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Management Factors Affecting Police Productivity

Summary Report

by

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MANAGEMENT FACTORS AFFECTING POLICE PRODUCTIVITY

SUMMARY REPORT

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This report explores some productivity improvement options for municipal police departments. For local governments in the United States, police services represent one of the largest budget categories. Police departments have been under particular pressure to reduce expenditures or, at best, to operate with constant budgets. To maintain or increase service levels, police must learn to make better use of the resources at hand.

Police managers are constrained in their selection of options for productivity improvement. Police managers find themselves bound by hiring decisions that antedate their tenure, by union and civil service work rules, by time-honored traditions, and by a lack of valid information regarding the likely effects of proposed changes. Basic resource decisions are often exogenous to their control. Personnel limits and equipment complements are frequently set through political processes external to the department. But police managers may have flexibility when deciding how personnel and equipment are to be utilized. These decisions and their implications for departmental productivity are the focus of this research. Key variables of interest are the allocation of sworn officers among specializations within departments and, for the patrol force, the deployment of officers for field duty. Additional variables of interest are the use of civilians and reserve officers.

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The research is exploratory in nature, involving two stages. In the first, a methodology recently developed by management scientists is used to assess the productive efficiency of police agencies relative to one another.¹ The methodology identifies those police agencies which obtain the highest levels of outputs for given inputs (or, conversely, those which employ the smallest sets of inputs to obtain given outputs) and computes a relative efficiency rating for departments that obtain fewer outputs or require more inputs. In the second stage, the efficiency ratings are regressed on variables indicative of different management choices to determine how these choices are related to productivity.

Police Outputs and Inputs

Police in the United States perform a wide array of tasks, ranging from the mundane to the most serious. It is not possible in any analysis to consider the full array. In this report, the focus is restricted to the core technology of policing. Two outputs were chosen to represent that core. These are the number of crimes cleared by arrest in one year and the average number of patrol units on the street at any time during a 24 hour period.

These two outputs account, at least as proxies, for the bulk of the work accomplished by local police departments. Attempting to solve reported crimes constitutes most of the workload of police detective and other investigative divisions. Preventive patrol and the response to service requests constitutes most of the workload of police patrol divisions. Investigation and patrol divisions together comprise the majority of officer assignments in all departments.

Three police inputs were used in the analyses. These are 1) the number of full time sworn officers, 2) the number of full time civilians, and 3) the number of vehicles utilized by the department. These inputs represent ninety to ninety-five percent of the expenditures of most local departments. One non-police input, the number of crimes reported to police in one year, was included as well. It was found to be a strong predictor of crime clearances, independent of the police inputs, and was included to represent the variety of socioeconomic and demographic characteristics of the departments' jurisdictions.

The Data

The data employed were collected in 1974-75 in a study of the organization of police service delivery in U.S. metropolitan areas.² All police departments in 85 Standard Metropolitan Statistical Areas were surveyed and data were obtained on each department's input resources, on the utilization of those resources, on jurisdictional service conditions, and on the outputs obtained. From the 469 municipal police departments with 10 or more full time sworn officers found in these 85 metropolitan areas, two subsets were selected. These were departments employing between 25 and 50 full time sworn officers and those employing between 100 and 200 officers. Separate analyses of productivity and possible productivity improvements were conducted for each subset.

Sixty-two police departments were included in the 25 to 50 sworn officer subset, while 49 departments were included in the 100 to 200 subset. Table 1 presents summary data on the output and input variables for these departments, together with three output/input

ratios. Police managers reading this report can make reference to these data to determine the comparability of their own departments to the ones analyzed.

Comparison of the three output/input ratios for the two subsets indicates a difference in the emphasis placed on production of the two outputs. Departments with 25 to 50 sworn officers emphasize patrol deployment more than crime clearance, while the reverse appears true in larger departments. In the 25 to 50 officer subset, the median department deploys one patrol unit for each seven sworn officers, while the median larger department deploys one unit for each 10 sworn officers. Thus, the smaller departments obtain relatively higher patrol productivity from their sworn officers. On the other hand, the larger departments obtain higher productivity in the clearance of reported crimes. Whether indexed by the number of crimes cleared per sworn officer or by the clearance rate, departments with 100 to 200 sworn officers score higher than those with 25 to 50 sworn officers. A partial explanation for this higher clearance productivity among larger departments is the higher volume of reported crimes in their jurisdictions. The median larger department recorded approximately 31 crimes per sworn officer in 1973, while the median department with 25 to 50 sworn officers reported approximately 20 crimes per sworn officer. Since total crimes reported is a significant predictor of total crimes cleared, independent of the level of discretionary resources, it is to be expected that the larger departments obtained more clearances per sworn officer. Further, the larger volume of crimes in their jurisdictions appears to lead to a shift in production emphasis toward crime-solving activities, with the result that the deployment of patrol units for on-street duties is lower.

