JAN GUNNARSSON: <u>Production Systems and Hierarchies of Centres: The Relationship</u>
<u>Between Spatial and Economic Structures, Atlantic Highlands, N.J.:</u> Humanities
<u>Press, 1977, viii, 140 pp.</u>

Peter Nijkamp, editor-in-chief of this series has afforded us another helpful
study. Jan Gunnarsson's monograph, like the others before it, provides regional
scientists with tools for empirical regional analysis and planning. In this
study, a quadratic programming model is introduced in order to bring together
for simultaneous analysis both plant sizes and city sizes.

Gunnarsson uses as his starting point the optimal distribution of plants and
centers according to both Tinbergen and Bos. Before presenting his model Gunnar-
sson provides a critical review of the common characteristics and differences in
the approaches of Christaller, Lösch, and Tinbergen. The fact that all three
fail to treat intermediate products leads the author to a programming model that
includes input-output coefficients, indivisibilities and transportation costs.
The model yields a ranking of sectors and centers. Two features of the model
are worth mentioning. First, footloose sectors are distinguished from locationally
restricted sectors. Second, total costs for transportation are minimized. One
can thus determine the characteristics of systems of centers that are optimal
with regard to transportation costs.

Gunnarsson then demonstrates how his static model can be used in a temporal
setting. In addition, he provides insights into systems of centers that are
optimal with regard to production and transportation costs. He shows the con-
ditions under which such systems are useful in terms of planning objectives.
Further discussion focuses on the location of economic activity when decision-
making is individual and based on price information.

Certain weaknesses in the programming model are brought out, such as the
condition that precludes total concentration in large centers when controls are
placed on the location of non-footloose sectors. In order to avoid this problem
but at the same time add the realism that comes from the scarcity of land in
centers, Gunnarsson provides an exploratory chapter where a number of restrictive
assumptions are relaxed. One of the results is a model for quadratic optimization
which includes fixed transportation, coordination, and control costs. No tests
are conducted here, however.

Early in the book, Gunnarsson reports on an empirical test concerning the
existence of a hierarchy of centers in Sweden. Principal components analysis is
used to group sectors according to the similarity of location and sector com-
position. Results indicate that the Christaller/Tinbergen type model better
reflects the Swedish system of centers than the Lösch model. This section is an
interesting aside to the general thrust of the book toward programming models.

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LEE R. MC PHETERS AND WILLIAM B. STRONGE: The Economics of Crime and Law Enforcement, Springfield, Ill.: Charles C. Thomas, 1976, viii, 508 pp.

This book is a collection of 24 essays on the economics of crime and law enforcement. All of these articles were previously published in various professional journals, five in the Journal of Political Economy, two in the Journal of Research in Crime and Delinquency, two in the Journal of Criminal Law, Criminology and Police Science, and each of the remaining articles are from various professional journals. The main purpose of this book is to bring together important contemporary articles on the economics of crime and to serve as an aid to students and analysts in the areas of economics, sociology and criminal justice. The book is divided into four sections:

    I.   Economic theory and criminal behavior
    II.   Empirical studies of the economics of criminal behavior
    III.   Law enforcement output and expenditures
    IV.   Economic analysis and operations research in criminal justice

The first section contains five articles with a key note opening essay by Gary Becker. Becker, as well as other authors of articles in this section, seek to make use of "positive economics" to answer normative versions of questions, such as how many resources and how much punishment should be used to enforce different kinds of legislation? How many offenders should be permitted and how many offenders should go unpunished? This essay mainly concentrates on determining optimal policies to combat illegal behavior, and concludes that optimal policies to combat illegal behavior are part of an optimal allocation of resources. There are two basic problems with the assumptions of Becker's analysis. First, he assumes that a criminal act is done by a "logical individual." Second, it is implicit in the supply function of offenses that the "criminals" not only have the knowledge of costs and benefits from criminal activities but they also know such things as their probability of conviction and their punishment per offense. Such a perfect rationality and knowledge is difficult to justify on the part of most of the criminals. Even George J. Stigler in an essay in this volume questions the notion of "social value of the gain to offenders" from the offense, and accordingly "one is entitled to doubt its usefulness as an explanatory concept: what evidence is there that society sets a positive value upon the utility derived from a murder, rape, or arson?" Furthermore, the market supply function for offenses is independent of population, which is hard to justify.

