimization rate of auto theft per 1000 population age 12 and over[a]

CLEAR- percent of reported index crimes cleared by police[d]

CLMURDER- percent of reported murders cleared by police[d]

CLRAPE- percent of reported rapes cleared by police

CLROB- percent of reported robberies cleared by police

CLASLT- percent of reported assaults cleared by police

CLBURG- percent of reported burglaries cleared by police

CLLARC- percent of reported larcenies $50 and over cleared by police

CLLAR2- percent of reported larcenies under $50 cleared by police

CLTOTLAR- percent of all reported larcenies cleared by police[a]

CLAT- percent of auto thefts cleared by police

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a. variable measured for Sample B only
b. variable measured for Sample A only
c. variable utilized in Sample B for purpose of comparing analysis with victimization rate to analysis with reported rate
d. adjustments made for inclusion in the analysis of Sample B included deletion of the murder clearance rate and substitution of the combined clearance rate for larcenies $50 and over and those under $50

It is important to note that the diagram presented in Figure 2 is only intended to serve as a schematic aid. The relationships in the model are far too complex to present in detail in a path diagram. In particular, the effects of specific exogenous variables upon the various endogenous variables are deleted from the diagram. At this point it should be emphasized that all exogenous variables do not affect all endogenous variables. In fact, it is the causal assumption that they do not which makes the system identifiable. The specific relationships of exogenous to endogenous variables postulated in the model are presented in the structural equations. Equations one, two, and four are identical in the analysis of Sample A and Sample B. Equation three is relevant only to the analysis of Sample B since the perception variable is not measured in Sample A. For the analysis of Sample A, equation five contains a larger number of exogenous variables than it does for Sample B due to the limited N of the latter. Finally, it should be recalled that the analysis is crime-specific. Thus the model is tested for nine specific types of crime in the analysis of Sample A while for Sample B it is tested a total of 16 times. Specific measures of crime and their corresponding clearance rates are therefore substituted for the terms CRIME and CLEAR each time the model is tested. Table 3 presents the structural equations and the remainder

of the chapter elaborates the rationale for the variables included in the model.

TABLE 3

STRUCTURAL EQUATIONS FOR THE MODEL

1.	POLICE=	f(CRIME, CITYREV, SALARY, NORTHEAST)
2.	PATROL=	f(POLICE, TWOCOP, DENSITY)
3.	PERCEP=	f(PATROL, CLEAR, PERNW, SOUTH, DENSITY)
4.	CLEAR=	f(CRIME, PATROL, POLICE, CRPPU, NORTHCENTRAL)
5.	A. CRIME=	f(CLEAR, PERNW, POPU, PERLOED, PERUNEM, SOUTH)
	B. CRIME=	f(CLEAR, PERCEP, PERNW, PERM, POPU)

Police

The police variable is measured as per capita sworn police officers and occupies a pivotal position in the model since it is the instrument for feedback. As indicated in Chapter II, there are strong theoretical grounds for supposing a positive relationship between levels of crime and numbers of police officers. As the President's Commission on Law Enforcement and Administration of Justice pointed out, "public concern about crime is typically translated into demands for more law enforcement" (Task Force Report: The Police:2). Thus the model predicts a positive relationship between crime rates and per capita sworn officers. The quantity of police in turn are thought to influence the level of police presence which, according

to deterrence theory, should then be negatively related to crime.

Police Presence

The indicator for police presence is the number of patrol units per capita. This is clearly a more satisfactory indicator of police resources and activities than those utilized in previous research. The core of the deterrence hypothesis in the model is that there are two causal paths by which police presence may lead to the deterrence of crime. Two of the most notable publications on the topic have recognized the importance of this theoretical distinction. In reviewing the literature, the recent National Research Council panel on deterrence noted that,

> Increases in police resources may increase actual apprehension risk by increasing police officers' ability to detect and apprehend offenders. . . . Alternatively, increased levels of police resources may increase the visibility of the police in the community (through increased numbers of officers and patrol cars) without having any measurable effect on the actual apprehension risk. This increased visibility could deter potential offenders who mistakenly assume that the apprehension risks are indeed increased (Blumstein et al., 1978:44).

Similarly in reporting their recent research on the police and deterrence, Wilson and Boland stated:

> An offender may alter the rate at which he commits crime not because the actual chance of being caught has increased but because he perceives that it has, perhaps because he sees more officers than usual or more activity among them (1978:369).

Despite the importance of this, no previous research on deterrence and the police has attempted to differentiate between these two paths which theoretically could provide the connection between police presence and crime rates. Specifically, no attempt has been made to measure perceptions of police presence and to then relate those perceptions to a theory of the deterrent effect of police presence.

Citizen Perception of Police Presence

A measure of citizen perception of police presence was obtained from the NCS survey. The specific item employed as the measure of citizen perception of police presence is presented in Table 4. A response that hiring more police is the most important factor in improving police performance was taken as a measure of low perception of police presence. These data were available for 26 cities in which NCS surveys have been conducted. Thus only Sample B (which is a subsample of the total population studied) includes citizen perception of police presence as a variable.

Certainty of Apprehension

The police clearance rate serves as the indicator for certainty of apprehension, representing the objective rather than the perceived probability of apprehension. As shown in the preceeding chapter, most previous research

TABLE 4

NATIONAL CRIME SURVEY ITEM EMPLOYED AS A MEASURE OF CITIZEN PERCEPTION OF POLICE PRESENCE
(Garofalo, 1977)

14a. Would you say, in general, that your local police are doing a good job, an average job, or a poor job?

360

1 ☐ Good
2 ☐ Average
3 ☐ Poor
4 ☐ Don't know-SKIP to 15a

b. In what ways could they improve? Any other ways? (Mark all that apply)

360*

1 ☐ No improvement needed-SKIP to 15a
2 ☐ Hire more policemen
3 ☐ Concentrate on more important duties, serious crime, etc.
4 ☐ Be more prompt, responsive, alert
5 ☐ Improve training, raise qualifications or pay, recruitment policies
6 ☐ Be more courteous, improve attitude, community relations
7 ☐ Don't discriminate
8 ☐ Need more traffic control
9 ☐ Need more policemen of particular type (foot, car) in certain areas or at certain times
10 ☐ Don't know
11 ☐ Other-Specify_____

(If more than one way)

362 c. Which would you say is the most important?

_____Enter item number

analyzing the relationship between clearance and crime rates has been consistent with the deterrence hypothesis. However, the empirical finding of a negative relationship is also consistent with other interpretations. One

interpretation, sometimes referred to as the system overload hypothesis, claims a causal order opposite from that postulated by the deterrence interpretation. The rationale is that lower crime rates allow the police to operate more efficiently and thus achieve higher clearance rates and conversely, that high crime rates overload the system causing lower clearance rates. In fact, deterrence and overload could occur simultaneously and therefore the model postulates a simultaneous relationship between the two.[2]

If a deterrent effect of the certainty of apprehension is observed, it must be established that there is also a positive relationship between police presence and certainty of apprehension in order to support a theory of the deterrent effect of police presence. Thus the model proposes that certainty of apprehension (the clearance rate) is a positive function of police presence. If it is not, then the implication is that the manipulation of police presence is unrelated to any deterrent effects of the objective certainty of apprehension that might exist.

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[2]There are additional interpretations that cannot be resolved by the use of simultaneous equations. The negative relationship could be due to the incapacitation of those who are apprehended. It could also be due to some biases in official statistics. Underreporting of crime by both citizens and police have the effect of reducing the crime rate and increasing the clearance rate. Moreover, since the police desire high clearance rates they are sometimes inflated by employing flexible criteria for declaring crimes "solved."

There are two additional paths related to certainty of apprehension that are included in the model for purposes of logical consistency, but which have little theoretical or empirical support. First, clearance rates could be affected by police other than those on patrol. Based on this rationale a path representing a positive influence of total police on apprehension is included. However, little confidence in this proposed relationship can be justified due to the findings of previous research which has tested the deterrence hypothesis by focusing on the relationship between total numbers of police and crime rates. Second, the model predicts a negative relationship between certainty of apprehension and the perception measure. That is, it could logically be expected that as clearance rates increase the perceived need for police will decrease. Intuitively, however, it seems doubtful that citizens would have such an accurate perception of the objective certainty of apprehension.

Crime

Crime is measured as the reported rate of index crimes in the analysis of Sample A. The analysis of Sample B employs both the official rate and the NCS survey rate. Utilizing both measures provides a check on the validity of the official measures and some insight concerning the effect that underreporting of crime has on the estimates of the relationships in the model.

Theory and previous research suggest that police presence may differentially affect various types of crime. Therefore, the analysis is crime-specific. That is, crime is operationalized as rates of specific types of offenses and the model tested for each. The concept of deterrence rests to some degree on an assumption of rationality, but it has been argued that this assumption is more applicable to some types of criminal behavior than to others. Chambliss (1967) has referred to the more rationally motivated offenses as instrumental and the less rational acts as expressive. The instrumental offense serves only as a means to some other end and is therefore more likely to be based on rational calculation. The expressive offense is pursued as an end in itself, serving to gratify some emotional drive.

A hierarchy of offenses in terms of levels of rationality was proposed by Geerken and Gove (1977) and was found to fit the deterrence hypothesis quite well with their data. The deterrence research reviewed in Chapter II is also consistent with their interpretation. Therefore, the same predictions are made for the present research. Optimal fit should be obtained for the more rational property offenses of robbery, burglary, auto theft, and larceny. The crime of rape should fall at an intermediate level, fitting the deterrence model also, but with a weaker relationship since the offense does not serve as a means to another end in the same sense as the

profit-oriented crimes. While it may tend to be more emotionally motivated than property offenses, studies of rape suggest that it is not entirely irrational. For example, Amir (1975) found that 71 percent of rapes were planned and 43 percent involved multiple offenders. Finally, the crimes of murder and assault occur most often in highly emotional states and therefore are not expected to fit the model. Wolfgang's (1958) analysis of homicide revealed primary relationships between the victim and offender in 65 percent of the cases, the presence of alcohol in 64 percent of them, and motivations classified by the police as either general altercations or domestic quarrels in 49 percent of these crimes. Thus the picture that emerges for the typical murder (or assault) is an emotionally charged rather than a rational one.

A certain amount of error is inherent in any attempt to classify various offense categories relative to their level of rationality. The seven classes of offenses analyzed do not represent homogeneous categories of behavior. While the typical murder takes place under highly emotional circumstances with little thought given to the consequences, there are clearly exceptional cases that do involve very rational calculation before commission of the crime. Likewise, auto theft is at times a highly rational profit-oriented offense with much thought given to avoiding apprehension, but a major exception is the juvenile auto theft committed for the purpose of

"joyriding." To the extent that the various offense categories examined are not homogeneous, the predictions based on assumptions concerning relative levels of rationality will not be adequately tested.

Another issue related to the question of the model's adequacy relative to different types of crime are the levels of visibility characteristic of each. In order for a crime to be deterrable by the potential of police intervention, it must occur in a location subject to view by the police in the course of routine patrol. This is ordinarily not the case with murder or assault since they frequently occur in a private residence. At the other extreme, auto theft virtually always involves some risk of an encounter with the police. However, just as with the issue of rationality, the various offense categories are clearly not homogeneous in regard to visibility. A robbery, burglary, theft, or rape may take place in locations highly visible to the police or in ones completely out of police visibility under normal circumstances. Again, to the extent that the various offense categories examined are not homogeneous in regard to rationality and visibility, the reasons for any crime-specific differences found in the analysis will not be clear.

Exogenous Variables

It is the exogenous variables which make the equations identifiable. Although predetermined (lagged endogenous) variables could also have been utilized to solve the equations, the assumption of uncorrelated error would have been questionable. There is a strong probability that measures derived from a single variable at times one and two would be correlated. If this serial correlation were present, the assumption of uncorrelated error would be violated. Although techniques exist for addressing this, they would have introduced additional complexities in the analysis and still would not have provided identification restrictions superior to carefully selected exogenous variables.

The rationale for the inclusion of exogenous variables is apparent in most cases. In order to minimize the number of variables in the equations, treatment of the dummy regional variable was limited to one region per equation. The decisions of which variables to include in each equation were based on review of previous research.

To summarize equation one (POLICE), it is suspected that greater city revenue facilitates the hiring of more police officers. Higher salaries on the other hand should have a negative affect on the total strength of a police agency since fewer officers could be employed at a given level of funding. It is also probable that police-citizen

ratios vary regionally. Specifically, it is postulated that northeastern cities have a higher ratio than those of other regions.

Equation two (PATROL) contains the number of patrol units consisting of two officers based on the obvious assumption that this reduces the total number of patrol units that can be deployed. Population density serves as a second exogenous variable and is included because it could be a factor in deciding how many patrol units are needed in a given locale.

The third equation (PERCEP) contains the exogenous variables percent nonwhite, south, and density. Since the measure of perception is probably not a clean measure of police visibility but may be confounded with preconceived attitudes concerning the need for police, these exogenous variables are entered in the equation to account for that. It is expected that nonwhites have a high perception of police presence (or are less likely to believe that more are needed), while southerners have a low perception of police presence (or are more likely to believe that more are needed). Finally, it is thought that density could have an impact upon perception of police presence.

Two exogenous variables are included in equation four (CLEAR). Crimes per patrol unit is entered on the rationale that as patrol units have a larger number of crimes to respond to, they will be successful in clearing a smaller proportion of them. The other exogenous variable

is the northcentral region which is based on the observation that clearance rates generally run higher in that region.

Five variables are included in equation five (CRIME) which have consistently been found to be correlated with crime in ecological studies. These include the percentages of the population nonwhite, male, unemployed, and with low education. It is generally expected that as the proportion of the population with these characteristics increases, crime will increase. Rates of crime are also expected to be a positive function of population. Finally, the variable south was included in the equation with the expectation that crimes of violence, but not property crimes, would be greater in that region.

Summary

This chapter has presented the theoretical model of the deterrent effect of police presence and elaborated upon the interrelationships of the variables. It was pointed out that a two-tier population sample was employed to facilitate the inclusion of indicators for citizen perception of police presence and additional measures of crime. Both of these measures were derived from the NCS surveys. The expectation of crime-specific differences due to variations in levels of rationality and visibility was also noted. These are very important theoretical issues but involve unknown levels of measurement error.

CHAPTER IV

RESEARCH METHODS

The model presented in the last chapter provides a mathematical formulation of a theory of the deterrent effect of police presence. The arrow diagram (Figure 2) and the structural equations (Table 3) express the theory in an explicit fashion that facilitates quantitative testing. The basic orientation of such a causal modeling approach provides the link between theory and research. It forces the researcher to make explicit the theoretical rationale for a set of regression calculations (Duncan, 1966). Thus it is fundamentally directed toward explanation rather than prediction and is useful for theory building as well as for theory testing.

This chapter discusses some of the major methodological issues in testing causal models and relates them to the present research. The crucial assumptions in the analysis of causal models are examined and measurement issues relating to the present model's variables are discussed. Both of these topics reflect on the validity of the estimates of the parameters of the model. In addition, the more mechanical procedures of the analysis are delineated.

Statistical Assumptions

There are a number of assumptions upon which the validity of the analysis of causal models rests. These assumptions may be divided into two classes. First, since the statistical technique utilized is regression, all of the assumptions for conventional regression analysis must be contended with. Second, there are some assumptions specific to the model.

Conventional Regression Assumptions

Regression is a quite robust technique, meaning that the assumptions it rests upon can frequently be relaxed without serious consequences. However, the effects of violating more than one assumption are unknown (Kerlinger and Pedhazur, 1973). Thus, sensitivity to the underlying assumptions is crucial and ameliorative steps prudential whenever violations are evident.

Linearity. It is assumed that the relationships between variables to be regressed are linear. That is, a change in the dependent variable occurs as a linear function of changes in the predictor variables. By plotting the relationships in the model it can be determined if this assumption holds. Then any significant departures from linearity can be adjusted through mathematical transformations (e.g., logarithm) of the dependent variable(s)

so that they will meet the assumption. This is a common procedure in regression analysis and is problematic only when the transformations implemented are not theoretically meaningful. Under these circumstances it provides a mechanical means of circumventing the assumption that the data are linear and additive, but serves to confound the theoretical understanding of the relationship since the transformed variable cannot be related back to the original theory.

Interval scales. A second assumption is that the underlying scale of the variables is interval or ratio. This issue has been discussed at length in the literature, providing considerable support for relaxing the assumption and treating ordinal data as interval or using dummy variables (Boyle, 1970; Labovitz, 1970; Lyons, 1971). The measurement scales for variables are not an important issue for the present research since all appear to meet the interval requirement with the exception of the dummy-coded region.

Representative sample. When statistics are calculated from a sample rather than from the total population in order to draw inferences or generalizations concerning that population, it must be assumed that the sample is representative. Otherwise, biased estimates of the parameters may result. The present study actually involves two populations. The population analyzed as

Sample A can be defined as United States cities of moderate and large populations. Specifically, it consists of all cities 50,000 and over in population. The data base includes all cities meeting this definition with the exception of those for which data were unavailable in either the Uniform Crime Reports (1971) or the County and City Data Book (1972). Thus with a nearly complete population (382 of 420) being analyzed, the issue of representativeness becomes a moot question. Drawing generalizations from the analysis however, requires recognition that the population does not include small towns and cities (below 50,000 population), cities outside of the United States, or a population with the same definition for a different time. Sample B consists of 26 large cities for which data have been collected in the NCS surveys. The NCS program and its sample are further discussed in the next section.

Normality and homoscedasticity. Tests of significance rest on the assumption that the dependent variable in any given equation is normally distributed around all values of the independent variables. If the distribution is a multivariate normal one, then this assumption of homoscedasticity (equal variances) will also be met (Blalock, 1972). The distribution of the dependent variables, particularly in the analysis of Sample B, should be scrutinized for numerous sources of departure from

normality. If significant departures from normality exist they may be rectified by mathematical transformations. However, violation of this assumption alone is not generally viewed as a major source of bias. Moreover, any departure from normality only affects significance tests and not the regression coefficients themselves. Finally, since the data base of Sample A might be viewed as the total population, significance tests are not necessary in that portion of the analysis anyway.

Minimal measurement error. A final assumption upon which the validity of regression analysis rests is that the error in measuring the variables is not excessive. To the extent that the measurements are plagued by random error, the regression coefficients may be attenuated. Systematic measurement error, however, can bias the regression coefficients either upward or downward (Asher, 1976). In the present research estimates of reliability are not obtainable, leaving measurement error unknown. Heise (1969) points out that this is a frequent predicament for the social scientist when limited to testing theories with cross-sectional data. Thus, the validity of analyses often rest on a qualitative assessment of the reliability of the measurement of the variables. No solution is available for systematic measurement error; it must be assumed that any measurement error is random. However, it has been demonstrated that coefficient

estimates generated through 2SLS are unlikely to be biased as a result of random measurement error due to the addition of instrumental variables (Heise, 1975; Johnston, 1972).

