Quantitative Studies in Social Relations

An Economic Analysis of Crime and Justice

Theory, Methods, and Applications

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Preface

In this book, we apply economic theory and econometric methods to various problems in criminology. It should not be surprising that economists would approach such problems differently than would psychologists, sociologists, or criminal justice professionals, both because economic theory imposes a particular view of the world and because economists tend to use somewhat different statistical techniques than do other social scientists. We hope to convince the reader of the potential usefulness of the economists' approach to criminology.

There are three separate parts to the book. Part I contains statistical analyses of various measures of criminal recidivism. This work was part of several research projects that we carried out, beginning in 1973. As our work progressed, it struck us that many of the models and methods of analysis that we were developing had potential application in areas other than those in which we were working. Furthermore, we could find no single source that described the methods we were using. (Indeed, many of them have been developed only quite recently.) Therefore, we provide (in Chapters 2, 4, and 6) surveys of statistical methods for analyzing qualitative and limited dependent variables of various kinds. These chapters should be of interest to a fairly wide audience, including economists as well as noneconomists. The applications (in Chapters 3, 5, 7, and 8) of these methods to the analysis of criminal recidivism should be of interest both because they illustrate the use of these statistical techniques and because the substantive results are valuable.

The impetus for Part II and Part III was somewhat different. We felt that recent developments in economic theory provided useful guidance for researchers studying crime and the operation of the criminal justice system. However, much of this research could be comprehended easily only by those with considerable background in economics. Further, this research appeared in widely scattered places, and its application to the study of criminal justice issues was often far from obvious. We have structured these two parts so that they begin with an introduction to the particular economic theory that will be utilized. Thus Part II, which provides empirical estimates and tests of the economic model of crime, begins (in Chapter 9) with a survey of economic models of crime. This survey should be useful to anyone wishing to know what sort of assumptions go into economic models of crime and what sorts of conclusions result. Similarly, we

begin Part III, which estimates long- and short-run cost functions for large-scale prisons, with a survey (Chapter 13) of the economic theory of cost and production and its application to public organizations. This survey will be of limited interest to readers with much economic training, but it should be useful for noneconomists. The empirical chapters in Parts II and III should be of substantial interest to anyone interested in the workings of the criminal justice system.

We hope that the book will be useful for students and scholars in economics, political science, planning, psychology, and sociology and for applied researchers in both the public and private sectors. Economists may find it useful to see how their ideas and techniques are applied. Noneconomists may find our surveys of economic ideas and econometric methods useful. Finally, our empirical work yields substantive conclusions of some importance, which should be useful for anyone interested in criminology.

This book was jointly written, and both authors share the credit or blame for all of it. The order of authors' names is alphabetical and is of no other significance. However, it is accurate to report that the first author was primarily responsible for Part I, whereas the second author was primarily responsible for Parts II and III of this book.

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Acknowledgments

Full acknowledgment of all individuals who aided us in the course of the work reported in this book would consume extensive space and make for tedious reading. Thus, we shall try to make our acknowledgments comprehensive but often not specific.

Collection of the 1969 and 1971 North Carolina data set required the cooperation of many released inmates. The individuals in this sample were usually very cooperative and helpful in providing detailed information about their postrelease experiences. The data set that resulted from their help is unique and is a source of strength for many of our analyses. We express our sincere appreciation for their help in our work.

Most of the work reported in this book was both expensive and time consuming to complete. Without funding, little or none of it would have been done. Original funding for the collection of the 1969 and 1971 data was provided by the National Institute of Law Enforcement and Criminal Justice, U.S. Department of Justice. As so often happens, money ran out before the project was completed. Fortunately, the University of North Carolina Research Council provided additional funding that allowed us to finish the project. Funding for the analyses reported in Part I was provided by the North Carolina Department of Correction. Funding for our review of economic models of crime (Chapter 9) was provided by the National Institute of Mental Health as a part of a much larger project designed to analyze family violence.

Finally, our estimation of cost functions for prisons was sponsored by the National Institute of Law Enforcement and Criminal Justice, U.S. Department of Justice. Many individuals who worked for these funding agencies provided guidance and support for our efforts. We would particularly like to thank George Silberman, who helped us guide the prison cost function project through many difficult and trying times.