In the second essay, "On the Economics of Law and Order," John R. Harris attempts to extend Becker's analysis to take into account the legal framework which, along with intensity of police activity and levels of punishment, is subject to policy choice. Harris points out that optimal levels of these policy variables rests on how various losses are perceived. It is the political process that will determine the extent of the interest of various groups to be reconciled or which groups will be able to impose their will on the rest of society. Harris makes it quite clear that the economic analysis is absolutely powerless to throw light on resolution of group conflict.

In the third essay, "The Optimum Enforcement of Law," George J. Stigler

proposes to construct a theory of rational enforcement. According to Stigler departures of actual from prescribed behavior are crimes or violations. If the same punishment were meted out for each crime, the rational utility maximizing criminal would commit the most serious crime it if netted him a larger income at no increase in the expected punishment cost. In conclusion, Stigler states that the failure to adopt national criteria of enforcement of laws has been due to a simple lack of understanding of the need for and nature of national enforcement.

Hann in his essay, "Crime and the Cost of Crime: An Economic Approach," tries to provide a rigorous definition of crime by using the analysis of welfare economics. He provides rather a circular and abstract definition of crime. "A criminal activity is a 'socially bad' criminal activity if, by restricting its level, the government could achieve a pareto better level of welfare for the community." An important point raised by this study is that "any cost of a crime or criminal justice program should, therefore, ideally be derived from dynamic models of the criminal justice system and the relations in such a model must be estimated simultaneously."

Finally in this section Gordon Tullock attempts to demonstrate the utility of economic perspective and to present simple computational tools in two areas of the law: (1) motor vehicle code violations; and (2) tax evasion. The interesting aspect of this essay is that most of us have had some personal experience with these violations. In both cases he provides us with rather simple computational tools for defining an "optimum law," but these calculations require empirical information which is both hard and costly to collect.

Section two contains seven essays which deal with a theoretical as well as an empirical investigation of criminal activities. First, a paper by Isaac Ehrlich tries to incorporate in the concept of opportunity costs - both of punishment and reward from legitimate and illegitimate pursuits. It also attempts to link formally the theory of participation in illegitimate activities with the general theory of occupational choice of presenting the offender's decision problem as one of an optimal allocation of resources under uncertainty. A simultaneous equation model is developed to explain the crime variations across states in the United States using data for the years 1950 and 1960. Empirical results are provided for both ordinary least squares and two stage least squares methods. First, his assumption that the rate of growth of the total population and of the criminal subpopulation are the same is questionable. These statistical results are not entirely consistent with his theoretical model. The fault is ascribed to the poor quality or lack of data rather than to weaknesses in the theoretical analyses. Such an inconsistency is present in most of the empirical papers presented in this volume. For example, a paper by David L. Sjoquist attempts to develop a model to explain the allocation of time by an individual between legal and illegal activities. However, empirical testing provided only tentative credence to Sjoquist's hypothesis. Similar limitations exist for the remaining papers in this section.

The papers in Section three examine the public goods aspects of police services and explore the effectiveness of society's police expenditures. First, a paper by Carl S. Sharp attempts to find standards for distributing a free governmental service like police protection and identifies the difficulties of