Modeling Assumptions

A causal model or system of structural equations is based on certain assumptions beyond those necessary for regression. The assumptions for recursive models are far more restrictive than those for nonrecursive models. By definition, the recursive model assumes that the causal order specified is correct and that there is no feedback or reciprocal causation. It is also assumed that the disturbance or error term for a dependent variable is uncorrelated with the disturbance of any of the independent variables in an equation.[1]

The model proposed in Chapter III is a nonrecursive model which does not meet the above assumptions. The specification of the model includes feedback resulting from the relationship between crime and the police as well as a symmetrical relationship between crime and certainty of punishment. This in turn causes violation of the assumption of uncorrelated error since

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[1]The error term has two components: the measurement error in operationalizing variables and the stochastic error which consists of the many unmeasured variables impinging upon those variables (Johnston, 1972; Wonnacott and Wonnacott, 1970).

endogenous variables with reciprocal relationships will necessarily have correlated error terms. It is the violation of this assumption which makes an ordinary least squares (OLS) regression unacceptable. Thus 2SLS is utilized as an alternative means of generating estimates.

As the term implies, 2SLS involves two separate applications of OLS regression. The first application serves the function of decontaminating the endogenous variable(s) on the right-hand side of each equation of the error it has in common with the dependent variable. In other words, nonrecursive sources are transformed into recursive ones so that the assumptions for an OLS estimate will be met. This is accomplished in the first stage by regressing each endogenous variable on the right-hand side of each equation on all of the exogenous variables in the system and then replacing the actual observations on those endogenous variables with the predicted values. Since these new values are a linear combination of exogenous variables, which are assumed to be independent of the error terms of the endogenous variables, OLS regression can then be applied in the second stage.

The identification problem was discussed in Chapter II. In order to achieve identification it was necessary to omit one or more exogenous variables from

each of the equations.[2] This led to a situation of exact identification in some equations and overidentification in others. The excess information in the case of over-identification presents no problem since it is all utilized simultaneously with 2SLS (Asher, 1976). However, the important assumption that the model was properly specified remains.

Measurement Issues

This section discusses issues concerning the measurement of those variables comprising the model and others measured for use in computing them. The three major sources of data drawn upon were the Uniform Crime Reports, the National Crime Surveys and census data published in the County and City Data Book (1972).

Uniform Crime Reports

The Uniform Crime Reporting Program was implemented by the Federal Bureau of Investigation in 1930. Since that time it has been in continuous operation and received periodic methodological updating. It is a means of acquiring data from local police agencies on a purely voluntary basis. Not all agencies participate, although

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[2]The necessary condition for identification is that "the number of exogenous variables excluded from the equation must at least equal the number of endogenous variables included on the right-hand side of the equation" (Wonnacott and Wonnacott, 1970:180).

the overwhelming majority do (agencies serving 93 percent of the national population in 1971), and the FBI does not vouch for the accuracy of the data although they do check for consistency. The data collected in this program, and especially that published in the annual Uniform Crime Reports, are frequently used by criminologists. There are serious problems in such use that the researcher should be aware of, but despite these many criminologists have concluded that they are the best statistics on crime and the police available on the national level (Lejins, 1966; Savitz, 1979).

Crime rates. The number of "crimes known to the police" are published in the Uniform Crime Reports and used as the measures of crime in this study. This is the most accurate measure in the Uniform Crime Reporting Program of the true amount of crime. However, it is clearly an underestimate of the actual amount since citizens do not report all crime and police do not record all that is reported to them (Black, 1970; Lejins, 1966; Nettler, 1974; Skogan, 1977). All crime data for Sample A are from the 1971 Uniform Crime Reports. Sample B utilizes data from the 1971, 1972, and 1973 reports as they correspond to the time of data collected in the NCS program.

The number of crimes were converted to rates per 100,000 population and analyzed separately for each of the seven index crimes. These offense categories are defined

by the FBI to insure uniformity in reporting. They were originally selected on the basis of their frequency and seriousness and are intended to serve as a general measure or index of crime rates. Both the number of crimes known to the police and the number cleared are maintained for index crimes and facilitated the present study. The seven index crimes and their definitions as given in the 1971 Uniform Crime Reports are summarized in Table 5.

TABLE 5

DEFINITIONS FOR INDEX CRIMES

Criminal homicide	Comprised of two categories: (1) Murder and nonnegligent manslaughter. Attempts and justifiable homicides are excluded. (2) Manslaughter by negligence. Only the former category is used to operationalize murder in the present research.
Forcible rape	Rapes and attempted rapes by force. Statutory offenses are excluded.
Robbery	Taking anything of value from a person by force or threat or attempting to do so.
Aggravated assault	An assault with intent to kill or inflict severe bodily injury, including attempts.
Burglary	Unlawful entry or attempted entry of a structure with intent to commit a theft or felony.
Larceny	Comprised of two categories of theft: (1) items valued $50 and over. (2) items valued under $50. Auto theft is excluded. These categories are analyzed separately in the present research.
Auto theft	Stealing or driving away a motor vehicle.

Clearance rates. Police agencies participating in the Uniform Crime Reporting Program provide the number of crimes cleared for each of the offense categories reported in Return A, although these statistics are not published. The Return A master tapes were obtained from the FBI for the years 1971, 1972, and 1973.[3] Clearance rates per 100,000 population coinciding with each of the crime rates were then calculated.

The clearance rate is the proportion of crimes known to the police which have been solved to their satisfaction. A crime may be cleared as the result of an arrest or by exceptional means in which the police are satisfied that the offender has been identified but are unable to make an arrest for some reason (e.g., death, incarcerated elsewhere, refusal of other parties to prosecute). The arrest of one person may result in many clearances or the arrest of several persons may clear just one crime. Since clearance rates are used to some extent as a performance criteria for the police (especially detectives), they are sometimes viewed with skepticism. Skolnick (1975) found evidence that clearance rates are sometimes inflated by detectives who encourage defendants to "clean" themselves by offering benefits such

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[3]Conversion of the Return A master tapes from EBCDIC to character sets readable by the UNIVAC system was accomplished with a COBAL program. The program also converted portions of the data from packed decimal to ordinary form.

as charge reductions and immunity from further investigation on prior offenses. This leads to the suspicion that some offenders (particularly burglars) may become "too cooperative" and confess to offenses they did not actually commit. Whether justified or not, these multiple clearances are problematic for deterrence research since the clearance rate is used as a proxy for certainty of punishment. Nevertheless it appears to provide a better estimate of the objective certainty of punishment than any other measure available (Tittle and Rowe, 1974).

Police employee data. Various statistics on police employees are also collected in the Uniform Crime Reporting Program. Numbers of sworn personnel are published in the Uniform Crime Reports for all three years and are employed as the police indicator after conversion to rate per 100,000 inhabitants. In addition, the FBI collected data on types of patrol for the years 1971 through 1973 and these were obtained from the master tapes on police employees for these years.[4] The data were collected by shifts for each of the following categories: one man vehicle, two man vehicle, one man foot, two man foot, and other patrols. Two important variables were calculated from these statistics: (1) total number of

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[4]A COBAL program similar to that written for the Return A master tapes was used for character conversion and to handle the packed data.

patrols per 100,000 population and (2) percent of patrol units (both foot and vehicle) which consisted of two officers.

National Crime Surveys

The Law Enforcement Assistance Administration and the Bureau of the Census have collected data through the NCS series of surveys since 1972.[5] One of their primary values is the detection of crime that is not officially reported or recorded. However, it has been argued that they are subject to some sources of error that can actually lead to overreporting (Levine, 1976; 1978). The series consists of two sets of surveys: a continuing panel design which utilizes a national sample and periodic surveys of independent cities (Garofalo, 1977). It is the latter component which provided a portion of the data for this research. Three survey groups were used: 1972 surveys in the eight cities comprising the LEAA High Impact Crime Reduction Program, 1973 surveys in the nations five largest cities, and 1974 surveys in 13 selected cities. They are presented in Table 6.

The city surveys estimate rates of crimes against persons, households, and commercial establishments for the 12 month period preceding the interview dates. Therefore, the three groups of surveys providing data are roughly

[5]The data from the NCS series and discussions of methodological issues are available in a series of National Criminal Justice Information and Statistics Service Reports.

TABLE 6

THE NATIONAL CRIME SURVEY SAMPLES

Sample	City	
High Impact Cities (1972)	Atlanta	Denver
	Baltimore	Newark
	Cleveland	Portland
	Dallas	St. Louis
Five Largest Cities (1973)	Chicago	New York
	Detroit	Philadelphia
	Los Angeles	
Selected Cities (1974)	Boston	New Orleans
	Buffalo	Oakland
	Cincinnati	San Diego
	Houston	San Francisco
	Miami	Washington, D.C.
	Milwaukee	
	Minneapolis	

comparable to the calender years of 1971, 1972, and 1973 and were used as a second measure of crime in Sample B. Methodological issues in the city surveys are discussed in some detail by Garofalo (1977). The sampling frame for household and personal crimes consisted of a list of housing units from the 1970 census supplemented by a list of new construction building permits. The sample size for each city was approximately 10,000. For each household one adult was interviewed about crimes against the household (burglary, household larceny, and vehicle theft) while each household member 12 years of age or older was individually questioned about their personal victimization (rape,

robbery, assault, and personal larceny). The sample for the commercial surveys was obtained by randomly selecting city areas and then visiting them to identify all eligible establishments. Interviews were then conducted with one representative for each business to estimate rates of robbery and burglary.

In addition to questioning household respondents about victimization, a subsample were asked questions which were intended to measure attitudes and perceptions about crime and criminal justice issues. Suggestions for improving police performance were elicited from those interviewees who first indicated that improvement was needed. The suggestion that more police were needed was used in the present research as an indicator of low perception of police presence. However, perception is a very difficult concept to measure directly and utilizing secondary data as a perceptual measure increases the risk of confounding it with other variables. An opinion that more police are needed could be due in part to preconceived attitudes independent of perception of police presence. In addition, the perceptions measured in the NCS surveys are those of the population in general and may overrepresent persons who are residentially stable, middle class, and older. However, it is the perceptions of the transient, lower class, and young which may be more important since they are more likely to be involved in the traditional types of crime examined in this study. In short, they are the

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1 OF 2

population whose perceptions are most important to the theory since it is largely those belonging to their group who might be deterred by police presence.

Other Sources

Seven variables from the County and City Data Book for the 1970 census were utilized.[6] These were land area, population, percent of the population female, number of white residents, percent of the population with less than five years of formal education, percent of the population unemployed, and per capita city government finances. Some of these variables served as indicators for variables in the model while others were used to calculate the values of indicators (see Table 2). In addition, definitions of four geographic regions (south, northeast, northcentral, and west) employed by the Bureau of the Census were used for dummy coding of the region variable.

A final source of data was the publication of the International City Management Association for the year 1971 (Sample A) and for the years 1971 through 1973 (Sample B). These publications provided the entry salary for patrolmen as of January 1 of each year. Since these data had a relatively large number of missing observations (69 of 382 in Sample A), estimates were obtained by two means. Entry

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[6]Other data for Sample A were from 1971, while the other data for Sample B were for 1971 through 1973. However, changes during these periods were thought to be slight and their effects negligible.

salaries of firemen were used in cases for which they were available (6 in Sample A) since they were identical in the majority of cities and coincided highly in the remainder. Second, adjusted salaries from the two adjoining years were used when available (37 cases in Sample A). The adjustment for inflation was made by adding or subtracting 5.5 percent. This estimate was derived by calculating the average salary increase from 1971 to 1972.

Procedures for Analysis

The analysis was performed with the UNIVAC 1140 utilizing SPSS: The Statistical Package For The Social Sciences (Nie et al., 1975). The RECODE facility was used to assign the value -9 to all missing observations. Pair-wise deletion of missing data was then used in all calculations.

The procedures employed for the 2SLS regressions were as follows. Each endogenous variable was regressed on all exogenous variables using forward (stepwise) inclusion and the default values for the inclusion criteria. Options were selected to output the resulting standardized predicted Y' values on a raw-output-data file. The predicted values in those files were then added to the SPSS files for Sample A and Sample B in order to use them in the second round of the 2SLS regressions. These new variables were then substituted for the original endogenous variables in each case where they appeared on the

right-hand side of the equation. Finally, OLS regression was used with the new variables to obtain estimates of the regression coefficients in the model. Hierarchical inclusion was used in testing the model with standardized regression coefficients output.

Summary

This chapter discussed the assumptions upon which the analysis rests. The usual assumptions for regression analysis are linearity, interval scales, representative samples, normality, and limited measurement error. The effects of violating these assumptions were discussed as well as techniques for correcting them if evidence of violations were found. The assumptions for causal models have been discussed in earlier chapters and were summarized here. The major methodological issue in the model is its simultaneous relationships.

The data sources for the study were identified and some of their shortcomings discussed. The underreporting that is characteristic of the Uniform Crime Reports is well known and therefore the victimization crime measures are a valuable addition to the analysis of Sample B. The clearance rate was discussed as the indicator for objective certainty of punishment as well as attempting to introduce a perceptual measure of police presence in the analysis of Sample B. The last section summarized the mechanics of the analysis.

CHAPTER V

ANALYSIS OF SAMPLE A

The findings of the analysis are presented for each structural equation in the model individually. Focusing on each equation provides insight concerning the fit of specific crime types to the various segments of the model. Note that a specific type of crime need not fit all equations in order to substantiate the deterrent effect of police presence. It is only necessary that a specific clearance rate be a positive function of per capita patrol and that the corresponding crime rate be a negative function of that clearance rate. It is not a logical necessity that every category of crime which shows evidence of deterrability also generate demand for police. Thus, the equations for per capita police and patrol can be viewed as analytically distinct from the equations for crime and clearance rates in terms of specific types of crime.

Table 7 presents a correlation matrix of all variables in Sample A. All correlations in the matrix are based on the original values of variables. Therefore the endogenous variables are not the same values as were employed as independent variables in the 2SLS regressions. The predicted values which were generated in the first

round of the 2SLS regressions are not included since they would have greatly increased the size of the matrix.

TABLE 7
SIMPLE CORRELATIONS FOR ALL VARIABLES
EMPLOYED IN THE ANALYSIS OF SAMPLE A

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1																															
2	.50																														
3	.52	.58																													
4	.72	.08	.15																												
5	.66	.10	.02	.35																											
6	.89	.49	.51	.61	.36																										
7	.52	.63	.41	.20	.22	.49																									
8	.55	.56	.28	.27	.21	.53	.55																								
9	.29	.60	.31	-.06	.04	.32	.53	.56																							
10	-.20	-.07	-.26	-.20	-.04	-.21	-.00	.17	.22																						
11	-.11	-.25	-.16	-.05	.08	-.15	-.13	-.15	-.09	.38																					
12	-.09	-.19	-.35	.06	.11	-.15	-.05	.00	-.06	.52	.28																				
13	-.13	-.01	-.05	-.25	-.02	-.10	.04	.05	.14	.65	.34	.31																			
14	-.24	-.07	-.19	-.18	-.20	-.19	-.10	.07	.19	.75	.14	.20	.27																		
15	-.12	-.13	-.14	-.10	.10	-.21	-.05	-.04	.01	.70	.41	.45	.55	.22																	
16	-.08	-.08	-.07	-.08	-.04	-.02	-.14	-.05	.05	.31	.25	.11	.15	.30	.18																
17	-.26	-.15	-.20	-.25	-.08	-.23	-.19	-.18	.01	.41	.39	.23	.34	.18	.40	.37															
18	.03	-.08	-.07	.06	.07	.02	.03	-.01	-.04	.06	.10	-.02	.06	-.02	.09	.19	.13														
19	.15	.47	.42	-.04	-.11	.17	.18	.14	.19	-.08	-.03	-.17	-.07	-.01	-.09	.09	-.01	-.13													
20	.31	.20	.14	.20	.29	.22	.17	.07	-.06	-.16	.05	.06	.02	-.32	.01	-.04	-.02	.06	.06												
21	.24	.64	.50	-.05	-.07	.24	.31	.33	.48	.05	-.06	-.19	.04	.09	-.02	.08	-.02	-.08	.67	.04											
22	.01	-.05	-.01	.02	.06	-.03	-.08	.04	.06	.09	.05	.03	.04	.09	.09	.10	.05	-.04	.19	-.14	.21										
23	.02	.23	.13	-.06	-.14	.07	.04	.12	.12	-.04	-.13	-.13	-.07	.06	-.13	-.03	-.04	.01	.03	.02	.13	-.29									
24	.08	.44	.42	-.11	-.15	.09	.10	.08	.10	-.23	-.20	-.22	-.04	-.19	-.14	-.05	-.05	-.15	.39	.15	.45	.01	.19								
25	.27	.02	-.00	.32	.16	.28	-.07	.15	-.08	-.09	-.06	-.01	-.09	-.11	-.12	-.11	-.09	.11	-.20	.10	-.20	-.21	.54	-.01							
26	.26	.63	.29	-.07	-.02	.32	.55	.52	.79	.19	-.12	-.06	.10	.17	.03	.05	.03	-.01	.29	-.06	.53	.07	.11	.10	.06						
27	.11	.41	.21	-.02	-.06	.10	.24	.18	.25	.05	-.03	-.05	.08	-.02	.03	-.08	-.06	.01	.35	.13	.38	-.02	.03	.32	-.15	.21					
28	.03	.24	.21	-.19	-.18	.16	.12	.25	.47	.17	.05	-.15	.10	.22	-.01	.17	.14	.06	.15	-.23	.31	.05	.11	.13	-.06	.49	.09				
29	.41	.30	.24	.21	.28	.39	.29	.17	.12	-.15	.02	-.11	-.00	-.26	.00	-.10	-.07	.09	-.02	.19	.04	-.16	.06	.09	.15	.12	.03	.15			
30	-.06	-.02	-.18	-.06	-.06	.00	.08	.28	.44	.35	.04	.12	.11	.35	.09	.14	.10	.05	-.08	-.30	.02	.14	-.10	-.29	-.10	.41	-.02	.45	-.24		
31	-.21	.07	.28	-.25	-.40	-.09	-.22	-.12	-.15	-.16	-.03	-.21	-.04	-.06	-.08	.10	.07	-.12	.47	-.11	.40	.24	.14	.45	-.11	-.08	.06	.15	-.12	-.31	
32	-.05	.00	-.10	-.02	.62	-.08	-.04	-.04	-.09	.04	-.16	.01	-.05	.14	-.07	-.01	-.15	-.02	-.18	.03	-.18	-.26	.17	-.06	.16	-.13	-.00	-.29	-.09	-.39	-.30

CRIME	1						MURDER	9										CLASLT	17										CRPPU	25		
ROBBERY	2						CLEAR	10										CLMURDER	18										PERNW	26		
AT	3						CLROB	11										CITYREV	19										POPU	27		
LARCENY	4						CLAT	12										SALARY	20										PERLOED	28		
LARCENY2	5						CLLARC	13										POLICE	21										PERUNEM	29		
BURGLARY	6						CLLAR2	14										PATROL	22										SOUTH	30		
RAPE	7						CLBURG	15										TWOCOP	23										NORTH	31		
ASSAULT	8						CLRAPE	16										DENSITY	24										NC	32		

Police

Table 8 presents the estimated Beta values for the police equations. It can be seen that city revenue and certain types of crime are the most important factors contributing to the number of police personnel per capita. An important finding is that some types of crime generate much demand for police while other types have little or no impact. Rates of murder, rape, robbery and auto theft

all produce greater increases in per capita police than does city revenue. These findings are at odds with Swimmer's (1974a; 1974b) conclusion that demand for police expenditure is a function of property crime and not of violent crime. His analysis may have been misleading due to the combining of several types of crime to yield only two categories (violent and property). Examination of the police equations below shows number of police to be a greater function of violent than of property crimes with the notable exception of auto theft.