Although funding was a necessary condition for most of our work, it was by no means the only necessity. The work required two other important elements: the cooperation of many individuals in federal, state, and local government and an able staff. We were truly blessed in both regards. Personnel of the North Carolina Department of Correction provided invaluable aid in collecting the 1969 and 1971 data set and provided us with all data for the 1975 release cohort. We would particularly like to thank Jerry Allen, Lena Basemore, Adrian Brancatto, Kip Kautzky, Ken Parker, Martha Upchurch, and Jeff Williams. Personnel of the Federal Bureau of Prisons and the California Department of Corrections provided us with data and guidance for our work on prison cost functions. Data collection in both the federal and California systems required the time and knowledge of people in many areas of the California Department of Corrections and the U.S. Department of Justice. We would like to especially thank Jim Parks and Vida Ryan of the California Department of Corrections and Howard Kitchener, Harriet Lebowitz, and Jerry Prather of the Federal Bureau of Prisons.

During the course of our research we often had truly exceptional persons working with us. The following individuals provided a level of knowledge and dedication far in excess of that required by their jobs: James Bachman, Pamela Reid, Carl Rizzo, and Von Underwood.

Turning from the research reported to the actual preparation of this manuscript, Betsy Pierce provided exceptionally able and thorough typing for Parts II and III of this book, and Kelli Sweet provided the same for Part I.

Finally, we would like to thank our families for their tolerance and support of our efforts. At many times we were thinking of our research when we should have been listening to them.

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Chapter 1

Overview

This book is composed of three parts. These parts are more or less independent of each other, though they are connected by the statistical methodology and data that are used.

The first part of the book, consisting of Chapters 2–8, discusses models of criminal recidivism. This is of course a common topic in criminology, but there is little here that would be familiar to most economists. Indeed, the relatively sophisticated statistical methodology employed is intended to be the distinguishing feature of Part I. Most measures of recidivism have peculiar features that make standard statistical techniques (e.g., use of the linear regression model) inappropriate. Therefore, we attempt to introduce the reader to more appropriate techniques and to convince him or her through the application of these techniques that they are worth the extra work involved. These statistical techniques have broad potential application for researchers in criminal and civil justice but have seldom been used in these fields to date. We describe a number of potential applications in the introduction to Part I.

Chapter 2 provides a survey of the statistical analysis of qualitative outcomes. The fact of recidivism or nonrecidivism is a qualitative outcome, and the models of Chapter 2 are therefore potentially useful for analyzing, among

other things, the determinants of this measure of recidivism. In Chapter 3 we use one of the models presented in Chapter 2, the logit model, to analyze two measures of recidivism, either of which is more informative than the common yes/no measure. One analysis is of the level of seriousness of the most serious recidivist conviction; felony, misdemeanor, or no conviction are the three possible outcomes. A second analysis is similar but has slightly different outcomes defined: conviction for a crime against a person, a crime against property, or another (miscellaneous) crime; or no conviction. This analysis gives insights concerning the way in which criminals' careers develop, particularly as regards crime switching.

Chapter 4 surveys the statistical analysis of censored and truncated outcomes. We pay particular attention to the Tobit model, which is designed for the analysis of outcomes that are censored at zero, that is, outcomes that cannot be negative and are often zero. Length of sentence is such an outcome, and in Chapter 5 we use the Tobit model to analyze the total length of recidivist prison sentences that an individual receives. Another interesting feature of the analysis is that we validate our models by using them to predict outcomes for a sample of individuals (the "validation sample") who were not included in the sample used in estimating the models (the "estimation sample").

Chapter 6 surveys the statistical analysis of survival time; that is, of the time until an event occurs. The particular application addressed in Chapter 7 is length of time from release until recidivism. Two major points are made. First, as is by now well known, it is necessary to recognize that the survival time is censored by the length of the follow-up period. (We cannot observe a length of time greater than the length of the follow-up period, and some individuals will not have become recidivists by the end of the follow-up.) Second, it is important to use individual characteristics (if they are available) as explanatory variables. This point seems to be little appreciated in the criminological literature; most analyses of time until recidivism still assume individuals to be identical. As in Chapter 5, our models are validated by prediction outside the sample. The models are very accurate: They predict numbers of recidivists within a few percentages of the actual numbers, and they also accurately predict the timing of recidivism.

Finally, Chapter 8 uses the models of Chapters 5 and 7 to evaluate a correctional program. The method used compares the actual outcomes of program participants with those predicted by our models. Although we encounter many of the usual problems in such nonexperimental evaluations, our results seem quite reasonable.