Comparing Efficient and Inefficient Departments

Table 2 presents summary measures of output and input variables and selected output/input ratios for the departments identified as efficient and inefficient in each of the size subsets. As one would expect, these data show that efficient departments obtain higher levels of police outputs, while employing generally lower levels of input resources.

The median number of patrol units deployed by efficient departments with 25 to 50 officers is 5.5, approximately 38 percent more than the median number deployed by inefficient departments of this size. The median clearances by arrest among the efficient departments is 74 percent greater than among the inefficient departments. Efficient departments of this size employ, at the median, more full time sworn officers and fewer civilian employees than do inefficient ones. The median values for patrols and clearances per sworn officer are substantially higher among the efficient than among the inefficient departments, as is the median clearance rate.

Similar output differences are found comparing median values for efficient and inefficient departments with 100 to 200 officers, although the percentage differences are smaller. The median values for all input values among efficient departments of this size are lower than those among the inefficient ones, including a smaller median sworn officer complement. Here, too, the output/input ratios show significantly higher productivity values for the efficient departments.

Estimating Productivity Impacts

The intent of this research was to identify factors subject to management control which might improve the productivity of local police departments. Available data allowed the estimation of the productivity impacts of four classes of factors. These were 1) the allocation of sworn officers among various specializations within departments, 2) the use of civilians, 3) the use of reserve (volunteer) officers, and 4) the deployment of patrol officers in one or two-person units.

Sworn officer allocation was measured by 1) the percent of sworn officers allocated to the patrol force, 2) the percent allocated to other direct and auxiliary service production, i.e., investigation, traffic, radio communications, crime lab, and training, and 3) the percent allocated to command functions and to staff such as planning and research. Civilianization was measured by the ratio of civilians to sworn officers in each department, while the use of reserve officers was measured by the ratio of volunteers to full time sworn officers. Patrol deployment was measured by the percent of patrol units deployed with a single officer assigned.

Productivity Impacts in the Smaller Departments

These managerial variables do a respectable job of explaining efficiency variations among the departments in the 25 to 50 sworn officer subset. In total, they explain 45 percent of the variation in relative efficiency among these departments. Three of the five managerial variables are highly significant ($p < .001$), while the other two just miss statistical significance.

The allocation of sworn officers to patrol duties has a significant positive influence on relative efficiency among these departments. For the median department in this size range, a ten percent increase in sworn officer allocation to patrol is predicted to increase relative efficiency by about seven percent. The allocation of sworn officers to command and staff positions is also positively related to efficiency, although not statistically significant. Less efficient departments in this size range appear to underinvest in these functions relative to more efficient ones.

The ratio of civilians to sworn officers exhibits a strong negative relationship with relative efficiency among these departments. The median department in this size range has a ratio of 0.12 civilians for each sworn officer (or about one civilian for each eight sworn officers). A doubling of this ratio, increasing civilians from 4 to 8, would reduce relative efficiency by nearly 14 percent for this median department. The contribution to efficiency of reserve officers is positive but quite small (and not statistically significant). This means that reserve officers contribute little to these departments' efficiencies.

Deploying patrol officers in one person units instead of two has a positive and significant impact on the relative efficiencies of these departments. In this size range, most departments do, in fact, use almost exclusively one officer patrols. Those that do not pay a penalty in reduced relative efficiency. If, for example, the median department were to shift from exclusive use of one officer patrols to a mix that included half two officer patrols, its relative efficiency would drop approximately twelve percent.

Summarizing the productivity impacts for departments with 25 to 50 sworn officers, some recommendations may be offered for managers of similar departments. First, when allocating sworn officers among specializations within the department, consider bolstering the patrol division first. Officer assignments to this division are the most significant in enhancing departmental efficiency. Second, deploy patrol officers in one officer rather than two officer units. This deployment, too, enhances departmental efficiency. Third, consider whether additional personnel are needed in command and staff positions. Less efficient departments underinvest in such assignments. Last, be wary of recommendations to substitute civilians for sworn officers. While civilian personnel are less costly, their contribution to departmental productivity is lower than that of sworn officers, and such substitution can reduce departmental efficiency.