The number of police per capita is seen to be slightly negatively related to police salaries after controlling for the regional variable of northeast (where greater numbers of police are employed at higher salaries). The somewhat larger number of police in the northeast is reflected in the relatively consistent low to moderate Beta values for that variable.

TABLE 8

ESTIMATED VALUES FOR THE POLICE EQUATIONS

DEPENDENT VARIABLES	INDEPENDENT VARIABLES			
POLICE	CRIME	CITYREV	SALARY	NORTHEAST
Beta	.19	.52	-.07	.20
F	14.09[c]	106.75[c]	2.86[a]	14.73[c]
POLICE	ROBBERY	CITYREV	SALARY	NORTHEAST
Beta	.53	.28	-.11	.22
F	178.07[c]	38.86[c]	9.79[c]	31.19[c]

TABLE 8 (Continued)

DEPENDENT VARIABLE	INDEPENDENT VARIABLES			
POLICE	AT	CITYREV	SALARY	NORTHEAST
Beta	.51	.36	-.11	-.03
F	117.68[c]	60.38[c]	9.61[c]	.50
POLICE	LARCENY	CITYREV	SALARY	NORTHEAST
Beta	.22	.50	-.03	.16
F	26.91[c]	108.87[c]	.62	11.83[c]
POLICE	LARCENY2	CITYREV	SALARY	NORTHEAST
Beta	-.18	.62	.07	-.02
F	5.79[c]	171.14[c]	1.81	.07
POLICE	BURGLARY	CITYREV	SALARY	NORTHEAST
Beta	.28	.49	-.08	.19
F	41.44[c]	112.77[c]	3.99[b]	.19
POLICE	RAPE	CITYREV	SALARY	NORTHEAST
Beta	.48	.42	-.09	.33
F	158.70[c]	102.91[c]	6.18[c]	61.77[c]
POLICE	ASSAULT	CITYREV	SALARY	NORTHEAST
Beta	.41	.46	-.02	.26
F	127.05[c]	124.44[c]	.41	37.72[c]
POLICE	MURDER	CITYREV	SALARY	NORTHEAST
Beta	.47	.40	.05	.29
F	167.43[c]	94.91[c]	1.80	49.97[c]

a. Significant at the .05 level
b. Significant at the .01 level
c. Significant at the .001 level

Police Presence

Police presence is measured as the number of patrol units per capita. The Beta values for per capita police and the TWOCOP variable are in the direction that would intuitively be predicted, although their magnitudes may not be as great as might be expected. One unit increase in per capita police results in an increase of .24 units in per capita patrol. An increase of one unit in the proportion of patrol units with two officers results in a .25 decrease in the number of patrol units per capita. The density variable has a low Beta value suggesting a slight tendency for the number of patrol units per capita to decrease as population density increases. Table 9 presents the patrol equation for Sample A.

TABLE 9

ESTIMATED VALUES FOR THE PATROL EQUATION

DEPENDENT VARIABLE	INDEPENDENT VARIABLES		
PATROL	POLICE	TWOCOP	DENSITY
Beta	.24	-.25	-.08
F	19.04[c]	23.93[c]	2.41

a. Significant at the .05 level
b. Significant at the .01 level
c. Significant at the .001 level

Certainty of Apprehension

An important linkage in the model is that between police presence and clearance rates. If a high objective certainty of apprehension deters certain types of criminal behavior, then a theory of deterrent effects of police presence assumes that police presence is positively related to clearance rates. In proposing the deterrence model it was argued that police presence is theoretically crucial and that per capita patrol would provide a better measure of that variable than previously used measures such as police expenditures and numbers of police. Thus, it was expected that patrol would be positively related to the clearance rates of at least the more rational and visible offenses and that the police variable would generally have a weaker relation. This is a crucial path since any deterrent effect observed in the crime equations can only be attributed to police presence if the clearance rate is a positive function of police presence.

The findings in the equation for the clearance of combined index crimes were consistent with expectations. The Beta values for the patrol and police variables were modest positives with the patrol variable being slightly stronger. The measures for burglary, auto theft, rape, and both types of larceny follow the predicted pattern but their Beta values are very weak to negligible. The measure of crimes per patrol unit is negatively related to total

index crimes and burglary. This provides some support for the relevance of patrol to clearance rates, indicating that as patrol units have less crimes to respond to a larger portion of them are cleared.

Examination of the Beta values for the various types of crime in the clearance equations reveals modest support for the overload hypothesis for the combined index crimes and in the case of larceny under $50, robbery, rape, and auto theft. The interpretation of their negative Beta values is that as the frequency of an offense increases, the clearance rate for that offense decreases due to the increased police workload. It is surprising that the overload hypothesis is supported for offenses as serious as rape and robbery while not appearing for larceny of $50 and over. Theoretically, it would seem more probable that police would make the manpower reallocations necessary to maintain clearance rates for those crimes perceived as most serious by themselves and the public. The clearance equations are presented in Table 10.

Other variables in the clearance equation are the number of crimes per patrol unit and the regional variable northcentral. It was expected that clearance rates would be a negative function of crimes per patrol unit. Negative relations did result in seven of the nine equations, but it is a substantial Beta value only in the case of burglary.

Considerable regional variation was found for the clearance rates.

TABLE 10

ESTIMATED VALUES FOR THE CLEARANCE EQUATIONS

DEPENDENT VARIABLE	INDEPENDENT VARIABLES				
CLEAR	CRIME	PATROL	POLICE	CRPPU	NC
Beta	-.22	.12	.09	.02	.08
F	15.46[c]	4.66[c]	2.57[a]	.13	2.24[a]
CLROB	ROBBERY	PATROL	POLICE	CRPPU	NC
Beta	-.20	-.01	.06	-.02	-.10
F	2.69[a]	.03	.18	.14	2.59[a]
CLAT	AT	PATROL	POLICE	CRPPU	NC
Beta	-.09	.09	-.15	-.00	.05
F	.61	1.60	1.57	.01	.51
CLLARC	LARCENY	PATROL	POLICE	CRPPU	NC
Beta	-.02	.03	.00	-.05	.01
F	.09	.17	.00	.49	.01
CLLAR2	LARCENY2	PATROL	POLICE	CRPPU	NC
Beta	-.26	.07	-.02	-.04	.22
F	21.49[c]	1.19	.18	.40	13.35[c]
CLBURG	BURGLARY	PATROL	POLICE	CRPPU	NC
Beta	.11	.02	-.15	-.18	-.00
F	2.11	.12	4.16[c]	5.91[c]	.00
CLRAPE	RAPE	PATROL	POLICE	CRPPU	NC
Beta	-.16	.12	.13	-.03	.08
F	5.08[c]	2.45[a]	3.45[b]	.35	1.39

TABLE 10 (Continued)

DEPENDENT VARIABLE	INDEPENDENT VARIABLES				
CLASLT	ASSAULT	PATROL	POLICE	CRPPU	NC
Beta	-.05	-.02	.01	-.03	-.14
F	.56	.09	.02	.26	4.72[c]
CLMURDER	MURDER	PATROL	POLICE	CRPPU	NC
Beta	.08	-.07	-.15	.07	-.09
F	1.24	1.09	3.81[b]	1.33	2.19

a. Significant at the .05 level
b. Significant at the .01 level
c. Significant at the .001 level

Crime

Table 11 reports the estimated Beta values of the crime equation for each type of offense. The combined index crime rate is most strongly related to the percent of the population unemployed and the percent nonwhite. It is also negatively related to the clearance rate, thus providing support for the deterrence proposition. Contrary to what might be expected, the rate of index crimes is negatively related to the percent of the population with low education.

TABLE 11

ESTIMATED VALUES FOR THE CRIME EQUATIONS

DEPENDENT VARIABLE	INDEPENDENT VARIABLES					
CRIME	CLEAR	PERNW	POPU	PERLOED	PERUNEM	SOUTH
Beta	.25	.33	-.22	-.22	.41	-.03
F	.12	27.64[c]	.08	15.71[c]	48.48[c]	.20
ROBBERY	CLROB	PERNW	POPU	PERLOED	PERUNEM	SOUTH
Beta	-.02	.66	.26	-.02	.16	-.23
F	.10	143.77[c]	60.37[c]	.22	19.34[c]	24.31[c]
AT	CLAT	PERNW	POPU	PERLOED	PERUNEM	SOUTH
Beta	-.19	.32	.08	.09	.14	-.24
F	10.04[c]	28.97[c]	3.08[b]	2.28[a]	8.26[c]	11.44[c]
LARCENY	CLLARC	PERNW	POPU	PERLOED	PERUNEM	SOUTH
Beta	-.14	.00	.06	-.29	.27	.21
F	5.47[c]	.00	1.06	24.18[c]	23.48[c]	10.67[c]
LARCENY2	CLLAR2	PERNW	POPU	PERLOED	PERUNEM	SOUTH
Beta	-.27	.06	-.05	-.30	.27	.28
F	17.32[c]	1.24	1.06	26.83[c]	21.75[c]	18.61[c]
BURGLARY	CLBURG	PERNW	POPU	PERLOED	PERUNEM	SOUTH
Beta	-.11	.32	.06	-.06	.38	.06
F	3.73[b]	34.78[c]	1.58	1.31	63.39[c]	.68
RAPE	CLRAPE	PERNW	POPU	PERLOED	PERUNEM	SOUTH
Beta	-.10	.61	.09	-.16	.24	.01
F	4.31[c]	175.45[c]	5.01[c]	9.61[c]	30.29[c]	.04
ASSAULT	CLASLT	PERNW	POPU	PERLOED	PERUNEM	SOUTH
Beta	-.10	.47	.05	-.07	.19	.20
F	2.98[a]	75.19[c]	1.47	1.79	17.00[c]	10.83[c]

TABLE 11 (Continued)

DEPENDENT VARIABLE	INDEPENDENT VARIABLES					
MURDER	CLMURDER	PERNW	POPU	PERLOED	PERUNEM	SOUTH
Beta	-.02	.69	.10	.03	.02	.15
F	.15	288.58[c]	8.52[c]	.38	.31	9.75[c]

a. Significant at the .05 level
b. Significant at the .01 level
c. Significant at the .001 level

Turning to the robbery equation, percent nonwhite appears as the most important variable. The rate of reported robberies is also a positive function of population and percent unemployed and a negative function of the regional variable south. The most important finding in the robbery equation is the negligible Beta value of the robbery clearance rate. On the basis of the Geerken-Gove thesis, a much stronger negative Beta value was expected. However, examination of the intercorrelations of some key variables in the equation raises some suspicions that warrant further exploration. The simple correlation between the predicted robbery clearance rate generated in the first round of the 2SLS regression (CLROBY) and the reported rate of robbery is quite strong (-.48). Percent nonwhite (PERNW) has a strong positive correlation (.65) with robbery as its Beta value in the equation suggests. However, CLROBY has a much higher

correlation with PERNW than with the actual clearance rate of which it is supposed to be a linear function. There is no apparent reason of theoretical importance for the high correlation between CLROBY and PERNW but the result may be a deflation of the relationship between CLROBY and ROBBERY in the structural equation. That is, the strong negative relationship between CLROBY and PERNW might have the effect of attenuating the relationship between CLROBY and ROBBERY. Since the predicted values of endogenous variables generated in the first round of the 2SLS regressions were not included in Table 7, the variable CLROBY is presented below in a correlation matrix with the other variables relevant to the present issue (Table 12).

TABLE 12

CORRELATIONS OF KEY VARIABLES IN THE ROBBERY EQUATION

	CLROB	CLROBY	ROBBERY	PERNW
CLROB	1.0			
CLROBY	.25	1.0		
ROBBERY	-.27	-.48	1.0	
PERNW	-.15	-.65	.65	1.0

The robbery equation was further explored by reestimating the Beta values with an OLS regression. This

required that the value of CLROB be substituted in the equation for that of CLROBY which is spuriously correlated with the percent nonwhite. Table 13 compares the results as calculated through the two different techniques. There are no appreciable changes in any Beta values other than that of the clearance variables for which a considerably stronger negative value results in the OLS regression. The equation was also estimated by OLS for all other crime types and resulted in no appreciable change in any of the Beta values. Thus the OLS regressions support the suspicion that PERNW suppresses the true relationship between robbery and its clearance rate when 2SLS is used as the estimating technique.

TABLE 13

COMPARISON OF ORDINARY AND TWO STAGE LEAST SQUARES FOR THE ROBBERY EQUATION

		CLROB(Y)	PERNW	POPU	PERLOED	PERUNEM	SOUTH
2SLS	Beta	-.02	.66	.26	-.02	.16	-.23
	F	.10	143.77[c]	60.37[c]	.22	19.34[c]	24.31[c]
OLS	Beta	-.16	.64	.26	-.00	.17	-.22
	F	24.21[c]	261.59[c]	64.55[c]	.01	23.84[c]	30.20[c]

a. Significant at the .05 level
b. Significant at the .01 level
c. Significant at the .001 level

Both types of larceny are a negative function of their clearance rates as was predicted on the premise offered by Geerken and Gove. In the clearance equations these two clearance rates were a positive, but negligible function of patrol. Thus while it might be concluded that certainty of apprehension has a deterrent impact on the offense of larceny, police presence is of negligible importance in apprehension and therefore in the deterrence of that crime. Focusing on other variables in the larceny equations shows both types to covary negatively with the percent of the population having low education and positively with south and percent unemployed.

The auto theft equation is consistent with the deterrence hypothesis as predicted. Since the auto theft clearance rate is also a positive function of patrol there is at least a minimal fit at both of these crucial points in the model. Further examination of the Beta estimates in the equation reveal that auto theft is a positive function of percent nonwhite, percent unemployed, percent with low education, and population. The negative Beta value for south indicates that less auto thefts occur in that region even after controlling for the other variables in the equation.

Burglary is also negatively related to its clearance rate although the value of Beta is weak and the relationship between the burglary clearance rate and per

capita patrol was negligible. Thus while there is some evidence of a deterrent effect, a conclusion that police patrol has a deterrent effect on burglary is not warranted. It is also clear that percent unemployed and percent nonwhite are far more important factors in the burglary equation than the clearance rate.

Rape fits the deterrence hypothesis, but again showing a weak negative Beta value. Its clearance rate was also found to be a positive function of patrol, thus providing a marginal but consistent fit at the two key deterrence junctures in the model. It is apparent that percent nonwhite is the most important determinant of rape, followed by percent unemployed. Population also shows a modest positive relation while the percent with low education has a moderate negative value.

Based on the Geerken-Gove theme it was predicted that assault and murder would be unrelated (or positively related) to their clearance rates. This prediction is substantiated in the murder equation by the negligible negative Beta (-.02). However, the Beta value for assault is a low negative. In both cases clearance rates are negatively related to patrol. Thus while there is some evidence of deterrence in the case of assault, it cannot be attributed to patrol. For both assault and murder the percent of the population that is nonwhite is clearly the most important variable. The second ranking

variable of importance in both equations is the regional variable south.

Summary

The analysis of Sample A was presented in this chapter. Per capita police was generally found to be a function of rates of crime. This was particularly true for the offenses of murder, rape, robbery, and auto theft, all of which caused more variation in per capita police than did the amount of city revenue collected. This is an important finding since many previous studies have not considered the simultaneous nature of the relationship between crime and the police. It supports the argument presented in postulating the model that high crime rates generate citizen demand for more police. It is also important to note that it is violent crimes which have the greatest impact on this demand with the major exception of auto theft.

Per capita police patrol was found to be a positive function of per capita police and a negative function of the proportion of patrol units with two officers. This finding was expected but the results of the clearance equations generally did not coincide with the predictions the model supports. Although the clearance rates of burglary, auto theft, rape, and both measures of larceny were positively related to per capita patrol, the

low Beta values indicate that patrol is not a very important determinant of clearance rates.

Modest support was found for the overload hypothesis in the cases of larceny under $50, robbery, rape, and auto theft. Some support was found for the deterrence hypothesis with both types of larceny, auto theft, burglary, rape, and assault. It was also found that robbery is a negative function of the robbery clearance rate, although this was suppressed in the initial analysis due to a spurious correlation between the percent of the population nonwhite and the clearance variable in that equation. While these findings may support some version of a deterrence theory, only in the cases of rape, auto theft, and larceny under $50 did the data fit both of the crucial deterrence paths in the model. It was pointed out however, that certainty of apprehension must be a positive function of patrol if the deterrent effects identified are a product of police presence. In conclusion then, the analysis of Sample A substantiates a deterrent effect of police presence only for the offenses of rape, auto theft, and larceny under $50.

CHAPTER VI

ANALYSIS OF SAMPLE B

The results of the analysis of Sample B are presented in the format followed in the preceding chapter. The equations should be interpreted in the same manner since they are similar, but estimated with different data. This analysis uses a subsample of the total population of the study. It serves the function of testing the model with a population that is distinct from the total population in several ways; the cities in this sample are all large, have above average crime rates, greater revenue, greater police resources per capita, and are characterized by more of the social conditions that ecological research has traditionally found to be associated with crime. Secondly, the analysis of Sample B serves as a check on the validity of the official measures of crime (the Uniform Crime Reports) since it includes the victimization survey measures. Finally, this sample facilitates the expansion of the model to include a measure of the perception of police presence.

A correlation matrix of all the variables in Sample B is presented in Table 14. As in the analysis of Sample A, the original values of the variables were utilized in calculating the matrix.