The second part of the book, consisting of Chapters 9–12, discusses the economic model of crime. This model is surveyed from a theoretical point of view in Chapter 9. Because the model basically postulates that individuals

make rational comparisons of the returns to legal and illegal activities, it is intuitively clear that crime should be deterred either by increased opportunity to conduct lawful activities or by increased sanctions for criminal offenses. The real question addressed in Chapter 9 is what assumptions are necessary for unambiguous results to hold. As is shown, these assumptions are really quite stringent.

In Chapter 10 we attempt to test the economic model of crime by analyzing two measures of criminal activity: the arrest rate (arrests per month at risk) and the conviction rate. Because these outcomes are censored at zero, the Tobit model is used once again. The results give weak support to the model. There is some evidence that increased sanctions deter crime, but very weak results are obtained for the effects of legitimate opportunities.

In Chapter 11 we investigate the nature of the labor market for prison releasees. Although the single word "dismal" might suffice, we analyze the determinants of two measures of labor market success: wage and stability of employment. The explanatory variables most favored by "human capital" theorists, age and education, do not appear to be very important. Finally, in Chapter 12 we allow the wage and arrest rate to be simultaneously determined. This alters some, but not most, of the comparable results of Chapters 10 and 11.

The third part of the book, consisting of Chapters 13–16, estimates cost functions for prisons. Cost functions give costs (either total or average) for a unit of production as a function of its level of output and the prices of its inputs. In Chapters 13 and 14 we survey the economic theory of cost and production, and we discuss the problem of suitably defining the inputs and output of a prison. In Chapter 15 we estimate short-run cost functions for federal and California prisons, and in Chapter 16 we estimate a long-run cost function for a group of Federal Correctional Institutions. (The distinction between "long-run" and "short-run" is that the capital stock is assumed to be fixed in the short run but variable in the long run.) In both cases we arrive at interesting results, chief of which is the optimal size (in the sense of minimum average cost) for such prisons. It appears quite clear that bigger prisons are cheaper (per confined person-day) than smaller prisons.

Following our conclusions in Chapter 17, there are three appendixes describing the data sets used in our analyses. It is impossible to do good empirical work with bad data, and we are pleased with the accuracy and detail in our data sets. Appendix A describes our data on a sample of 641 men who were in prison in North Carolina in 1969 or 1971. This data set is not an especially representative sample of the North Carolina (or national) prison population, but it contains very detailed information about the individuals in it, and the information on postrelease activities is unusually accurate and complete. Appendix B describes our data on all 4881 individuals

released from prison in North Carolina in the first 6 months of 1975. As such it is very clear what population the data represent. The level of detail and accuracy is good, though not as good as for the previous data set. Appendix C describes our data on 27 federal prisons, monthly from November 1975 through June 1978, and on 10 California prisons, quarterly from July 1968 through June 1978. Although the federal data set is stronger than the California set, both are good; the information about characteristics of inmates is especially notable.

Overall, the book represents the end product of an enormous investment in the collection of original data and in the use of sophisticated models in its analysis. We hope that the result justifies this investment and that others will be encouraged to use similar techniques.

PART I

Statistical Analyses of Recidivism

In this part of the book, our primary aim is to present and illustrate the use of a number of statistical techniques that allow the modeling of commonly used measures of criminal activity in a careful and correct manner. The most frequently used measures of criminality tend to be either qualitative (i.e., a series of discrete categories), limited (i.e., the range of values observed is restricted in some way), or not normally distributed (e.g., skewed). Variables with any of these characteristics cannot be correctly analyzed using traditional multivariate statistical techniques (such as ordinary and generalized least squares) that assume that dependent variables have continuous, unrestricted normal distributions.

The first chapter of this part contains our discussion of proper methods of analyzing qualitative (categorical) dependent variables. Such variables occur in many studies of criminality and in studies of both the criminal and civil justice systems. For example, studies of police, court, and correctional decisions frequently analyze categorical variables, such as whether a particular subject is arrested [e.g., see Hepburn (1978)], whether or not a defendant released on bail shows up for court, or the type of sentence that a defendant receives [e.g., see Clarke, Freeman, and Koch (1976) or Clarke and Koch (1976)]. Correctional research is frequently concerned with such things as

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