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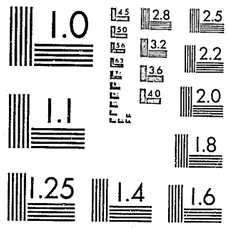

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CRIME AND ARREST RATE PREDICTIONS FOR THE STATES OF ALASKA AND OREGON: EXECUTIVE SUMMARY

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NCJRS
JAN 24 1984
ACQUISITIONS

JUSTICE CENTER
SCHOOL OF JUSTICE
University of Alaska · Anchorage

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EXECUTIVE SUMMARY

This research addresses two related questions: (1) what is the "future of crime" in Alaska and Oregon, and (2) can criminal justice agencies use statistical forecasting methods as a routine planning tool? To address the first question, Box-Jenkins models were constructed for 96 crime and arrest time series. The forecasts generated by these models were consistent with expectations for the most part, although there were some surprises. A mail survey of state criminal justice agencies and our experience with data sources in Alaska and Oregon addressed the second research question. The results of this survey suggest that many agencies routinely deal with forecasting problems but few do forecasting on a routine basis. Major obstacles to routine forecasting in criminal justice agencies include a lack of experience with statistical forecasting methods, a lack of resources, and a lack of appropriate data. Our experience with forecasting crime and arrest statistics in Alaska and Oregon suggests several methods for overcoming these obstacles.

The Future of Crime in Alaska and Oregon

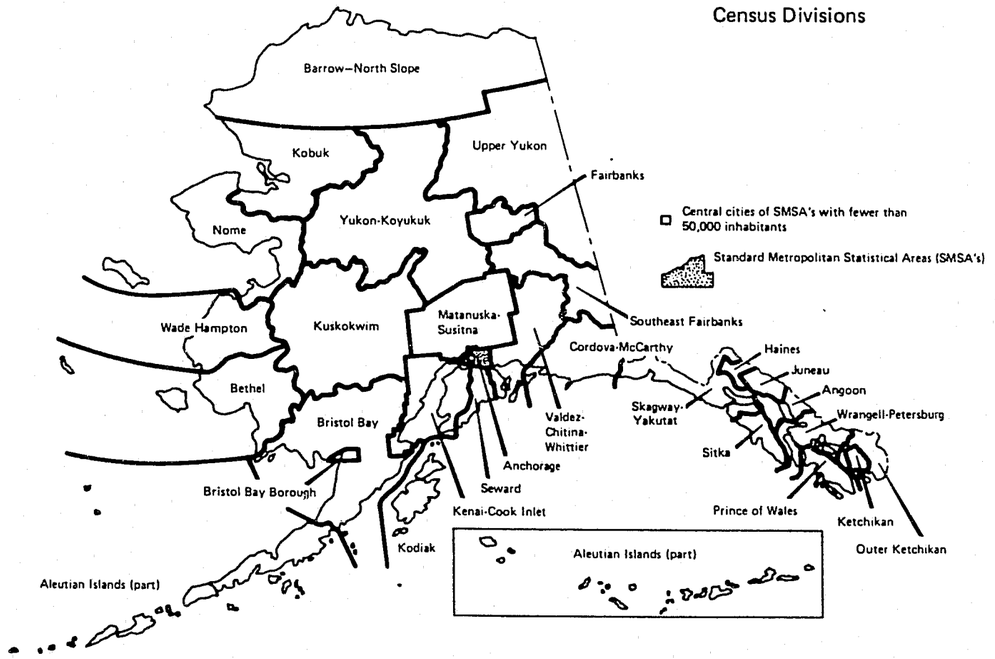
Seven years of monthly crime and arrest statistics were collected from 16 Alaska and 36 Oregon Uniform Crime Reporting (UCR) areas. For the purposes of forecasting, these data were aggregated into violent crime (homicide, assault, rape, and robbery) and property crime (burglary, theft, and auto theft) categories. Arrest data, aggregated into the same violent and property crime categories, were broken down into age (juvenile

and adult) and race (white and nonwhite) categories. The eight time series defined in this way were then forecasted for four regions of Alaska and seven regions of Oregon.