TABLE 14
SIMPLE CORRELATIONS FOR ALL VARIABLES EMPLOYED IN THE ANALYSIS OF SAMPLE B

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1																																									
2	-.64																																								
3	.49	-.24																																							
4	.45	.44	.18																																						
5	-.25	.39	-.08	-.36																																					
6	.25	-.34	.20	.91	-.19																																				
7	.24	-.18	.09	.19	.08	-.02																																			
8	-.25	.56	-.02	-.34	.73	-.21	-.36																																		
9	.20	.09	.67	.28	.22	.34	.40	.12																																	
10	-.49	.85	-.10	-.42	.63	-.29	-.24	.81	.13																																
11	-.27	.10	-.07	-.30	-.13	-.38	.63	-.47	.08	-.09																															
12	.12	.27	.02	.07	.60	.10	-.27	.72	.08	.46	-.72																														
13	-.05	.09	-.12	-.09	.50	-.19	.75	.11	.24	.16	.33	.15																													
14	-.27	.29	.39	-.10	.02	.07	-.15	.30	.48	.35	.06	-.01	-.24																												
15	-.05	.43	.26	-.10	.48	.06	-.31	.83	.41	.65	-.51	.67	-.03	.63																											
16	-.61	.38	-.14	-.08	.28	.17	.07	.14	.39	.34	.29	-.17	.15	.51	.21																										
17	.56	-.07	.65	.21	-.02	.04	.18	.12	.38	.06	-.26	.37	.15	-.08	.23	-.51																									
18	-.45	.43	-.31	-.12	.23	-.04	-.34	.33	-.20	.47	-.32	.34	.11	-.13	.20	.05	-.10																								
19	.55	-.31	.11	.04	.06	-.19	.44	-.00	-.10	-.23	-.01	.12	.32	-.29	-.04	-.58	.50	-.17																							
20	-.36	.55	-.21	-.33	.11	-.29	-.02	.29	-.06	.62	.24	-.02	.08	.33	.30	.31	.05	.15	-.15																						
21	-.64	.25	-.22	-.04	.28	.25	.02	.14	.36	.25	.18	-.13	.14	.44	.19	.88	-.55	.13	-.59	.14																				
22	.42	-.30	-.06	.40	-.06	.23	.37	.00	.20	-.20	-.18	.18	.34	-.09	.08	-.09	.36	-.18	.33	-.17	-.06																				
23	-.35	.61	-.02	-.33	.31	-.25	-.17	.41	-.05	.74	.01	.31	.13	.05	.29	.02	.19	.59	-.05	.56	-.04	-.17																			
24	-.32	.13	.14	.02	-.13	.17	.20	-.06	.43	.01	.26	-.26	.19	.62	.24	.64	-.24	-.09	-.41	.15	.64	.01	-.24																		
25	.30	-.14	.49	.18	-.16	-.01	.87	-.18	.52	-.20	.39	-.06	.59	-.02	-.04	.07	.23	-.38	.45	-.07	.05	.41	-.28	-.32																	
26	-.44	.51	-.41	-.39	.49	-.31	-.33	.56	-.20	.58	-.15	.39	.09	-.13	.11	.20	-.24	.33	-.27	.14	.24	-.11	.24	-.25	-.37															
27	.24	.12	.59	.24	.27	.20	.48	.15	.98	.16	.10	.11	.33	.41	.40	.30	.43	-.18	.01	-.05	.28	.27	-.03	.34	.62	-.15															
28	.62	-.34	.20	.15	-.07	.10	-.26	.07	-.16	-.10	-.43	.28	-.24	-.28	.02	-.53	.37	-.24	.20	-.19	-.53	.36	.08	-.54	-.30	.01	-.14													
29	.06	.09	.15	-.23	.41	-.12	-.39	.48	-.12	.41	-.37	.52	-.10	-.16	.28	-.20	.18	.22	.04	.03	-.19	-.04	.58	-.54	-.39	.30	-.13	.58												
30	-.13	.12	.07	.04	-.12	-.04	.21	-.23	.13	-.21	.21	-.27	.00	.17	-.06	.07	-.05	.01	.09	.03	.00	-.10	-.21	.17	.34	-.43	.15	-.57	-.40											
31	.52	-.33	.13	-.01	-.04	-.09	-.08	-.05	-.14	-.33	-.09	-.04	-.22	-.25	-.17	-.38	.17	-.55	.20	-.24	-.42	.30	-.21	-.62	-.11	.07	-.13	.75	.29	-.28										
32	.02	-.03	-.15	-.16	-.09	-.14	.20	-.20	-.22	-.18	.40	-.24	.14	-.46	-.40	.14	-.33	-.21	-.12	-.21	.09	-.04	-.07	.10	.04	-.09	-.25	.02	.09	-.25	.23									
33	.32	-.56	.07	.48	-.71	.44	.09	-.62	-.03	-.65	.05	-.45	-.26	.13	-.32	-.07	-.08	-.43	-.07	-.14	-.00	.30	-.42	.31	.06	-.57	-.09	.18	-.41	-.02	.11	-.06								
34	.63	-.41	.18	.23	-.21	.15	-.27	-.02	-.26	-.39	-.36	.20	-.36	-.41	-.10	-.54	.11	-.33	.22	-.44	-.52	.09	-.25	-.42	-.17	-.14	-.27	.66	.33	-.29	.67	.34	.17							
35	.58	-.11	.51	.02	-.01	-.14	.09	.10	.23	-.05	-.19	.22	-.13	-.08	.15	-.53	.84	-.08	.32	-.03	-.56	.36	.29	-.32	.05	-.09	.30	.62	.40	-.25	.38	-.05	-.10	.20						
36	-.14	-.09	-.06	-.01	-.10	-.03	.33	-.28	.16	-.13	.48	-.36	.27	-.35	-.04	.28	-.34	-.19	-.07	.09	.30	-.04	-.06	.57	.35	-.34	.14	-.38	-.37	.19	-.23	.21	.62	-.19	-.38					
37	.26	-.19	.07	.25	-.29	.24	-.41	-.13	-.13	-.25	-.33	.05	-.63	-.15	-.11	-.31	-.22	-.08	-.08	-.49	-.26	-.00	-.17	-.47	-.20	-.05	-.13	.34	.27	-.13	.31	-.00	.13	.64	-.09	-.27				
38	-.05	.17	.31	-.38	.07	-.46	.03	.18	.06	.24	.14	-.03	.11	.20	.14	-.17	.49	.14	.40	.20	-.35	.01	.30	-.14	-.04	-.10	.01	.02	.14	.35	.04	-.45	-.26	-.31	.41	-.22	-.30			
39	.06	-.15	-.03	.23	.00	.31	-.01	.08	.12	.10	-.23	.24	.14	.08	.17	.00	.08	.00	-.22	.01	.25	.10	-.09	.31	-.01	.03	.12	.06	-.20	-.26	-.18	.06	.30	.07	.03	.26	-.36	-.39		
40	-.19	.32	-.18	-.21	-.08	-.17	.04	-.11	-.06	.18	.26	-.25	.06	-.22	-.20	.40	-.20	.16	-.17	.32	.17	.10	.05	.11	-.05	.18	-.09	-.34	.13	.03	-.21	.34	-.29	-.29	.14	.09	-.22	-.04	-.22	
41	.21	-.09	.05	-.12	-.06	-.09	-.39	.12	-.29	-.13	-.39	.22	-.29	-.17	.08	-.29	-.03	-.22	.04	-.08	-.35	.12	-.30	-.24	-.21	.01	-.29	.26	.08	.02	.36	.24	-.06	.67	.07	.15	-.27	-.19	-.01	.08

ROBBERY	1	CLEAR	8	CLTOTLAR	15	RAPE	22	PATROL	29	CRPPU	36
CLROB	2	VCRIME	9	VTHEFT	16	CLRAPE	23	PERCEP	30	NORTH	37
TVROB	3	CLVCRIME	10	MURDER	17	VRAPE	24	CITYREV	31	SOUTH	38
AT	4	LARCENY	11	CLMURDER	18	BURGLARY	25	SALARY	32	NC	39
CLAT	5	CLLARC	12	ASSAULT	19	CLBURG	26	TWOCOP	33	FERM	40
VAT	6	LARCENY8	13	CLASLT	20	TVBURG	27	DENSITY	34	POPU	41
CRIME	7	CLLAR8	14	VASLT	21	POLICE	28	PERNW	35		

Police

Table 15 gives the results of the police equation for the various crime types. City revenue is the most important variable affecting per capita police, showing a positive relation. The number of police also increases in response to increased rates of murder, robbery as measured officially or by survey, and auto theft as measured either way. The official and survey data are inconsistent with regard to the impact of assault, rape, and burglary on per capita police. Note however, that in the cases of robbery and auto theft the official measures

show a stronger relation and in cases of assault and rape it is the official measure which is positively related to police. This can be interpreted as supporting the proposition that increased crime produces citizen demand for more police since citizens should be more aware of the officially publicized rate of crime than of the underlying true rate. Citizens simply cannot be aroused by the occurrence of crime unless it is brought to public attention and therefore demands for more police will not be made.

The findings of this analysis, like those of Sample A, contradict Swimmer's (1974a; 1974b) conclusion that demand for police is a result of rates of property crime and not of violent crime. The crimes which generate the greatest demand for more police appear to be murder, rape, robbery, and auto theft. All measures of larceny are negatively related to per capita police. As for other variables in the equation, salary has a slight negative effect on the ratio of sworn police personnel to citizens while that ratio is somewhat larger in the northeast even after controlling for salary and city revenue.

Police Presence

The most important variable affecting police presence is the proportion of patrol units consisting of two officers. For every unit increase in the proportion of patrol units with two police officers, there is a

TABLE 15

ESTIMATED VALUES FOR THE POLICE EQUATIONS

DEPENDENT VARIABLE	INDEPENDENT VARIABLES			
POLICE	CRIME	CITYREV	SALARY	NORTHEAST
Beta	-.12	.69	-.11	.10
F	.47	18.10[c]	.47	.30
POLICE	VCRIME	CITYREV	SALARY	NORTHEAST
Beta	.06	.68	-.11	.17
F	.12	17.47[c]	.46	1.07
POLICE	ROBBERY	CITYREV	SALARY	NORTHEAST
Beta	.42	.45	-.09	.09
F	6.71[b]	7.26[c]	.42	.39
POLICE	TVROB	CITYREV	SALARY	NORTHEAST
Beta	.35	.58	-.02	.14
F	5.68[b]	15.08[c]	.03	1.02
POLICE	AT	CITYREV	SALARY	NORTHEAST
Beta	.28	.69	-.08	.06
F	3.17[a]	20.48[c]	.30	.12
POLICE	VAT	CITYREV	SALARY	NORTHEAST
Beta	.22	.72	-.10	.07
F	1.89	20.54[c]	.46	.17
POLICE	LARCENY	CITYREV	SALARY	NORTHEAST
Beta	-.43	.70	.06	-.01
F	6.77[b]	23.45[c]	.13	.00
POLICE	LARCENY2	CITYREV	SALARY	NORTHEAST
Beta	-.07	.67	-.12	.11
F	.09	17.01[c]	.61	.25

TABLE 15 (Continued)

DEPENDENT VARIABLE	INDEPENDENT VARIABLES			
POLICE	VTHEFT	CITYREV	SALARY	NORTHEAST
Beta	-.49	.54	-.03	-.01
F	11.76[c]	15.76[c]	.05	.00
POLICE	BURGLARY	CITYREV	SALARY	NORTHEAST
Beta	-.10	.68	-.13	.13
F	.40	17.58[c]	.74	.62
POLICE	TVBURG	CITYREV	SALARY	NORTHEAST
Beta	.06	.68	-.11	.17
F	.14	17.42[c]	.44	1.07
POLICE	RAPE	CITYREV	SALARY	NORTHEAST
Beta	.20	.57	-.10	.21
F	1.37	9.43[c]	.42	1.75
POLICE	VRAPE	CITYREV	SALARY	NORTHEAST
Beta	-.28	.54	-.07	.03
F	1.75	8.53[c]	.19	.03
POLICE	ASSAULT	CITYREV	SALARY	NORTHEAST
Beta	.09	.65	-.00	.17
F	.29	14.40[c]	.49	1.13
POLICE	VASLT	CITYREV	SALARY	NORTHEAST
Beta	-.36	.54	-.07	.07
F	5.12[b]	12.01[c]	.23	.25
POLICE	MURDER	CITYREV	SALARY	NORTHEAST
Beta	.47	.53	.07	.27
F	10.88[c]	14.15[c]	.25	4.18[a]

a. Significant at the .05 level
b. Significant at the .01 level
c. Significant at the .001 level

.51 unit decrease in per capita patrol units. As the model hypothesizes, patrol is positively related to police per capita with a Beta value of .42. Population density has a slight positive relation to patrol. These relationships are shown in Table 16.

TABLE 16

ESTIMATED VALUES FOR THE PATROL EQUATION

DEPENDENT VARIABLE	INDEPENDENT VARIABLES		
PATROL	POLICE	TWOCOP	DENSITY
Beta	.42	-.51	.10
F	2.71	8.60[c]	.17

a. Significant at the .05 level
b. Significant at the .01 level
c. Significant at the .001 level

Perception of Police Presence

Table 17 shows that the regional variable south has the greatest impact on perception of police presence. Southerners more frequently responded that more police are needed than did non-southerners. The percent of nonwhite residents consistently appears as the variable in the equation with the next largest Beta value. The negative sign indicates that as the percent of nonwhite residents increases, the proportion who perceive a need for more police declines. The direction of the Beta for

the patrol variable in the equation is negative as the model postulates, but with low values. The weakness of these Beta values relative to the exogenous variables of percent nonwhite and south raises some question about the validity of the perception variable. It should be viewed with caution since it may reflect the attitudes of various sub-populations toward the police more than their perceptions of police presence. Thus, southern residents might respond high on perception of police presence even in cities where per capita police patrol is very high. Likewise, nonwhite citizens might score low on the perception variable even if residing where per capita police patrol is low. In sum, the indicator appears to be a relatively weak measure of perception of police presence due to confounding with other variables.

The various categories of clearance rates have no consistent effect on perception. This variable was included in the model since it is logically defensible, but it is not surprising that it does not fit empirically. It suggests that citizens in general do not have accurate perceptions of the objective certainty of punishment. Population density is also shown to be unimportant to the perception of police presence.

Certainty of Apprehension

The most consistent finding in the clearance equations is that clearance rates are positively related

TABLE 17

ESTIMATED VALUES FOR THE PERCEPTION OF POLICE PRESENCE EQUATIONS

DEPENDENT VARIABLE	INDEPENDENT VARIABLES				
PERCEP	PATROL	CLEAR	PERNW	SOUTH	DENSITY
Beta	-.32	-.10	-.30	.56	.05
F	1.66	.19	1.70	5.83[b]	.04
PERCEP	PATROL	CLVCRIME	PERNW	SOUTH	DENSITY
Beta	-.17	-.03	-.33	.54	.02
F	.26	.01	1.56	5.01[b]	.00
PERCEP	PATROL	CLROB	PERNW	SOUTH	DENSITY
Beta	-.14	-.07	-.35	.53	-.02
F	.16	.05	1.48	4.79[b]	.00
PERCEP	PATROL	CLAT	PERNW	SOUTH	DENSITY
Beta	-.20	.01	-.32	.54	.04
F	.34	.00	1.40	4.92[b]	.02
PERCEP	PATROL	CLLARC	PERNW	SOUTH	DENSITY
Beta	-.26	.13	-.34	.56	.05
F	.81	.32	1.82	5.41[b]	.04
PERCEP	PATROL	CLLAR2	PERNW	SOUTH	DENSITY
Beta	-.16	.14	-.31	.50	.08
F	.36	.35	1.55	4.12[b]	.10
PERCEP	PATROL	CLTOTLAR	PERNW	SOUTH	DENSITY
Beta	-.23	.15	-.33	.53	.07
F	.76	.53	1.78	4.91[b]	.08
PERCEP	PATROL	CLBURG	PERNW	SOUTH	DENSITY
Beta	.00	-.24	-.42	.46	-.10
F	.00	.93	2.45	3.35[a]	.12

TABLE 17 (Continued)

DEPENDENT VARIABLE	INDEPENDENT VARIABLES				
PERCEP	PATROL	CLRAPE	PERNW	SOUTH	DENSITY
Beta	-.24	.06	-.32	.53	.08
F	.40	.03	1.62	4.39[b]	.05
PERCEP	PATROL	CLASLT	PERNW	SOUTH	DENSITY
Beta	-.20	-.00	-.32	.54	.17
F	.49	.00	1.57	4.49[b]	.02
PERCEP	PATROL	CLMURDER	PERNW	SOUTH	DENSITY
Beta	-.17	-.04	-.33	.53	.01
F	.26	.02	1.53	5.03[b]	.00

a. Significant at the .05 level
b. Significant at the .01 level
c. Significant at the .001 level

to per capita sworn police personnel. The positive relation between patrol and clearance rates is an important finding since it provides a fundamental link in the model. Without demonstrating such a linkage between police presence (patrol) and certainty of apprehension (clearance rates), any deterrent effect that might be signified by a negative relationship between crime and clearance rates could not be attributed to police presence. The fact that there are substantial negative Beta values for the variable of crimes per patrol unit lends further support to the value of patrol operations in achieving clearances.

Thus support for this crucial portion of the model is quite strong, in contrast to the findings with Sample A.

Although a finding of no relationship would not be surprising, the consistent strong negative relationship between per capita police and clearance rates is. The model proposed a positive relationship since it is logical to test the hypothesis that police assigned to functions other than patrol have a deterrent effect, although there is limited theoretical and empirical support for such a proposition. Reasons for the strong negative relation can only be speculated. However, the fact that opposite findings result, depending on whether the police or the patrol variable is used reinforces the caution extended in the literature review that numbers of police is an inadequate measure for operationalizing police presence.

Clearance rates are generally seen not to be a function of crime rates. That is, the data do not support the overload hypothesis postulated in the model. Notable exceptions are for larceny over $50 as measured by the Uniform Crime Reports and larceny as measured by the victimization surveys. Since larceny is probably perceived as the least serious of the offenses being analyzed, it would seem logically consistent that the police would not reallocate resources to maintain a given clearance rate as the quantity of larcenies increase.

Table 18 presents the estimated values for the clearance equations.