having uniform standards. John C. Weicher in the second paper examines the direction and extent of the income redistribution that is generated by municipal expenditures on police patrol activities, and the taxes levied to finance these costs. Based on police patrol expenditures for only 35 Chicago police districts, this study concludes that in terms of income classes, the police expenditures are not made primarily to serve rich and middle income families and accordingly, do not involve income redistribution in favor of these groups. Further, this study asserts that police expenditures are made primarily in poor districts, to serve poor families, who are subsidized by the middle income classes. The case of the rich is ambiguous and they may be subsidizing the poor or they may be subsidized by the middle classes. Norman Walzer in his paper claims to have constructed an index of service for police departments which is a composite of the number of offenses cleared, number of accidents investigated and miles traveled by police vehicles. It is not clear from his paper as to how he adds dissimilar items to come up with an overall index. Nevertheless, his statistical results suggest economies of scale in police services. Julius A. Gylys in his essay attempts to determine the optimal quantities of county police activity each political district should receive as well as their matching tax bills. His analysis indicates that results depend upon the peculiar nature of externalities that occur in the provision of urban law enforcement services. The remaining three papers deal with the question of relationship between police expenditure and crime rates. McPheters and Stronge show in a simultaneous equation system the relationship between crime and police expenditures is negative, suggesting that increased police expenditures do have a definite deterrent input upon criminal activity.

Section four contains five essays which are diverse in nature. The Phillips and Votey paper examines the processes generating crime, and the productivity of law enforcement agencies. These two processes are combined in a model which allows an analysis of underlying causes and the various appropriate responses to the crime problem. According to their statistical model crime can only be controlled provided we fight crime by simultaneously providing sufficient resources to law enforcement agencies to combat crime and by maintaining sufficient economic opportunities for an important segment of the population. Heller and Markland attempt to develop a forecasting model by adding two climate variables to their regression model and they achieve reasonable success in forecasting demand for police services in three cities - St. Louis, Chicago, and Detroit. In their paper Chilton and Spielberger propose to adopt a uniform booking report and all police agencies in a state were required to submit reports for all persons cited or taken into custody. Such additional information could provide a valuable insight into the crime trends in a state. Finally, Blumstein and Larson attempt to model the criminal justice system, both in a detailed linear model and in a rather aggregated way. These models allow them to study questions regarding the criminal justice system, its costs, workloads, and resource requirements and the effects of alternative rehabilitative procedures on criminal careers.

This volume brings together many scattered materials and it will serve as a reference book for researchers in economic, sociology and criminal justice. However, in using this volume we must keep in mind that in the selection of essays the editors have created a bias towards propagating the Chicago school of thought in the use of economic analysis to the field of criminology.

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B. S. PUSHKAREV AND J. M. ZUPAN: <u>Public Transportation and Land Use Policy</u>,
   Bloomington: Indiana University Press, 1977, ix, 242 pp.

The basic question addressed in this book is how to match the supply of
transit services to an existing pattern of demand. In analyzing what is essen-
tially a management problem, Pushkarev and Zupan rely on the well known relation-
ship between the density of economic activity and patterns of transit usage.
Although the basic question is couched in terms of future improvements in all
transit systems, the analysis relies solely on a cross-sectional evaluation of
the somewhat unique New York City transit systems.

The book is neatly divided into three parts sequentially discussing the demand
for transit service, the supply attributes of transit and the matching of supply
with demand. Chapters One and Two are concerned with identifying the interplay
between the density of economic activity and socio-economic characteristics on
the pattern and levels of mechanized trips. An appendix, containing the procedures
used for estimating transit demand, is included as a planning cookbook. Chapters
Three and Four describe the supply attributes of transit service. Eight different
modes of transit (taxi, dial-a-bus, local bus, express bus, light rail, light
guideway, standard rapid transit and commuter rail) are defined in terms of cost
and other standard output indicators in Chapter Three. Operating conditions
(speed, station spacing, means of access and peaking ratios) are then discussed
in Chapter Four. In Chapter Five, the authors carry out the matching of supply
with demand. Although different methods are used for the analysis of the eight
modes, the basic conclusion is that optimal levels of transit supply are dependent
upon the size of a community's CBD and the length and slope of various density
gradients emanating from nonresidential activity centers. In most cases, this
matching is accomplished by relating a measure of supply costs to the combined
center size-density configuration which produces the required ridership to meet
the "target" values on a cost/revenue criterion. Finally, Chapter Six attempts
some general answers to the dual questions of how the location and intensity of
economic activity affects transit usage and what kinds of transit service can
be supported where. Various land use and transportation funding policies which
would enhance the delivery of transit services are explored and prototypical
scenarios presented.