In Alaska, the forecasting regions were Anchorage, Fairbanks, Juneau, and "rural" Alaska. The cities of Anchorage, Fairbanks, and Juneau have populations of 180, 20 and 7 thousand respectively and are considered to be the urban centers of the state. The fourth forecasting region, rural Alaska, comprised the remaining thirteen UCR jurisdictions, including Bethel, Homer, Kenai, Ketchikan, Kodiak, Palmer, Petersburg, Sitka, Skagway, Soldotna, Valdez, Wrangell, and the Alaska State Troopers who police the rest of the state (see Chart 1).

With the exception of Anchorage, violent crime is expected to remain stable in Alaska through 1987. In Anchorage, violent crime is expected to rise modestly and since Anchorage constitutes the bulk of Alaska's crime, statewide violent crime is also expected to rise modestly. Property crime is also expected to rise steadily in Anchorage through 1987 at a faster rate than the rise expected for violent crime; but property crime rates in Fairbanks, Juneau, and rural Alaska are expected to remain constant or even decline. Overall, these forecasts suggest that crime will become an increasing problem in Anchorage, though not in the rest of Alaska. We furthermore expect property crime (burglary, larceny, and auto theft) to become a proportionately larger share of the total crime problem in Alaska through the next decade.

Census Divisions

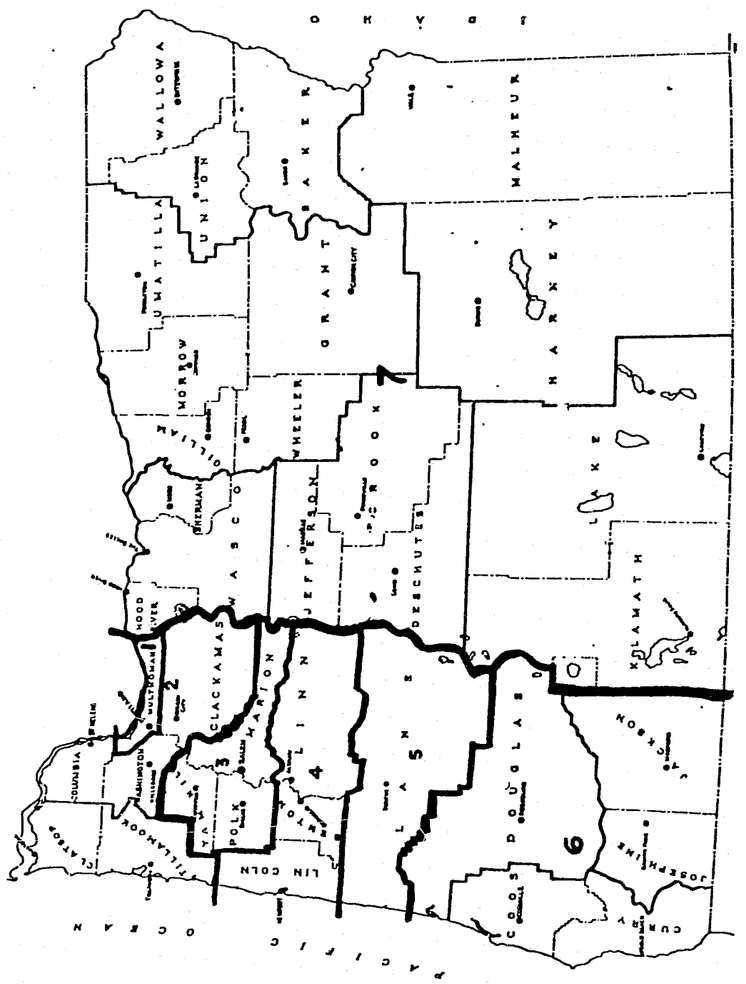


In Oregon, the future of crime is expected to be somewhat different. The seven Oregon forecasting regions are the officially defined planning regions used by the Oregon Law Enforcement Council (see Chart 2). Region 1 consists of Multnomah County, including the city of Portland. Region 2 includes the suburban communities adjacent to Portland and the northwest portion of the state. Region 3 comprises the north-central portion of the Willamette Valley and Region 4 covers part of the central Willamette Valley including a portion of the coastal area. Lane County, including the cities of Eugene and Springfield, is Region 5 and Regions 6 and 7 comprise the southwest and eastern half of the state. Regions 1 and 5 are the most populated areas of Oregon and Regions 2, 3, 4, 6 and 7 are a mix of urban and rural areas.