TABLE 18

ESTIMATED VALUES FOR THE CLEARANCE EQUATIONS

DEPENDENT VARIABLE	INDEPENDENT VARIABLES				
CLEAR	CRIME	PATROL	POLICE	CRPPU	NC
Beta	-.11	.63	-.41	-.23	.32
F	.28	6.22[b]	3.04[a]	.92	2.18
CLVCRIME	VCRIME	PATROL	POLICE	CRPPU	NC
Beta	.34	.52	-.79	-.37	.32
F	4.04[a]	5.28[b]	13.82[c]	3.24[a]	3.33[a]
CLROB	ROBBERY	PATROL	POLICE	CRPPU	NC
Beta	-.15	.32	-.66	-.26	.24
F	.21	2.09	2.63	1.16	1.20
CLROB	TVROB	PATROL	POLICE	CRPPU	NC
Beta	.08	.38	-.84	-.32	.28
F	.11	2.14	9.60[c]	1.89	1.92
CLAT	AT	PATROL	POLICE	CRPPU	NC
Beta	-.16	.66	-.64	-.13	.38
F	.53	6.05[b]	5.53[b]	.36	3.87[a]
CLAT	VAT	PATROL	POLICE	CRPPU	NC
Beta	-.16	.65	-.67	-.14	.41
F	.55	5.82[b]	7.16[c]	.45	4.29[b]
CLLARC	LARCENY	PATROL	POLICE	CRPPU	NC
Beta	-.73	.65	-.41	.19	.14
F	13.34[c]	11.44[c]	4.85[b]	.79	.69

TABLE 18 (Continued)

DEPENDENT VARIABLE	INDEPENDENT VARIABLES				
CLLAR2	LARCENY2	PATROL	POLICE	CRPPU	NC
Beta	-.17	.01	-.27	.27	.10
F	.46	.00	.74	.96	.16
CLTOTLAR	VTHEFT	PATROL	POLICE	CRPPU	NC
Beta	-.55	.26	-.67	-.07	.27
F	3.00[a]	.79	4.12[a]	.08	1.43
CLBURG	BURGLARY	PATROL	POLICE	CRPPU	NC
Beta	-.01	.35	-.57	-.52	.45
F	.00	1.85	5.44[b]	3.67[a]	4.19[a]
CLBURG	TVBURG	PATROL	POLICE	CRPPU	NC
Beta	.18	.28	-.55	-.58	.43
F	.90	1.17	5.30[b]	6.49[b]	4.55[b]
CLRAPE	RAPE	PATROL	POLICE	CRPPU	NC
Beta	-.01	.72	-.47	.09	.11
F	.00	5.30[b]	1.78	.14	.21
CLRAPE	VRAPE	PATROL	POLICE	CRPPU	NC
Beta	.51	.97	-.36	-.10	.05
F	.74	6.21[b]	1.52	.10	.04
CLASLT	ASSAULT	PATROL	POLICE	CRPPU	NC
Beta	.15	-.12	-.42	-.19	.20
F	.33	16	2.03	.51	.58
CLASLT	VASLT	PATROL	POLICE	CRPPU	NC
Beta	-.34	-.13	-.58	-.14	.24
F	1.09	.19	2.89[a]	.29	.89

TABLE 18 (Continued)

DEPENDENT VARIABLES	INDEPENDENT VARIABLES				
CLMURDER	MURDER	PATROL	POLICE	CRPPU	NC
Beta	.14	.51	-.87	-.35	.40
F	.44	4.55[b]	13.00[c]	2.77[a]	4.58[b]

a. Significant at the .05 level
b. Significant at the .01 level
c. Significant at the .001 level

Crime

The results of the crime equations are displayed in Table 19. When all index crimes are combined there is slight support for the deterrence paths representing both the objective and perceived certainty of punishment (or apprehension). However, when the victimization measures of crime are used the relationship between crime and clearance rates reverses direction and the relationship between perception of police presence and crime virtually disappears. No conclusions beyond the need for a crime-specific analysis can be drawn from this.

The robbery clearance rate is strongly and negatively related to robbery as measured by the Uniform Crime Reports. Using the robbery victimization data the estimated Beta is in the same direction but is a negligible value. The perception variable is also in the

predicted direction for the victimization robbery equation, but has a slight negative value for the equation employing the Uniform Crime Report data. Given that the linkage between patrol and robbery clearance rates was supported by the clearance equations, it can be concluded that the analysis of Sample B generally provides support for the major deterrence paths in the model. However, much stronger support is found where the official crime measure is used and where the objective rather than the perceived measure of certainty of punishment is used. As for other variables in the robbery equations, the percent nonwhite has a strong positive impact whether robbery is measured officially or by survey. Estimates of the Beta values for other variables in the equation are inconsistent.

Auto theft, whether measured officially or by survey, is negatively related to auto theft clearance rates. The auto theft clearance rate in turn was seen to be a positive function of per capita patrol units. The Beta values for the perception variable are opposite of the model's prediction. However, this is due to the validity problem of the perception variable. Since perception has a high positive correlation with the regional variable south (.32) which is negatively related to auto theft as measured in the Uniform Crime Reports (-.35) and as measured in the victimization surveys (-.44),

a spurious negative relationship between perception and auto theft results.

The results of the auto theft equations are highly consistent between the official and unofficial measures. The exogenous variables of percent nonwhite, percent male, and population are all negatively related to auto theft in both cases. Thus the crime of auto theft does not appear to be a product of the variables traditionally identified in ecological research.

All of the measures of larceny employed are a negative function of their clearance rates. However, only the Beta for the officially measured larceny of $50 or greater is substantial. The perception measure is in the direction predicted by the model in two of the three equations, but with little magnitude. In the equation for all larcenies as measured by the victimization surveys it has a negligible value. Again, it should be recalled that all of the larceny clearance rates were a positive function of patrol with the greatest impact being on larcenies of $50 or greater. Thus with the officially measured larceny of $50 or greater, the paths representing the objective certainty of punishment fit very well. However, the Beta values are too weak to support that conclusion for the perceptual measure of certainty of punishment or for the other measures of larceny. The findings with the perception variable may be due to its weakness. The

findings with the other larceny indicators however, suggests that only the theft of more valuable items may be deterrable.

The other variables in the equation show all types of larceny to be a negative function of population and positively related to the percent male. The official and unofficial measures disagree as to the effect of the percent of the population nonwhite on larceny. Both official measures indicate that it is a low positive relationship while the unofficial measure reveals a strong negative relation.

The clearance rate for burglary has only a modest negative relation to the reported rate of burglary while its relation as measured in the victimization surveys is positive. The perception variable does have positive but weak Beta values, consistent with the predictions of the model. However, considering the weakness and inconsistency of the Beta values little support for the deterrence hypothesis is evident. Other variables in the equation show that burglary is a positive function of the percent nonwhite and a negative function of population.

The rate of rape is a negative function of the clearance rate for rape whether measured officially or by survey. It is also a positive function of the perception of police presence in both equations as the model predicts. Therefore, since the clearance rate for rape was a positive

function of patrol, the model fits the crime of rape very consistently. The only inconsistency observed in the analysis of rape is that the official rate has a strong positive relation to the percent nonwhite, while it is actually a slight negative relation when the victimization measure is used.

Entirely different results are obtained with the assault equation depending on which measures are used. The Beta values are strongly in the direction predicted by the model when the official measure is used but in the opposite direction when the survey measure is used. All of the exogenous variables result in Beta values in opposite directions as well. These opposing findings could be due to an actual underlying difference in the fit of the two variables to the model since they are somewhat different variables. The official measure includes only aggravated assaults, while the unofficial measure is for all assaults. On the other hand, the differences could reflect a validity problem with the official data.

The most important variable in the murder equation is clearly the percent nonwhite. As predicted on the basis of the Geerken and Gove (1977) thesis, the clearance rate for murder is not negatively related to the rate of murder. To the contrary, the perception variable is positively related to the murder rate. However, this is

misleading due to the confounding variable south. The relationship is a result of the strong positive correlation between perception and south (.32) and between murder and south (.49).

TABLE 19

ESTIMATED VALUES FOR THE CRIME EQUATIONS

DEPENDENT VARIABLE	INDEPENDENT VARIABLES				
CRIME	CLEAR	PERCEP	PERNW	PERM	POPU
Beta	-.28	.24	.20	.05	-.31
F	2.19	1.50	1.04	.07	2.73[a]
VCRIME	CLVCRIME	PERCEP	PERNW	PERM	POPU
Beta	.27	.02	.23	-.06	-.23
F	1.62	.01	1.12	.09	1.25
ROBBERY	CLROB	PERCEP	PERNW	PERM	POPU
Beta	-.54	-.08	.47	.10	.17
F	12.72[c]	.32	11.23[c]	.46	1.57
TVROB	CLROB	PERCEP	PERNW	PERM	POPU
Beta	-.06	.22	.57	-.06	.09
F	.08	1.25	8.49[c]	.08	.22
AT	CLAT	PERCEP	PERNW	PERM	POPU
Beta	-.38	-.32	-.12	-.27	-.15
F	3.88[a]	2.59	.32	1.95	.59
VAT	CLAT	PERCEP	PERNW	PERM	POPU
Beta	-.32	-.37	-.29	-.26	-.13
F	2.76[a]	3.26[a]	1.98	1.71	.45

TABLE 19 (Continued)

DEPENDENT VARIABLE	INDEPENDENT VARIABLES				
LARCENY	CLLARC	PERCEP	PERNW	PERM	POPU
Beta	-.56	.08	.04	.12	-.25
F	9.33[c]	.24	.04	.52	2.21
LARCENY2	CLLAR2	PERCEP	PERNW	PERM	POPU
Beta	-.13	.25	.21	.09	-.30
F	.22	.88	.94	.16	2.01
VTHEFT	CLTOTLAR	PERCEP	PERNW	PERM	POPU
Beta	-.02	-.03	-.49	.33	-.33
F	.01	.02	7.49[c]	3.98[a]	4.20[b]
BURGLARY	CLBURG	PERCEP	PERNW	PERM	POPU
Beta	-.20	.14	.11	.02	-.20
F	.69	.34	.23	.01	.95
TVBURG	CLBURG	PERCEP	PERNW	PERM	POPU
Beta	.29	.20	.40	-.05	-.26
F	1.69	.76	3.36[a]	.07	1.81
RAPE	CLRAPE	PERCEP	PERNW	PERM	POPU
Beta	-.72	.12	.70	.00	-.37
F	11.48[c]	.42	11.49[c]	.00	4.16[b]
VRAPE	CLRAPE	PERCEP	PERNW	PERM	POPU
Beta	-.28	.23	-.12	.14	-.36
F	1.16	1.09	.24	.46	2.66
ASSAULT	CLASLT	PERCEP	PERNW	PERM	POPU
Beta	-.43	.62	.58	.14	.04
F	2.78[a]	7.04[c]	8.33[c]	.38	.05
VASLT	CLASLT	PERCEP	PERNW	PERM	POPU
Beta	.39	-.45	-.77	-.13	-.36
F	3.98[a]	6.24[b]	24.97[c]	.53	6.83[c]

TABLE 19 (Continued)

DEPENDENT VARIABLE	INDEPENDENT VARIABLES				
MURDER	CLMURDER	PERCEP	PERNW	PERM	POPU
Beta	.11	.23	.92	-.07	.07
F	.97	4.25[b]	65.06[c]	.35	.36

a. Significant at the .05 level
b. Significant at the .01 level
c. Significant at the .001 level

Summary

This chapter presented the findings resulting from the analysis of Sample B. It showed per capita police to be a positive function of murder, rape, robbery, and auto theft. This is an important finding which is highly consistent with those of the analysis of Sample A.

Per capita police patrol was found to be a negative function of the proportion of patrol units with two officers and a positive function of per capita police. This coincides with the findings of Sample A as well, but the Beta values were somewhat larger for Sample B.

Estimation of the perception equation suggested that it may be confounded with the variables south and percent nonwhite. This was substantiated later in the analysis where a spurious relation was generated in the auto theft equation due to its negative correlation with

south and for the murder equation due to its positive correlation with south.

An important finding is that clearance rates are a strong positive function of per capita patrol, but a negative function of per capita police when introduced after the patrol variable. This supports the assertion that numbers of police is an inadequate measure for testing a model of the deterrent effect of police presence. It also provides support for the crucial hypothesis that police patrol (or visibility) leads to higher clearance rates, which in turn are used as an indicator of certainty of punishment in deterrence research.

Support was found for the overload hypothesis only for larceny as measured in the victimization surveys and for larceny $50 and over as measured in the Uniform Crime Reports. Evidence of a deterrent effect was found for the offenses of robbery, auto theft, larceny of $50 and over, and rape. However, the findings with official and survey data were consistent only in the cases of auto theft and rape with stronger deterrent effects being found where the official measures were used. Since the clearance rates for all of these offenses were found to be a positive function of per capita patrol, it can be concluded that the analysis of Sample B provides at least partial support for the deterrence portions of the model in the cases of

robbery and larceny $50 and over. The support for the model's deterrence paths was strong and consistent for the offenses of auto theft and rape in all portions of the analysis.

CHAPTER VII

SUMMARY AND CONCLUSIONS

This research has derived a theoretical model of the deterrent effect of police presence from previous sociological, econometric, and evaluation research. Major features of the model are the simultaneous relationship of crime and the police, the distinction between objective and perceived certainty of punishment, and the relationship between police presence and the certainty of punishment (perceived or objective).

The model was tested using cross-sectional data with cities as the unit of analysis. It was necessary to use two samples to test the entire model since the victimization survey data, which included the perception measure, were available only for a subsample. Since there were some discrepancies in the findings with the two samples, further comparisons of them are made in this chapter.

Since the model is nonrecursive the data were analyzed using two-stage-least-squares regression. The only evident violation of the statistical assumptions necessary for this technique was the apparent systematic error in the measurement of perception of police presence. This generated spurious relationships in at least two

cases and probably attenuated most other regression coefficients for the perception variable.

Summary of Findings

Both samples showed that per capita police are a positive function of city revenue. However, the important theoretical finding of the police equation was that both analyses showed the rates of murder, rape, robbery, and auto theft to be very important variables. Rape had this impact in both samples as measured officially, but not as measured by survey in Sample B. However, rather than suggesting that rape does not generate a demand for more police, it may reflect a low public awareness of the actual rates of rape. Nettler (1974) has pointed out that rape is grossly underreported in victimization surveys relative to other crimes and this is supported in the present sample by the extremely low correlation between rape as measured officially and by survey (.01) and the high correlations of the official and unofficial measures of robbery (.69) and auto theft (.91). Citizens might be cognizant of variations in the official rate of rape but not aware of the much greater frequency of rape as reflected in victimization surveys. Therefore, variations in official rates of rape may be related to demand for police while variations in the survey rate are not, simply because the public is not aware of them.

As was pointed out earlier, the police and patrol equations can be viewed as theoretically distinct from the deterrence equations (i.e., crime, clearance, and perception). Thus, the findings concerning the demand for police may be important independent of their role in the present model. The analyses of both samples support a conclusion that it is crimes of violence which have the greatest impact on demand for police. Auto theft is the only property crime that appears to generate demand for increased police protection. This could be due to higher rates of reporting auto theft and to greater publicity accorded increases in that crime relative to other property crimes.

Per capita patrol was found to be a negative function of the proportion of patrol units with two officers and a positive function of per capita police. The analyses of both samples showed the two officer units to be slightly more important. This indicates that the deployment of one-officer rather than two-officer patrol units could have an appreciable impact on those clearance and crime rates for which police presence (patrol) was found to have an influence.

Findings concerning the deterrent effect of perceived certainty of police presence were inconclusive due to the apparent measurement error for the perception variable. The indicator reflected the perceptual biases

of southerners and nonwhites more than the actual perceptions of police presence. This systematic error probably attenuated the regression coefficients in most cases, but clearly generated spurious results in the cases of auto theft and murder which were highly correlated with the regional variable south. Much additional research will clearly be needed to clarify the relationship between the perceived and objective certainties of punishment. The perceptual portion of the present model is useful conceptually and provides some informative data, but was not sufficiently tested.

One of the major points on which the analyses of Samples A and B differed was the effect of police patrol on the various clearance rates. While Sample A revealed weak positive relations for five categories of offense, the analysis of Sample B showed very strong positive relations for almost all offense categories. It was pointed out that this path represents a crucial relationship in the model because police presence must affect the certainty of punishment to support the theory of a deterrent effect of police presence. It is important to contrast these two samples to suggest possible reasons for the discrepancies; this is done in the next section.

The clearance equations also differed for the two analyses in the findings for the path representing the

overload hypothesis. While both supported that hypothesis for some measures of larceny, Sample A also revealed an overload effect for robbery, rape, and auto theft. Again, this emphasizes the need for comparison of the two samples.

A final point regarding the clearance equations is the overall weakness of other variables in the equations. It is clear that there are unidentified variables which individually or cumulatively have a major impact on clearance rates. This points to a need for research on the dynamics of clearance rates. If researchers are to continue to use them as an indicator of the objective certainty of punishment in studying deterrence, it is clear that these other variables must be identified and included.

Several variables traditionally used in ecological research were employed in the crime equations. The percent unemployed and percent nonwhite were far more important than the certainty of punishment in most cases. Consistent with previous ecological analyses, crime was positively related to the percent unemployed in all cases and to the percent nonwhite in most. However, some have argued that certainty of punishment can be manipulated by government policies more readily than other social and economic factors (Wilson, 1975). Viewed from this perspective, the relationship between

crime and certainty of punishment may take on more importance than suggested by the empirical findings alone. Due to the direct policy relevance of the deterrence proposition, relatively weak relationships may be sufficient for significant effects on crime.

The strongest conclusions for the deterrence segment of the model can be drawn for the offenses of auto theft and rape. For these crimes a substantial negative relationship was observed between the offenses and their clearance rates in both samples and in Sample B, whether measured officially or by survey. Moreover, since a positive relationship between police presence and these clearance rates was observed in all cases, it can be concluded that the observed deterrent effects are at least partially a result of police presence.

Some evidence of a deterrent effect was also observed for the offenses of robbery, larceny, burglary, and assault. However, the findings with these crimes are less conclusive. In Sample A the relationships between patrol and the clearance rates were too weak to attribute the deterrent effects to police presence. In Sample B the official and survey measures were inconsistent, with the former showing stronger deterrent effects. In addition, Sample B indicated that assault clearance rates are not a function of police presence. Thus, the fit of assault to the model is the poorest of all

offenses except murder. As expected, no deterrent effect was observed for murder.

The fit of the model for all types of crime in Sample A are summarized in path diagrams in Figures 3 through 11. Those paths which have Beta values less than .10 are deleted from the diagrams, but the remaining paths are not reestimated. These figures then, serve the purpose of visually summarizing the most important relationships in the model by crime type.

Figures 12 through 27 summarize the findings with Sample B by casting each crime type in a path diagram. The same criteria for deletion are employed as were in Sample A. The perception variable is omitted due to the measurement error that was encountered in attempting to measure it.