Two aspects of the study are of particular interest. First, the authors are
concerned more with the supply rather than the demand side of service provision,
even though this may not be evident given the prominence of the demand discussion
and the title of the book. If one were to build a conceptual model of the
author's approach, the size of the CBD and the density gradients are endogenous
and the problem is one of finding the type and level of supply which is most
appropriate. This approach, of course, differs in kind from the prevalent
academic inclination towards the study of transit, i.e., modeling transit usage
within the context of modal split, given a transit network and competing attri-
butes of the auto.

Second, coincident with the producer orientation is a novel measure of suppl
used in the analysis of local bus systems. The indicator, vehicle-hours per
square mile, is one of the few attempts anywhere to characterize the produced
output of an essentially non-punctiform public service in spatial terms. This

is a creative approach worthy of further academic study. Furthermore, Pushkarev and Zupan also develop a cost measure associated with these produced service levels in areal units. According to the authors, such measures have "intrinsic value ...for...they suggest that even if residents of an area ...wish...to have bus service (of certain attributes)...they can have it - provided each resident contributes (in terms of generating revenues from ridership or paying a subsidy)," [p. 140, emphasis added]. From the point of view of the producer of services, the calculation of zonally defined output and cost measures goes a long way in determining the efficiency of production processes which are inherently spatial. Transit, of course, is a prime example of such a production process.

There are also two major shortcomings. In the final chapter, the authors provide a broad discussion of what kinds of transit systems could work in different kinds of communities, defined on the basis of CBD size and average residential densities. However, since it is intraurban variations in density which were earlier shown to be the basis of transit demand, more time should have been spent on discussing land use and transportation policies affecting intraurban variations in supply. In the short run, adjustments to existing systems are likely to be much more important than determining the appropriate type of transit for new systems. As an exercise in logic, it is useful to follow the authors' line of analysis to the sub-system level. An optimal allocation of services would mandate a large concentration in high density areas with the possible adjunct of providing little or no service in lower density suburban areas. While this is a meaningful economic recommendation, it is often dismissed on political grounds. This leads to a discussion of the second shortcoming of the volume: political inputs into the transit provision process are virtually ignored. The political dimension often requires the scattering of existing service over an entire metropolitan area, including those portions where any level of supply could never be justified on the basis of demand. Naturally, this serves to erode the aggregate efficiency of the transit operator, as measured by cost per passenger. In a study devoted to identifying strategies to increase transit sector productivity, surely the most significant constraint should have been more extensively discussed.

The Pushkarev and Zupan book appears at a time when questions of public service management, including transit, are burning issues. The encyclopedic documentation of variations in transit supply attributes, although weakened by lack of reliable cost and operating data on a large scale, is appreciated. Data forthcoming from UMTA's Sec. 15 (a) regulations will yield finer cost estimates and better tools of transit service measurement. The use of producer related performance criteria, such as cost per passenger, to determine economic viability of different systems in different operating environments is especially topical in light of recent UMTA activity in this area.

As a point of interest, this book has recently been reviewed in Transportation [Burnett, 1978] and the Journal of the American Institute of Planners [Doug Lee, 1978]. The reviews, both by prominent figures, present a contrasting picture of the study. The first review is extremely critical of the cross-sectional inductive approach to determining general statements concerning transit demand. On the other hand, the second review was complementary especially in regard to the

planning uses of the information presented and the nature of the land use and transport policies suggested. It seems, therefore, that there is a gap between what the academic purist wants, i.e., sophisticated demand modeling and what is useful to the practitioner, i.e., useful management techniques.

Overall, the book is a success. It provides an excellent introduction to the evaluation of transit service supply and is written in such a manner as to command a wide audience among both academicians and practitioners.

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