Productivity Impacts in the Larger Departments

Very little can be said about the impact of the managerial variables included in this research on relative efficiency among departments with 100 to 200 sworn officers. Only one of the variables considered is marginally significant. This variable, the percent of sworn officers allocated to command and staff positions, exhibits the opposite pattern from that found for the smaller departments. Less efficient larger departments appear to overinvest in command and staff ranks rather than underinvest. Police managers in similar departments, therefore, may wish to consider whether more productive assignments may be found for some command and staff officers. As with the smaller departments, civilianization is negatively related to relative efficiency among the larger departments, though the

coefficient for this variable falls short of statistical significance. Its substantial negative magnitude, however, suggests that managers of these departments, like their colleagues in smaller departments, should be wary of substituting civilians for sworn officers. The remaining managerial variables had essentially no relationships with relative efficiency. Obviously there are other factors at work which explain the differences in relative efficiency among these departments, but they could not be ascertained in this research.

Conclusions and Speculations

This report documents research aimed at identifying factors subject to managerial control which could be manipulated to enhance the productivity of local police departments. The research was exploratory in that it attempted to bring some recent methodology developed in management science to bear on this question. As with much exploratory research, the results are mixed. Analyses were conducted on two sets of police agencies. For one set, police departments employing between 25 and 50 sworn officers, managerial factors were identified that were significantly related to police productivity. Based on this identification, it was possible to recommend management strategies for these departments - increasing resource allocation to patrol, deploying officers in one person units wherever possible, and limiting the substitution of civilians for sworn officers. For the second set, departments employing between 100 and 200 sworn officers, the results were not satisfactory. While the methodology successfully identified the more efficient departments in this size range, the managerial factors analyzed were not consistently related to variations in departmental efficiency.

A possible explanation for this difference in results lies in the nature of managerial factors which could be explored in this analysis. The methodology employed for computing the relative efficiency of a set of agencies embodies an assumption that the units analyzed are "similar." That is, the underlying process for transforming inputs to outputs is common among the units studied. The data were analyzed in two size subsets because it was clear from an examination of outputs supplied that the two subsets differed significantly in their relative emphases. The smaller departments emphasized patrol related outputs and the larger emphasized investigation related ones. The managerial factors which did a satisfactory job of explaining productivity variations among the small, but not among the larger departments, are relevant for departments with a patrol emphasis, but much less so for departments emphasizing investigative outputs. For departments having such an emphasis, further analysis is required to identify factors enhancing investigative productivity.

Footnotes

1. Details of this methodology can be found in the full report of this project and in the references contained in that report.
2. A description of this study can be found in Elinor Ostrom, Roger B. Parks, and Gordon P. Whitaker, Patterns of Metropolitan Policing, Cambridge, Massachusetts: Ballinger Publishing Company, 1978.

TABLE 1. Outputs, Inputs, and Selected Output/Input Ratios.

	<u>25 to 50 Sworn Officers (N = 62)</u>			
	Median Value	Interquartile Range	Lowest Value	Highest Value
Average Patrol Units on the Street	5	4-6	3	8.5
Clearances by Arrest	104	56-225	13	461
Full-Time Sworn Officers	34	29-39	25	50
Full-Time Civilians	4	2-6	1	14
Number of Police Vehicles	8	7-11	4	24
Total Crimes Reported	706	381-998	145	1,787
Average Patrols per Sworn Officer	.140	.125-.150	.070	.200
Clearances per Sworn Officer	3.31	1.62-6.11	0.45	11.91
Clearances per 100 Crimes Reported (Clearance Rate)	16.4	12.0-23.1	3.6	36.7
	<u>100 to 200 Sworn Officers (N = 49)</u>			
Average Patrol Units on the Street	13	11-16	6	27
Clearances by Arrest	856	540-129	286	2,154
Full-Time Sworn Officers	125	112-150	100	194
Full-Time Civilians	25	16-35	4	57
Number of Police Vehicles	38	30-52	20	81
Total Crimes Reported	4,091	3,041-5,156	1,386	8,147
Average Patrols per Sworn Officer	.103	.087-.124	.049	.182
Clearances per Sworn Officer	6.50	4.51-9.86	2.13	14.00
Clearances per 100 Reported Crimes (Clearance Rate)	22.0	16.7-28.8	8.8	36.9

TABLE 2. Comparison of Outputs, Inputs, and Selected Output/Input Ratios for Efficient and Inefficient Departments.

Median Value of:	25 to 50		100 to 200	
	Sworn Officers		Sworn Officers	
	Efficient (N = 15)	Inefficient (N = 47)	Efficient (N = 12)	Inefficient (N = 37)
Average Patrol Units on the Street	5.5	4.0	14.0	12.5
Clearances by Arrest	172	99	958	787
Full-Time Sworn Officers	36	31	124	130
Full-Time Civilians	2	5	16	27
Number of Police Vehicles	8	9	36	38
Total Crimes Reported	547	716	3,918	4,306
Average Patrols per Sworn Officer	.157	.135	.124	.100
Clearances per Sworn Officer	3.91	3.17	7.70	5.78
Clearances per 100 Crimes Reported (Clearance Rate)	22.7	15.4	31.5	19.6