Sample Comparisons

Sample B was included in this research to obtain a measure of the perception of police presence and supplement the official measure of crime with the survey measure. This sample of 26 cities is frequently used by researchers for similar reasons. Caution is usually extended due to the small N, which is particularly problematic for regression analysis. However, another serious problem that is typically not addressed is the sample itself.

Figure 3

Path Diagram for CRIME with Sample A

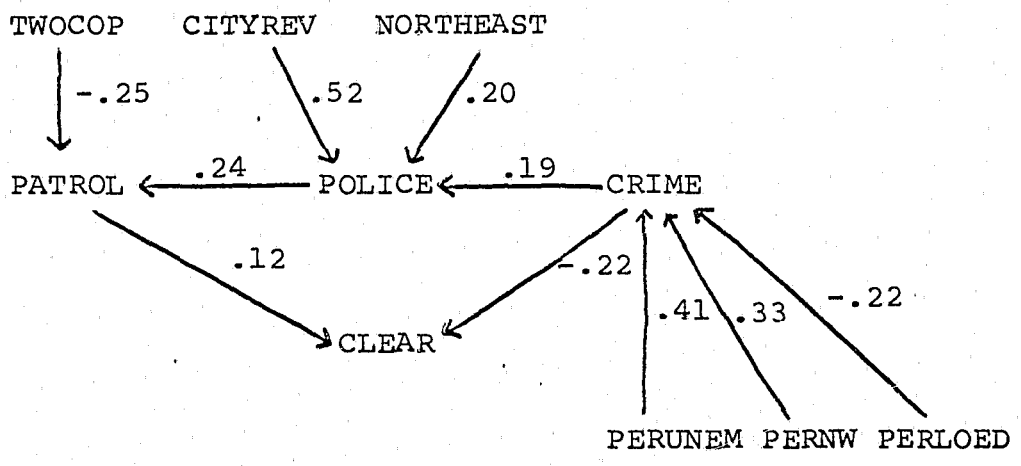


Figure 4

Path Diagram for ROBBERY with Sample A

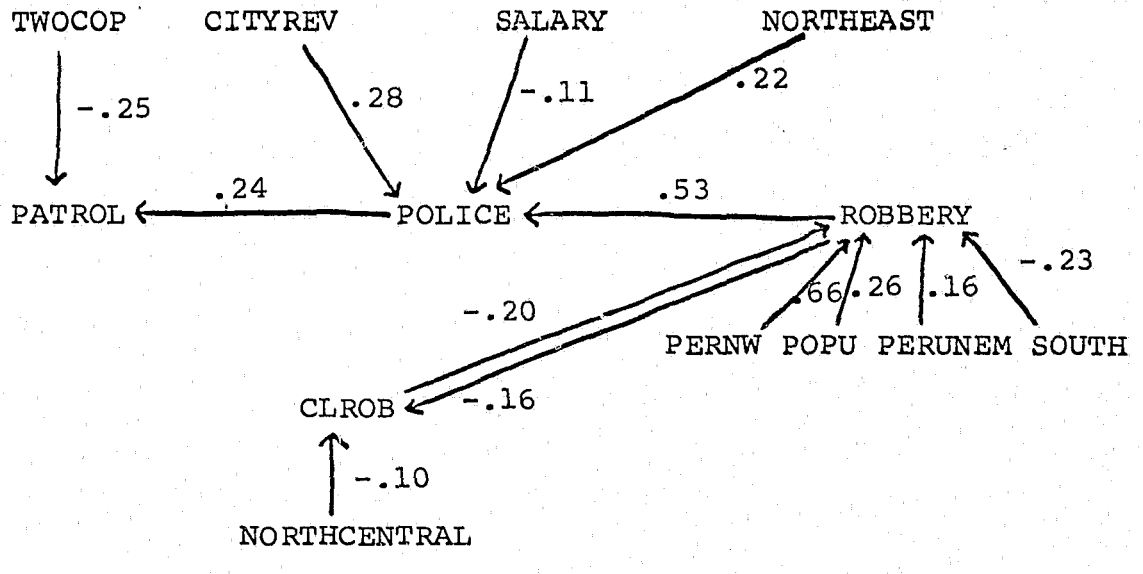


Figure 5

Path Diagram for AT with Sample A

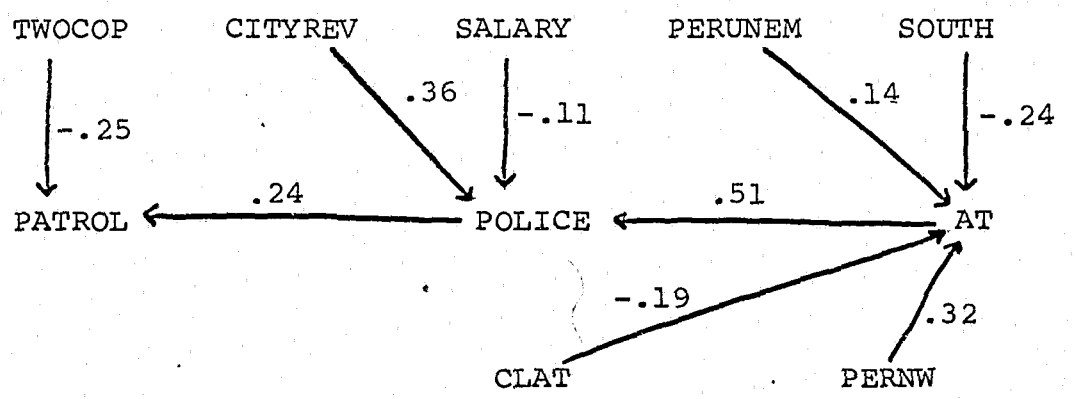


Figure 6

Path Diagram for LARCENY with Sample A

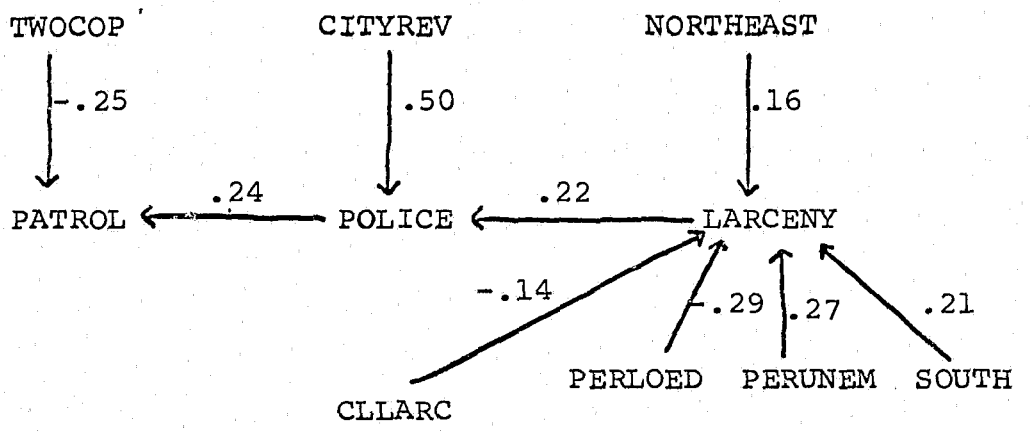


Figure 7

Path Diagram for LARCENY2 with Sample A

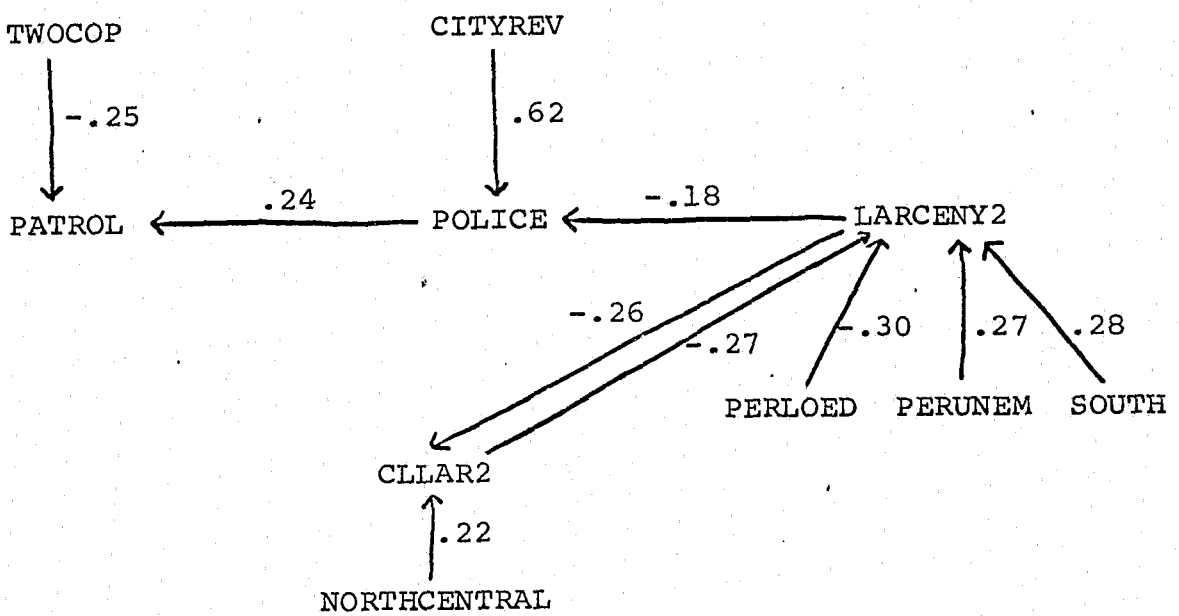


Figure 8

Path Diagram for BURGLARY with Sample A

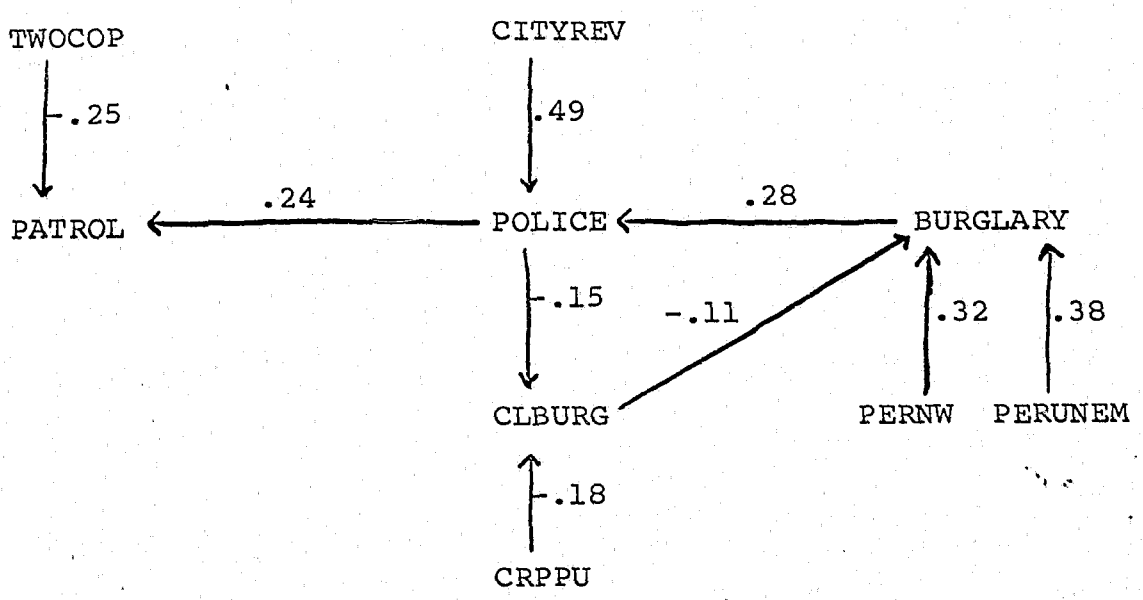


Figure 9

Path Diagram for RAPE with Sample A

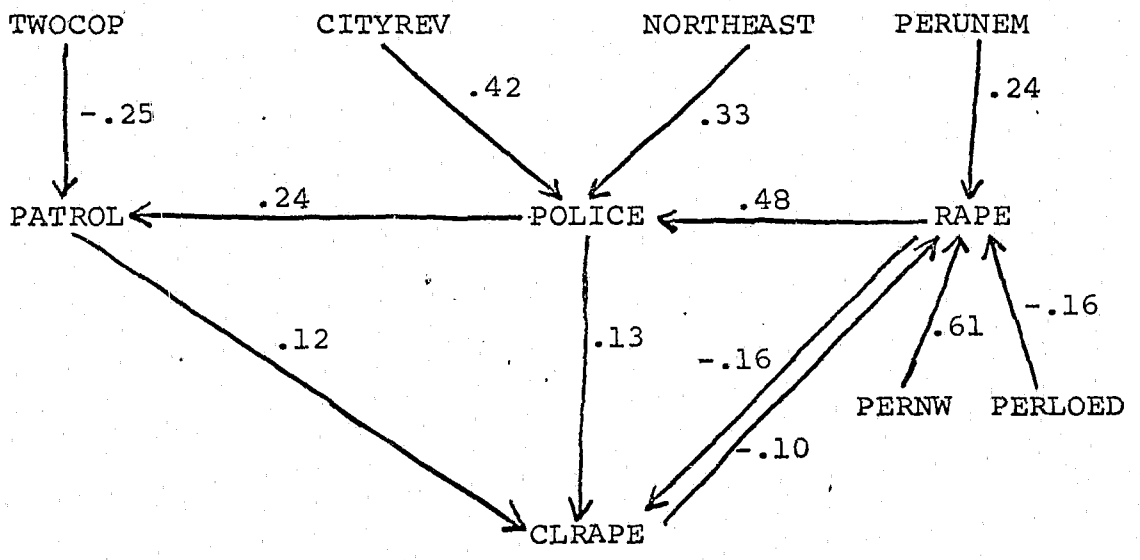


Figure 10

Path Diagram for ASSAULT with Sample A

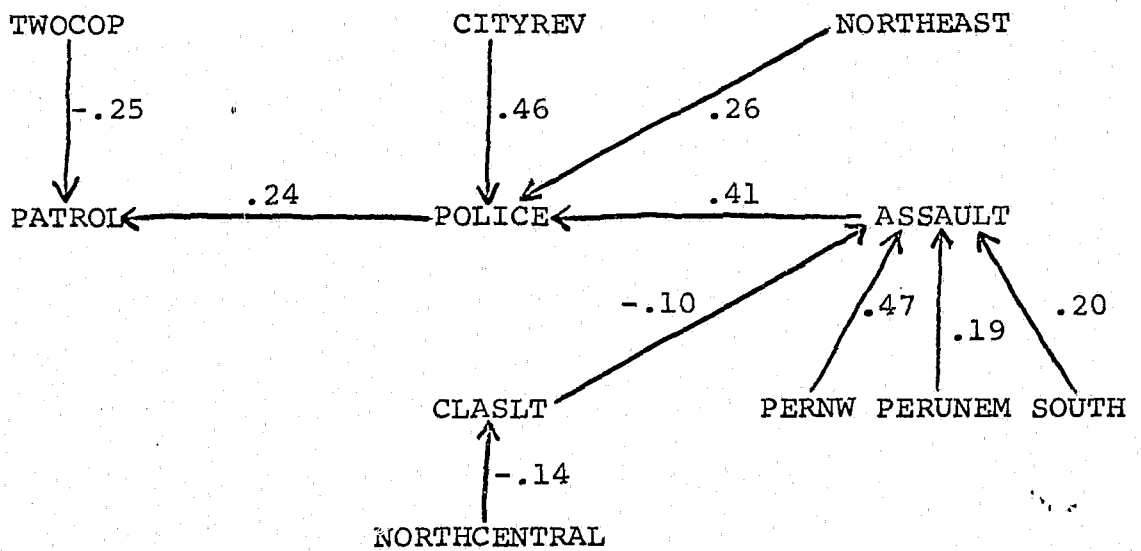


Figure 11

Path Diagram for MURDER with Sample A

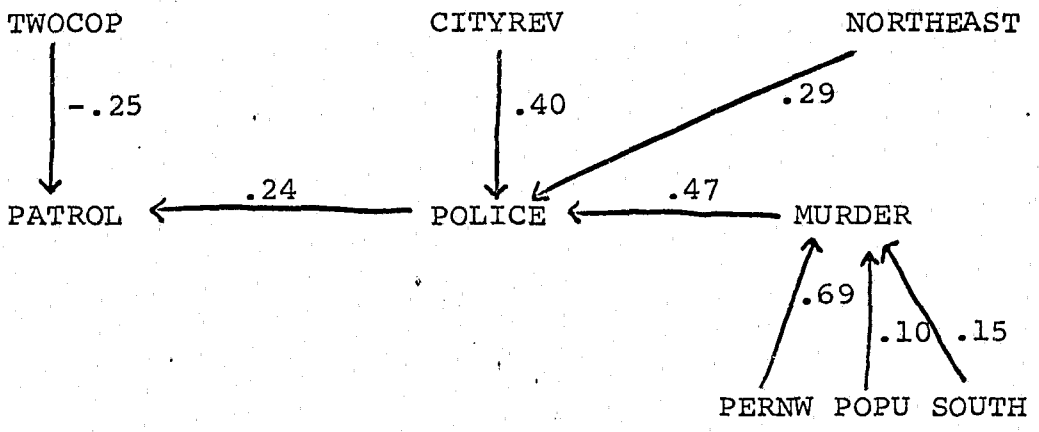


Figure 12

Path Diagram for CRIME with Sample B

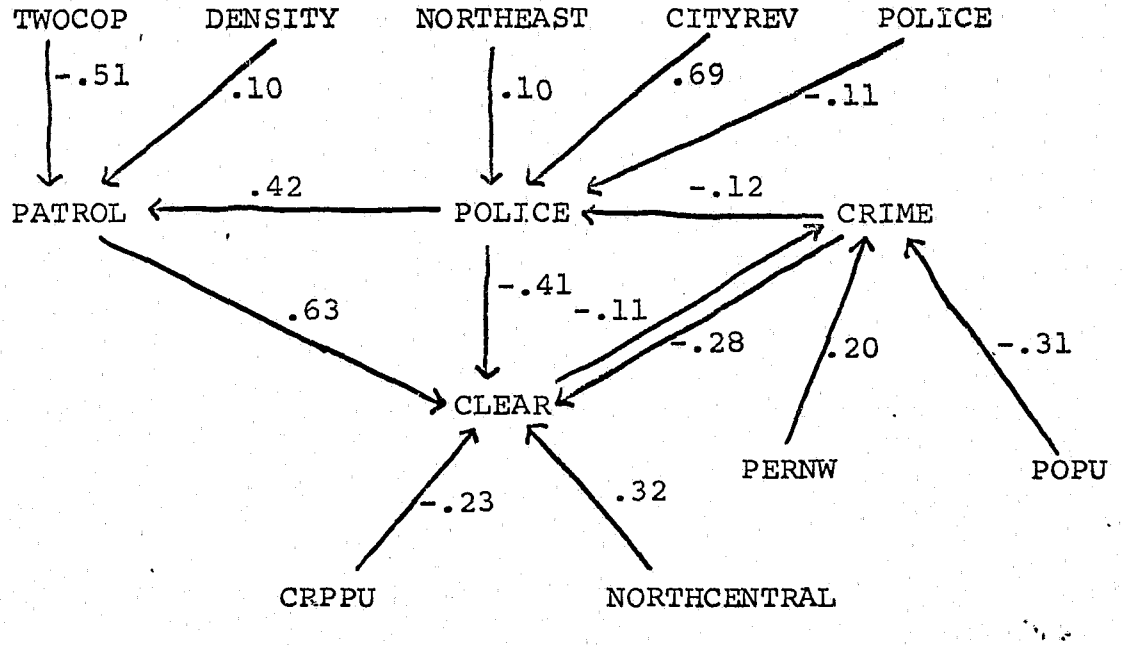


Figure 13

Path Diagram for VCRIME with Sample B

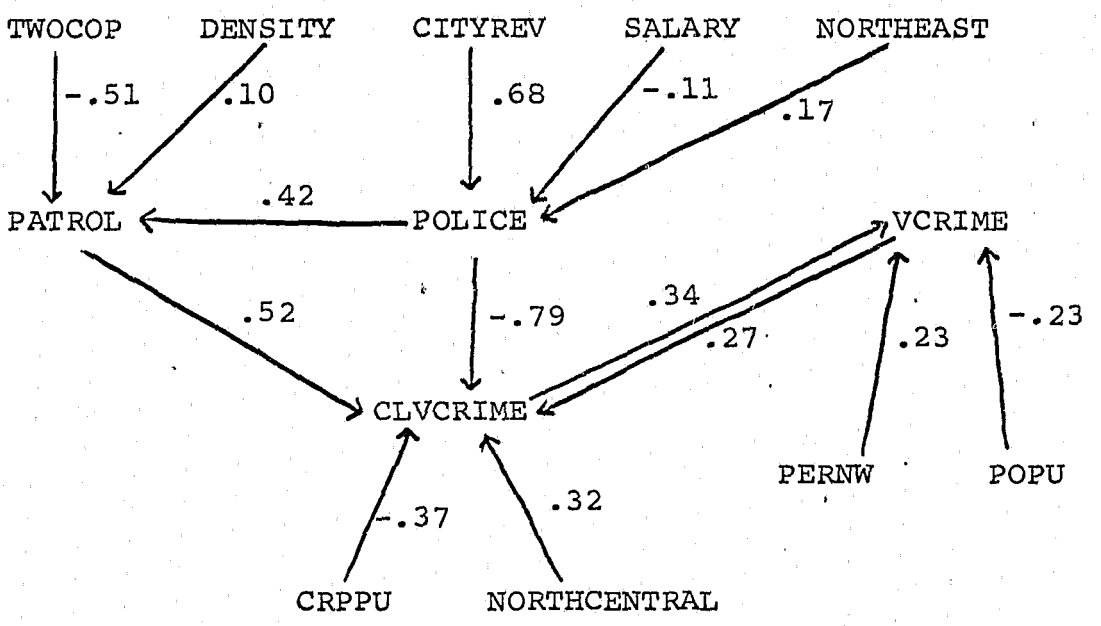


Figure 14

Path Diagram for ROBBERY with Sample B

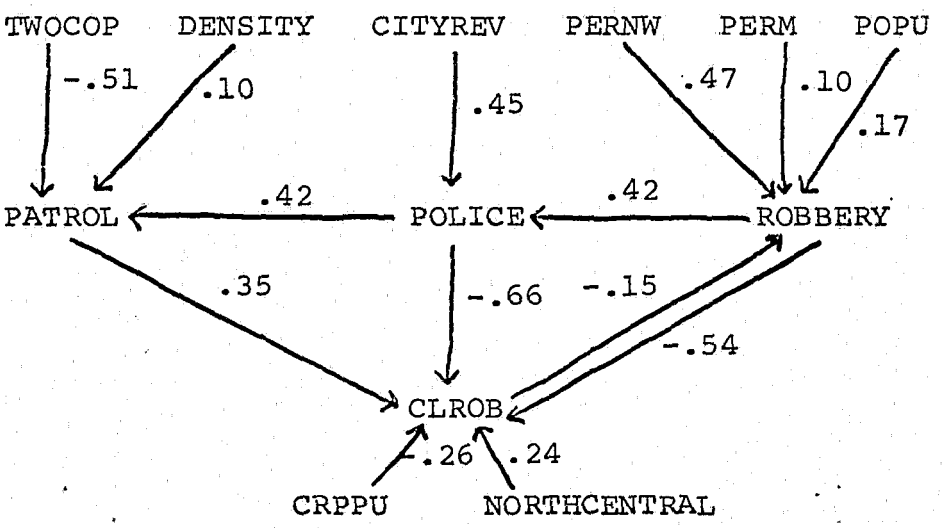


Figure 15

Path Diagram for TVROB with Sample B

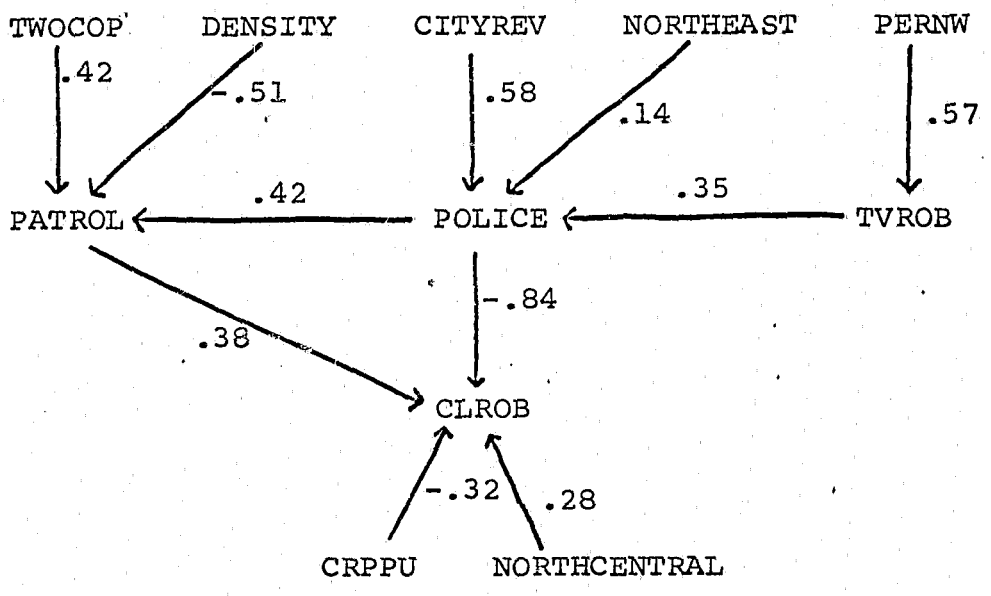


Figure 16

Path Diagram for AT with Sample B

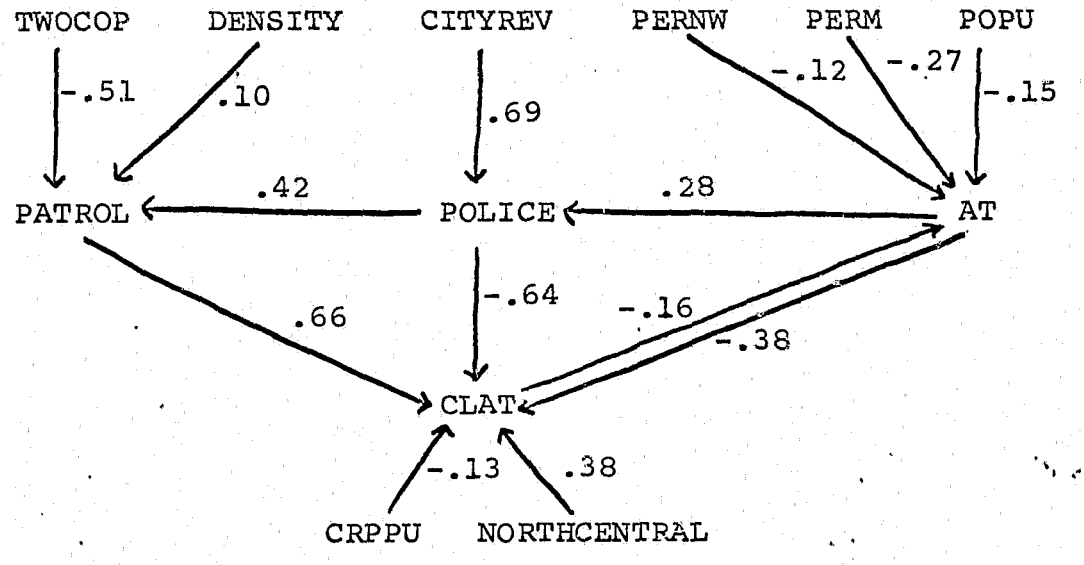


Figure 17

Path Diagram for VAT with Sample B

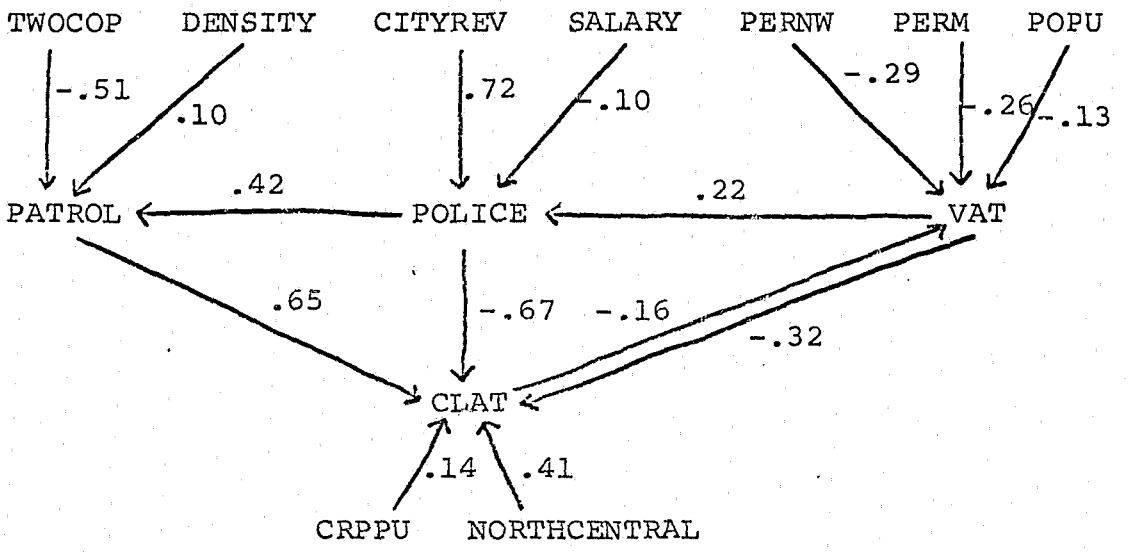


Figure 18

Path Diagram for LARCENY with Sample B

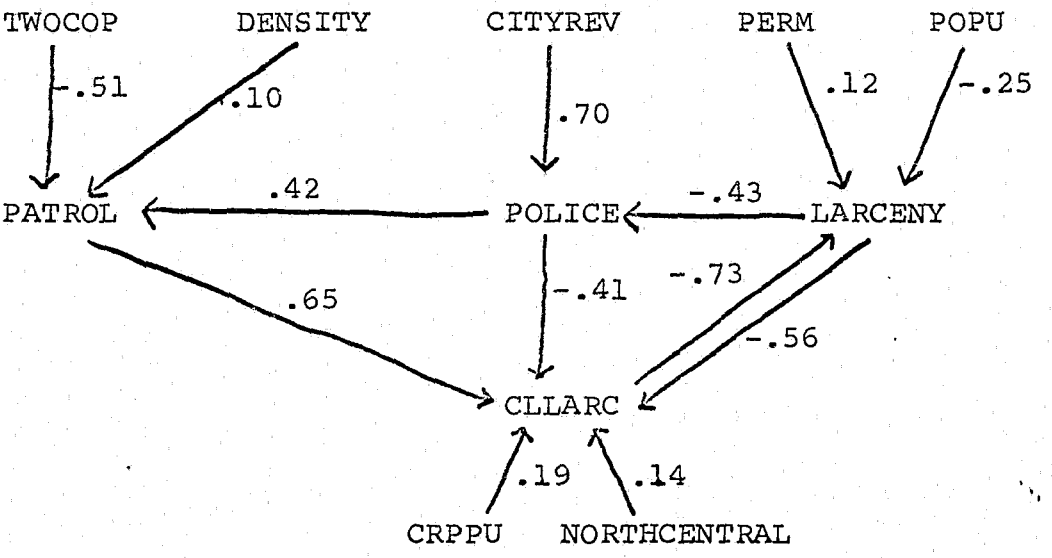


Figure 19

Path Diagram for LARCENY2 with Sample B

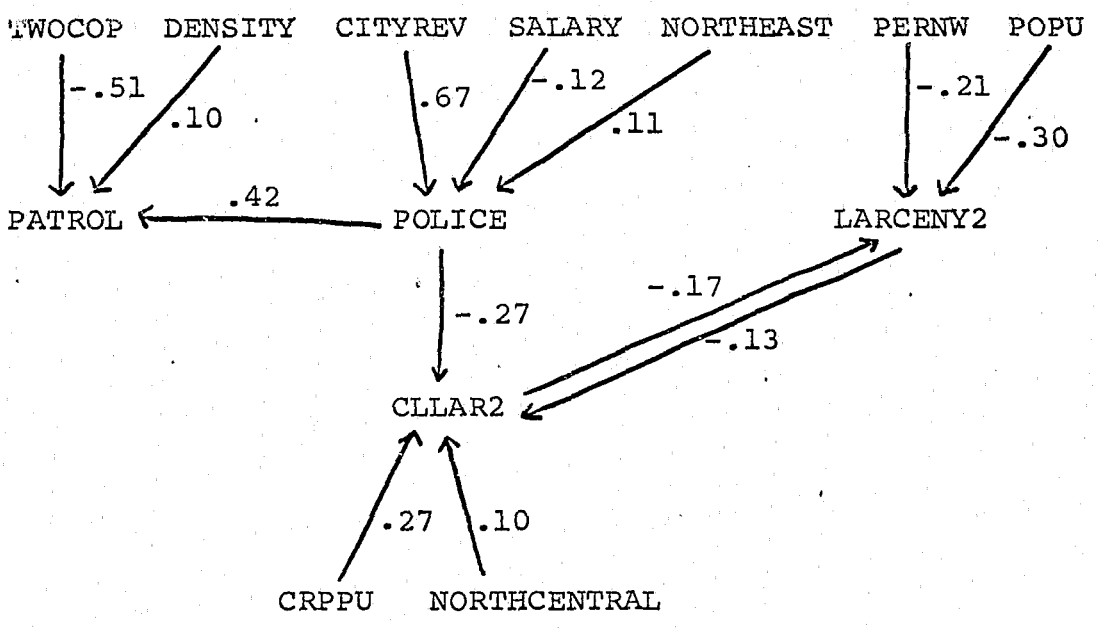


Figure 20

Path Diagram for VTHEFT with Sample B

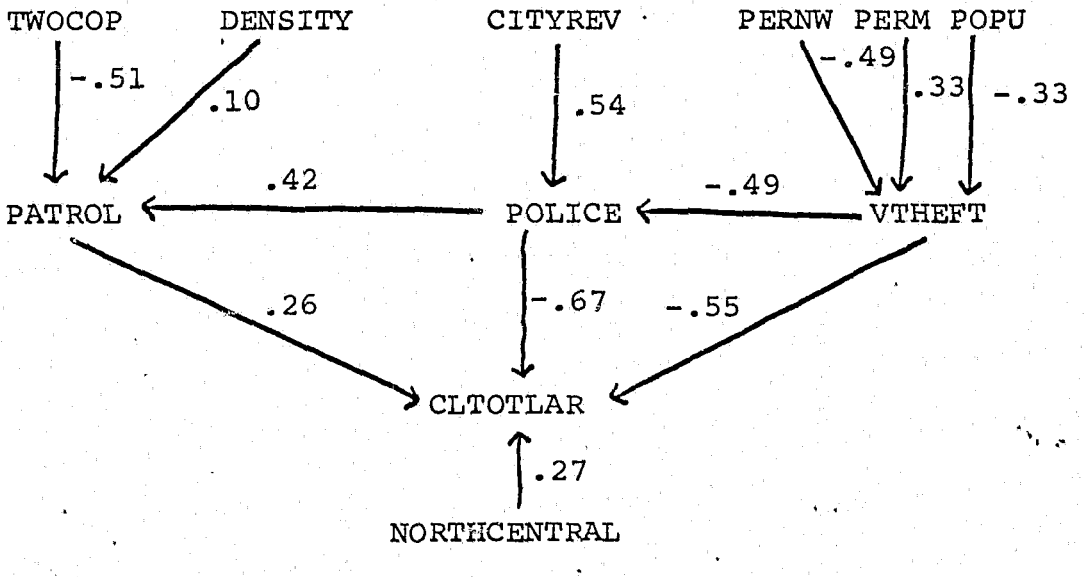


Figure 21

Path Diagram for BURGLARY with Sample B

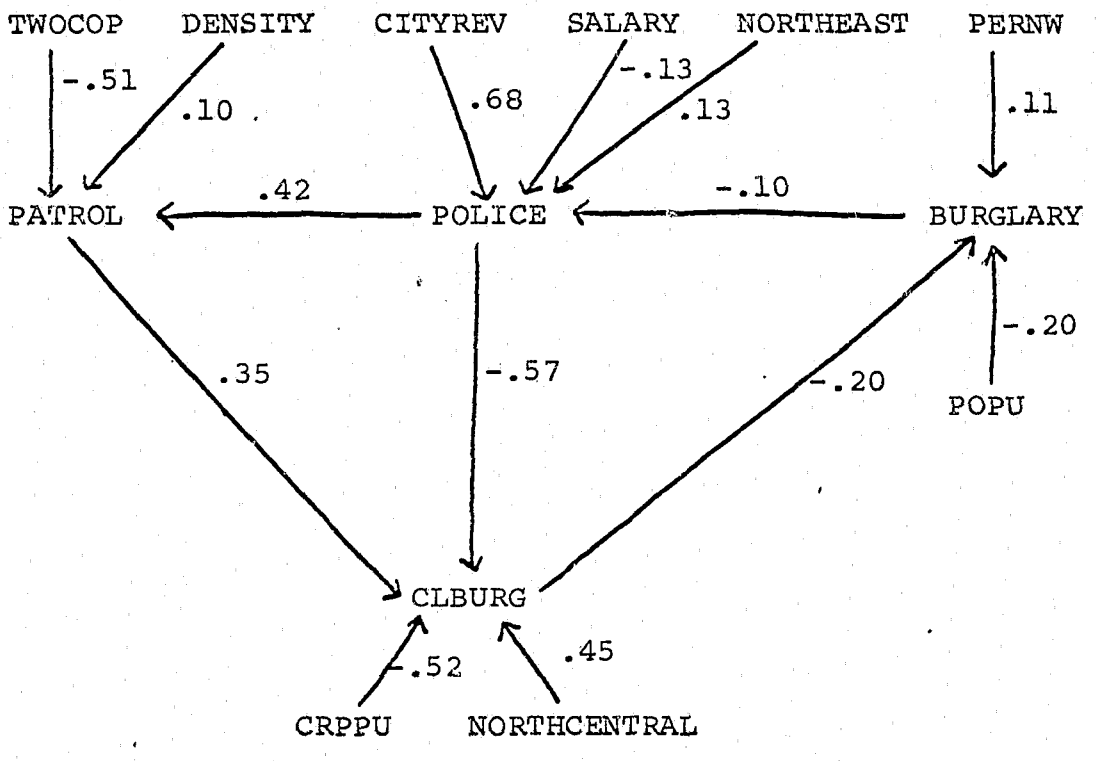


Figure 22

Path Diagram for TVBURG with Sample B

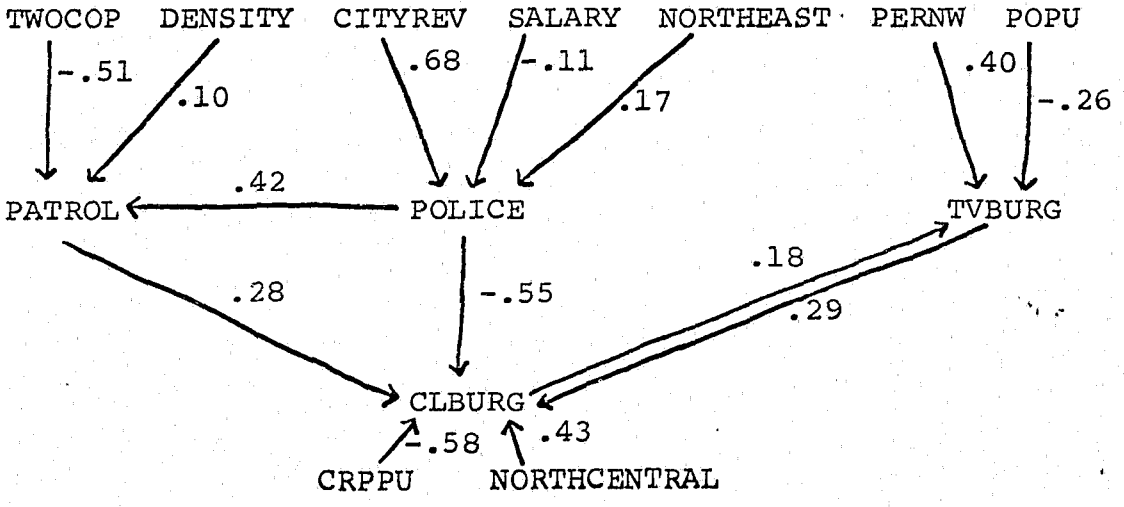


Figure 23

Path Diagram for RAPE with Sample B