Violent crime in six of the seven Oregon regions is expected to remain constant or even decline through 1987; Region 3 is the exception. In Region 1, which includes the city of Portland, violent crime increased steadily throughout the late 1970s, and it appears that the increase has now "peaked." Property crime is another matter. In Regions 1 and 2, property crime is expected to increase steadily. Prior to 1982, however, property crime in Region 1 increased markedly. The expected increases through 1987 will be somewhat smaller than the pre-1982 increases, suggesting that growth of property crime in this largely urban region will taper off over the 1980 decade.

Summarizing these forecasts, we expect crime in Alaska to

CHART 2


WALLOWA
UNION
BAKER
MALHEUR
UMATILLA
GRANT
HARNEY
MORROW
WHEELER
CROOK
JEFFERSON
SHERMAN
WASCO
DESCHUTES
LAKE
KLAMATH
HOOD RIVER
CLACKAMAS
MARION
LINN
LANE
DOUGLAS
JACKSON
COLUMBIA
WASHINGTON
YAMHILL
POLK
BENTON
CLATSOP
TILLAMOOK
LINCOLN
COOS
CURRY
JOSEPHINE
1
2
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4
5
6
OCEAN
PACIFIC

become an increasingly urgent problem while, in Oregon, rates of growth are expected to decline. Although the crime problem in Oregon may grow larger, it is not expected to grow substantially larger and may even decrease by the end of this decade.

In theory, crime and (clearance by) arrest are related, so one might expect the "future of arrests" to mirror the "future of crime." This is not always the case. In Alaska, the rate of clearance by arrest for property crime is expected to rise slightly and then begin gradually declining through 1987. Arrests for violent crime, in contrast, are expected to decline in 1983 and then level off through 1987. In Anchorage and rural Alaska, the property crime arrest trend is expected to be heavily influenced by an increase in arrests of juveniles. The expected arrests of nonwhites for property crime are similar to the statewide estimates but nonwhite arrests for violent crime are expected to decline significantly during 1983 and then level off through 1987. This trend is prevalent in Anchorage, Fairbanks, and rural Alaska. In Juneau, the trend is constant throughout the five-year period.

In contrast to Alaska, arrests for both violent and property crimes are expected to increase substantially in Oregon through 1987. Considering age, juvenile and adult arrests for violent crime are expected to differ with a more substantial increase in adult arrests than in juvenile arrests. For property crime, juvenile arrests are expected to rise gradually in 1983 and then level off, whereas adult arrests will increase significantly.

Nonwhite arrests for violent property crime are expected to be roughly similar to the statewide and Region 1 total arrest trends. The numbers are too few to accurately break out nonwhite arrests in other regions of the state.

There was an analysis of other arrest trend patterns in Alaska and Oregon, but they are too varied and complicated to be summarized here. Furthermore, there is no simple means of interpreting the trends. Increases and decreases could reflect changes in the types of offenders, changes in the types of crime reported to the police, or changes in the official responses of police agencies to reported crime.

One complicating factor in these forecasts, for Alaska at least, is that the Alaska Criminal Code was substantially revised in 1980. In an effort to determine the impact of this event on the future of crime, the Alaskan property and violent crime time series were reanalyzed using Box-Jenkins intervention analysis procedures. This reanalysis found a statistically significant decrease in both property and violent crimes beginning with implementation of the revised code in January, 1980 but the results should be considered tentative. That is, these estimates provide some evidence for the hypothesis that the revision of the Alaska Criminal Code in 1980 had a salutary impact on violent and nonviolent crime; however, our reanalysis had only 24 post-revision observations and there was no control group available for comparison. Because of these design problems, we cannot rule out other reasons for the change in crime patterns following the

Code revision. For example, we could not take into consideration the effects of abolishing plea bargaining or of recent changes in sentencing practices or the impact of completing the Trans-Alaska pipeline. It is quite possible that the estimated impact would change substantially if a longer postintervention series were available or would disappear if compared to a control group. We recommend that this issue be re-examined in the near future.