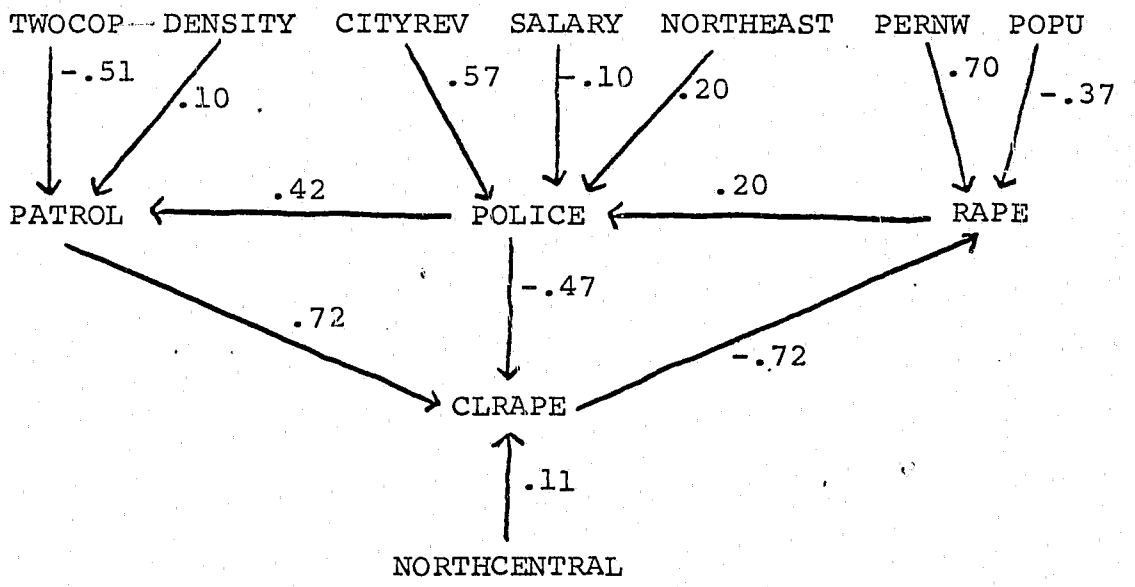


Figure 24

Path Diagram for VRAPE with Sample B

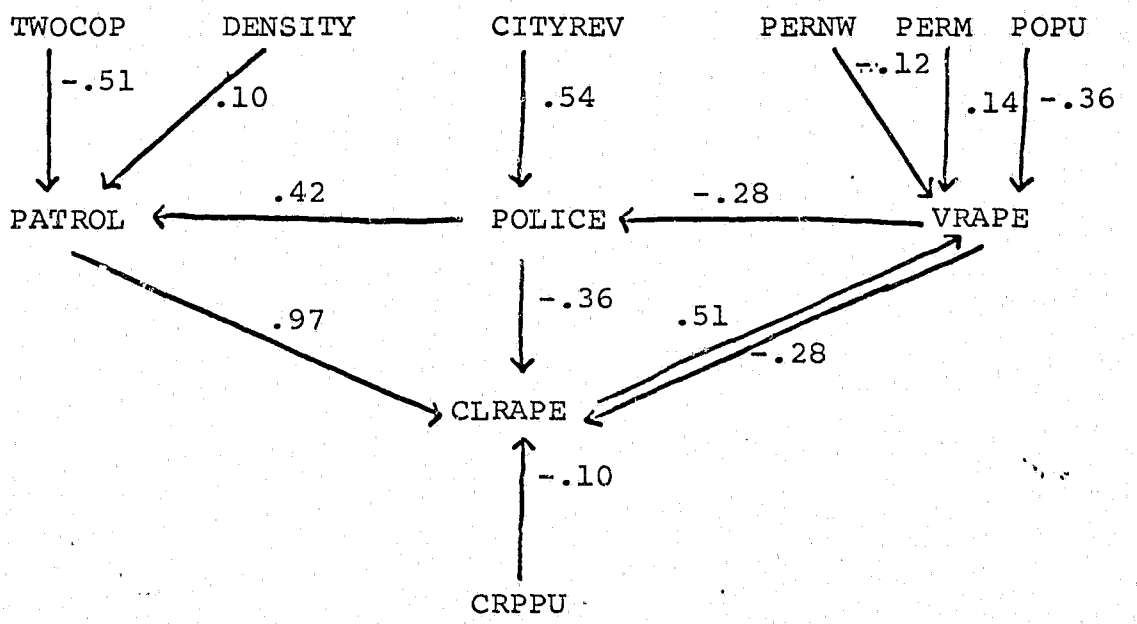


Figure 25

Path Diagram for ASSAULT with Sample B

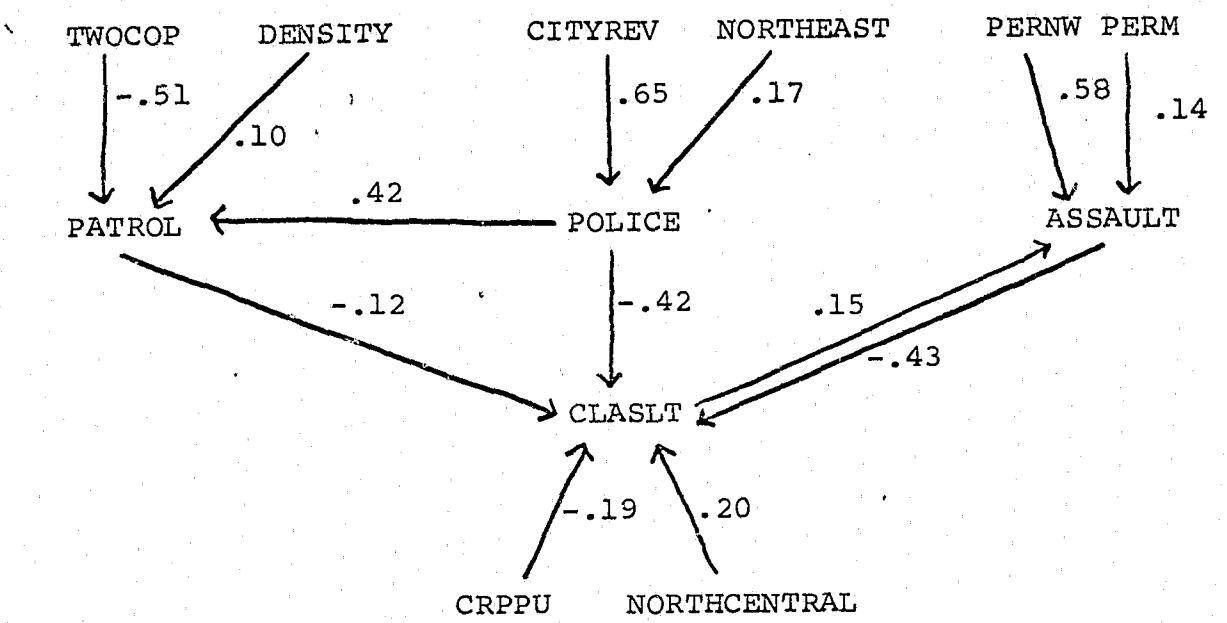


Figure 26

Path Diagram for VASLT with Sample B

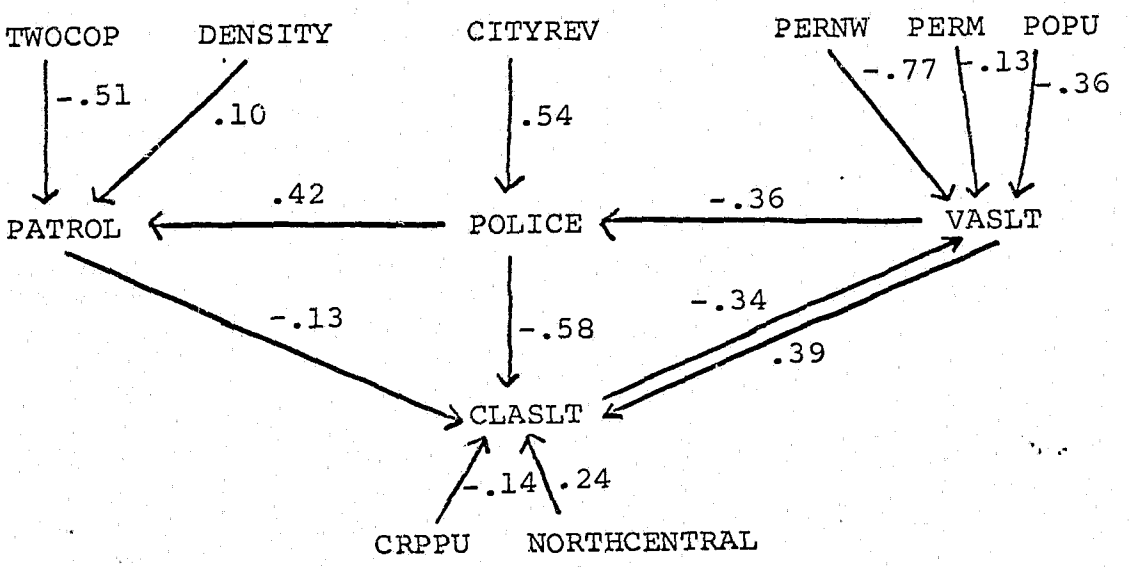
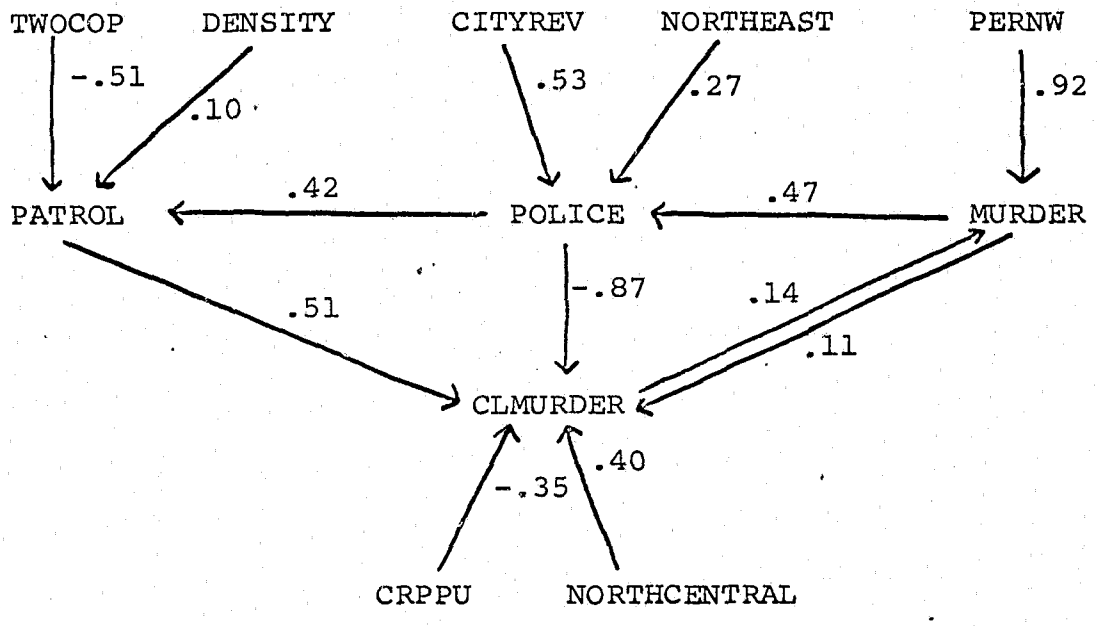


Figure 27

Path Diagram for MURDER with Sample B



Two problems result from the analysis of this purposive sample: the possibility of spurious relationships and difficulty in drawing generalizations. The possibility of spurious relationships being found in analyzing these data exists because the sample is comprised of three distinct groups, each being identified by specific characteristics. When these characteristics are included in the analysis, the results may be misleading. The sample included eight cities from the High Impact Crime Program which were characterized by exceptionally high crime rates and the nations five largest cities which generally had lower crime rates than the cities specially selected for the High Impact Crime Program. As a result, the crime equations in Sample B revealed mostly negative Beta values for the population variable while they were mostly positive for the analysis of Sample A.

Three major differences were observed in the findings of the analyses of Samples A and B. These related to the effect of police patrol on clearance rates, the effect of clearance rates on crime, and the effect of crime on clearance rates. Unlike the findings with the population variable, there is no clear explanation for these discrepancies. While the differences may be an artifact resulting from the composition of Sample B, they may also indicate true underlying differences. However,

due to the manner in which the cities were selected for inclusion in this sample it is difficult to draw generalizations or to make comparisons to Sample A. Table 20 presents the mean values of key variables describing the samples in order to compare and suggest differences that might account for the variations in the fit of the data.

TABLE 20

MEAN VALUES OF KEY VARIABLES
DESCRIBING THE SAMPLES

Variable	Sample A	Sample B
POPU	189,372	1,167,396
PERLOED	4.9	6.3
PERUNEM	4.6	5.2
CITYREV	183	323
DENSITY	5232	9487
PERNW	13	31
TWOCOP	19	37
POLICE	1.7	2.9
PATROL	.36	.53
CRIME	6079	8366
MURDER	10	23
RAPE	24	54
ROBBERY	207	642
ASSAULT	209	392
BURGLARY	1561	2183
LARCENY	1290	2084
LARCENY2	1968	1802

TABLE 20 (Continued)

Variable	Sample A	Sample B
AT	654	1185
CLMURDER	87	76
CLRAPE	56	54
CLROB	33	31
CLASLT	68	63
CLBURG	19	22
CLAT	19	17
CLLARC	12	11
CLLAR2	19	26

Research Directions

Several avenues for future deterrence research are suggested by the results of this study. The need for a crime-specific focus is clearly supported. The predictions developed in the research of Geerken and Gove (1977) were largely supported for the relationship between crime and certainty of punishment. However, when the element of police presence was considered support for that portion of the model was consistent only for the crimes of auto theft and rape. This introduces an additional complexity for the understanding of deterrence. It suggests that even for those crime categories for which a negative relationship between crime and certainty

of punishment (as reflected by clearance rates) is consistently found, it is not necessarily a function of police presence. Thus further study of the relationship between police and clearance rates is needed. This is particularly important because of the inherent policy implications. This research has indicated that it could be fallacious to assume that deterrence of some types of crime could be expanded by increasing police presence.

A second major area requiring much additional research is citizen perceptions of police presence and other indicators of certainty of punishment. While the theoretical importance of this is clear, the measurement problem is substantial. The need for more victimization survey data is also apparent. The analysis of the victimization sample indicated not only that it is difficult to draw generalizations, but also that spurious relationships can be generated in some cases.

Finally, the conclusions which this research consistently supported should be subjected to replications and reconceptualization. Deterrence is a relatively new area of research which is continually growing more complex. This research has added to those complexities by contradicting some previous theory and research. It is clear that this interplay of theory and research must continue for some time before patterns of deterrence are understood.

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