These forecasts and the impact analyses are based on the Box-Jenkins time series method. One major disadvantage of this statistical method is that, in most cases, the cause or source of a trend cannot be isolated. The method can estimate a likely trend, that is, but cannot ordinarily specify the variables underlying the trend. In light of this disadvantage, several multivariate statistical methods were applied to the same forecasting problem. Data for these analyses consisted of annual crime and arrest (per population) rates and a set of annual crime control, health, economic, social, and political indicators which theoretically were thought to cause crime in Alaska and Oregon. Examples of these causal indicators are the number of police personnel, the number of court filings, unemployment rates, conviction rates, and a broad collection of demographic and vital statistics.

Over 80 potential predictor variables were originally identified for these analyses of which 34 were actually available in any form. Of these 34, only a dozen variables were available for four consecutive years between 1976 and 1980. The quality of

these multivariate models is necessarily limited by this "lack of data" problem.

Nevertheless, in Alaska, a multivariate (panel) model found that past crime, arrest, and criminal filing rates were causally linked to future crime rates. Specifically, when criminal filing rates decrease, crime rates subsequently increase. One may interpret this result to mean that prosecutorial activity has a salutary impact on crime in Alaska; however, in Oregon, a multivariate (panel) model, which unfortunately did not have criminal filing at the time of the analysis, found that past crime, arrest, and imprisonment rates were causally linked to future crime rates. Specifically, when imprisonment rates decrease, crime rates subsequently decrease. This finding implies that the use of prison sanctions against convicted criminals actually causes crime and, as such, it is a counterintuitive finding. It must be emphasized that there are a number of alternative, subtle explanations for these findings, including a purely statistical one. In short, we do not wholly endorse the validity of these findings for Alaska or Oregon but, rather, recommend that further analysis be completed when better data become available.

The forecasts derived from the panel models are not of the same quality as the forecasts derived from the univariate Box-Jenkins models. As a general rule, multivariate methods such as a panel model require better quality data than univariate methods and these were simply not available for either Alaska or Oregon.

Highlights of the Forecasting Results

Our experience at forecasting crime and arrest rates in Alaska and Oregon has led us to the general conclusion that crime rates in both states will increase through 1987. In both states, the bulk of the increase will be realized in nonviolent or property crimes; and, in Alaska, the increase will be realized almost entirely in the city of Anchorage. Beyond this, our analyses uncovered some evidence of the causal mechanisms underlying these increases. In Alaska, for example, we found preliminary evidence to suggest that the 1980 Criminal Code revision may have resulted in a decrease in both violent and property crime. Although we forecast both crime categories to increase through 1987, our analysis suggests that this increase is due primarily to population growth; without the 1980 Criminal Code revision, the increases would be expected to be much larger. The problem with this finding of causation is that it is based on only two years of post-revision experience and there was no control group. The data must be reanalyzed using more rigorous evaluation methods.

Finally, in both states, our analyses uncovered lead indicators of crime and arrest rates which, in theory, can be manipulated by the policymaker. In Alaska, criminal filing rates, a crude measure of prosecutorial activity, was negatively related to crime rates; when the criminal filing rate rose, the crime rate fell one year later. In Oregon, imprisonment rates were positively correlated with crime; when the imprisonment rate rose - or when the use of probation dropped - the crime rate rose one year later.

These relationships need further study but both appear to promise policy options for reducing the crime rate. It is important for future research to analyze state data using both criminal filings and imprisonment rates in the same study. If criminal filings and imprisonment rates are found to be statistically significant predictors within the same state, then it may be important to increase the prosecutorial and court actions with more emphasis on diversion or community-based treatment options.

The Future of Forecasting in Criminal Justice

The second question addressed by this research concerns the feasibility of forecasting in a routine agency context. It is one thing for academic researchers to prepare *ad hoc* forecasts but quite another thing for agency personnel to prepare forecasts on an ongoing, routine basis.

Throughout this project, we consciously worked "as if" we were preparing forecasts for use in an agency. We consulted regularly with agency personnel in several states and, in the end, our forecasts reflect the needs of operational agencies as we perceived those needs. Not surprisingly, the problems we encountered were similar or even identical to those encountered by agency personnel. Our solutions to these problems were, by and large, the solutions that agency personnel would have chosen; they were practical solutions.

If our experiences were typical, the greatest obstacle to routine forecasting of crime rates is the lack of data. In principle, high quality data are available for this purpose. In

practice, however, data collection costs and time deadlines limit both the quantity and quality of data. ARIMA time series analysis proved to be the most feasible method of forecasting simply because this method required the least amount of data. In both states, reliable crime statistics were available only beginning in 1976. This immediately ruled out the econometric method. The panel method was not ruled out but was limited by the length of the available series and number of cases at the city and county level of analysis. Analysis cost was also high for this method.

In light of the importance of data in forecasting crime and arrests at the state level, we present several suggestions for improving the quality of data.

First, there is a need for state level, comprehensive planning concerning the organization and operation of data bases. At present, not only is there no comprehensive state policy concerning criminal justice data management, but also no available index of the major data sources, systems or files exists. Anyone interested in general policy analysis or planning must begin projects by surveying and searching federal, state, local, and private agencies for appropriate data sources.

The planning for data bases should logically begin with the development of a data index or catalogue which is routinely maintained and available for use in policy development. The simple identification of available, usable data would substantially facilitate use of the information and reduce duplication of efforts and studies.

Once an accurate description of the existing data bases is available, decisions can be made concerning possible duplication, deficiencies, and priorities. The system for making such decisions should provide for participation by a broad spectrum of policy officials in the legislative, judicial and executive branches of government as well as researchers from the academic and planning communities.

Second, the states, through administrative or legislative action, should establish standard definitions, reporting areas, reporting periods, and reporting deadlines. This standardization should be applicable to all agencies involved in the data system. It would help to ensure comparable data within each state. Where national definitions have been developed, the state should, wherever possible, remain consistent with the national guidelines.

Third, additional federal and state level financial support should be designated specifically for the operation of data base operations. This support should go to both the operational agencies that have been given the responsibility for accumulating and reporting the raw data and to the specialized operations responsible for processing and maintaining the data. Organizations with independence from operating agencies and missions specifically related to data base maintenance and processing would in all likelihood serve to ensure the most reliable information and objective reporting - especially if such agencies are provided with the authority to audit the data collection and processing activities of those organizations responsibile for submitting

raw data. It is quite clear that both federal and state budget reductions have served to substantially reduce the data bases available only a few years ago. Given the present situation, it will not be possible to use the same variables to replicate this study using post-1980 data because many of the data bases have collapsed.

Fourth, each state should create a formal process for instituting, modifying or discontinuing data bases. This process should be sufficient to prevent actions that might affect the policy analysis capabilities of the state. It will also serve to ensure that funds are invested in the maintenance of high priority data which will remain comparable over a period of time.

The preceding suggestions relate only to the area of data bases which are beyond those designed solely for the internal management of agencies. They are directed at establishing a system which will provide the comprehensive information required in assessments of broad social policies and forecasting long term trends. While there is already considerable advocacy for the maintenance of data bases for internal management of individual operating agencies; however, advocates become less enthusiastic for maintaining agency data to use in policymaking affecting a cluster of agencies.

Overview of the Final Report

The final report presents the details of our research. In Section I, Crime Forecasting in Perspective, we discuss the state of the art of crime forecasting. Attention is given to an analysis of the literature on the subject and to the results of a national survey on the use of forecasting in criminal justice agencies.

Section II, Conceptual Requirements for Crime Forecasting, presents literature and discussion of the theoretical issues associated with crime forecasting. Importantly, the conceptual framework for this research which emphasized a social policy perspective is presented.

In Section III, Data Sources and Requirements for Crime Forecasting, our discussion focuses on the research setting, variable identification and data collection. Particular attention is given to the data problems incurred in Alaska and Oregon as well as problems reported in our national survey on criminal statistics. This section is highlighted with suggestions for improving data for crime forecasting purposes.

Section IV, entitled Comparison of Univariate and Causal Extrapolation Forecasting Methods, points to the similarities and differences in the forecasting methods that were being considered for our research. This section is closely allied to Section V, Crime and Arrest Forecasting Procedures and Results which presents a step-by-step discussion of the forecasting methods employed and crime forecasts themselves.

Each section of the report is organized on a project team model with sections linked to form the primary product. Readers who are interested in less technical discussions may find

Sections I and III more stimulating. Those who are interested in theory are directed to Section II and those interested in analytical methods should read Sections IV and V. Readers who are only interested in the results will find that this Executive Summary will suffice.

END