



Relative efficiency of police directorates in Slovenia: A non-parametric analysis

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ARTICLE INFO

Keywords:

Performance measurement
Data envelopment analysis
Police
Slovenia

ABSTRACT

The main purpose of the paper is to apply a non-parametric methodology for measuring public police performance in Slovenia. The paper considers how previous studies have modeled the role of policing in their specifications of inputs and output. In particular, the multiple-stage Data Envelopment Analysis (DEA) technique is presented and then applied to measure the relative efficiency of police-work-related data for eleven Police Directorates (PDs) in 2010 and also compared with the efficiency scores in 2005. The data obtained from the police databases is analyzed through the Frontier Analyst 4.0 and SPSS 19.0 statistical package software. The results show that the technical efficiency varies significantly across the police directorates and across the selected years, even when we allow for environmental factors and control for these non-discretionary inputs. Most police directorates in Slovenia could attain a higher output if they were fully efficient. Indeed, all of the inefficient police directorates can learn how to ensure a "good" performance from the efficient ones (i.e. the Maribor PD and the Novo mesto PD) by observing how they are processing their inputs and outputs. Finally, the empirical results of the paper are important indicators of the relative efficiency (or inefficiency) of police directorates that can serve as a guide to the General Police Directorate when further investigating how to enhance the performance efficiency of the various units.

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1. Introduction

Up until recently the measurement of the efficiency and performance of the state administration was somewhat neglected. A prevalent attitude was that the state administration functions on its own accord and does not merit particular attention given that it has no competition. However, the requirements of the functioning of the public administration and thus also the state administration are becoming increasingly demanding. Due to the limited volume of public funds, there is a growing need to establish efficiency and performance so as to improve the management of the organization as such and to satisfy the needs of the public at large. Like in other spheres, the state administration is also undergoing a transformation aimed at increasing the role of procedures, improving efficiency and promoting result- and customer-driven services. This means following the principles of quality and excellence and the efficient management of the human, financial and material resources in the public administration.

The Slovenian police should necessarily join the process of adjusting to modern trends, as should the state administration. The global financial and economic crisis also offers a window of opportunity for deep structural reforms to the police since police

activity is a cornerstone of all other institutions of the rule of law, freedom and security; without the police service there can be no development, democracy, economic progress or social and legal equality. Slovenia does not have a modern system for objectively monitoring the state of security as well as the performance, efficiency and quality of the police's work. Therefore, a central goal of the presented empirical research is to obtain additional expert premises and guidelines for the streamlining and reorganization of the police in Slovenia.

The police carry out one of the main activities of public importance that is crucial for ensuring the uninterrupted functioning of modern society. The state allocates a relatively large amount of budget funding for police operations (e.g. in 2010 the Republic of Slovenia allocated about EUR 330 million to the police, accounting for 3.1% of total budget expenditure) and a large share of public employees work in the police (i.e. 8989 employees, accounting for 26.3% of state administration staff in Slovenia in 2010). Due to the importance of this activity and the mentioned desire to improve the use of public funds, ever more countries have decided to transpose successful practices from the private sector into the police sphere and introduce their efficiency and performance measuring methods to the greatest extent possible.

The police are clearly a relatively centralized part of the state administration. The legislative solutions differ by country, but in most countries the police are organized hierarchically. In Slovenia, police organizations can be defined at three levels: local (police

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stations), regional (police directorates) and national (the Slovenian Police). Each of these levels of the structural organization of the police has its own characteristics that facilitate comparisons. At the national level, the most common comparisons include different countries and are based on numerical indicators which are sometimes only conditionally comparable due to differences in national legislation (even similar countries, e.g. EU member states, differ). At the local level, police officers most often have direct contact with people, which is why their activities are the most visible. However, the organizations at the local level are relatively small and the value of the related indicators is strongly influenced by individual extraordinary events, which makes any realistic comparison impossible. Moreover, the autonomy of these units is relatively low as all resources (money, people and technical equipment) are usually allocated at higher regional levels. At the regional level, the organizational units of the police are bigger (greater population, larger territory, etc.). At this level, the relative meaning of individual extraordinary events is reduced and so the objectivity of statistical analysis and the correctness of comparisons is improved. Further, in many countries police organizations at the regional level have a relatively high degree of autonomy when it comes to the allocation of financial, technical and human resources. In this respect, the regional level of police activity (i.e. the level of Police Directorates (PDs) in Slovenia)¹ appears to be the most appropriate for benchmarking (i.e. comparing the performance of the units).

In the first phase of our empirical study we were interested in establishing which activities of the Slovenian police (at the regional level) were undertaken as a consequence of criminal offenses and breaches of regulations and laws which occurred in the environment. The statistics covering areas of police activity (e.g. crime, road safety, etc.) include several so-called gray areas. The first is that only those criminal offenses that have been recorded actually enter the police system. The second is that once a criminal offense is recorded it may not trigger appropriate activity by the police (research, investigation, etc.). Our study mainly focused on this second area as we were interested in the police's response to (unlawful) events in the environment. On this basis, we assessed the efficiency of selected police units (i.e. police directorates).

The way the police respond to events is also influenced by the importance and structure of the events involved (criminal offenses, violations, etc.) and therefore the efficiency measurement model must also account for these influences. Besides inputs showing the frequency of these events in the environment (quantity), our empirical model included external influences that should reveal the structure of these events (quality). The structure of criminal offenses, public order violations, traffic violations and other events is also influenced by socio-economic and other factors, e.g. population density, employment, age structure, development level of road infrastructure, equipment of the population with motor vehicles, etc.

Thus, in this paper we attempt to examine the relative efficiency of the Slovenian Police at the regional level. The paper considers how previous studies have modeled the role of policing in their specifications of inputs and outputs. In particular, a three-stage Data Envelopment Analysis (DEA) technique is presented and then applied to measure the relative efficiency of police-work-related data for (all) eleven Police Directorates in 2005 and 2010. This also involves a Tobit regression to control for external (environmental) factors. The data obtained from the police

databases is analyzed through the Frontier Analyst 4.0 and SPSS 19.0 statistical package software.

The rest of the paper is organized as follows. The next section discusses related prior studies that have influenced the current work. The methodology and data regarding the selection of the input and output measures for use in a three-stage DEA model is then presented. The empirical results obtained from the DEA assessment are presented and discussed in the third part of the paper. The paper concludes with a summary of the findings regarding the use of DEA to improve the performance of police services in Slovenia.

2. Literature review

The literature review reveals that the techniques employed for estimating efficiency are usually divided into two major groups: frontier and non-frontier models. With these techniques we can measure efficiency absolutely or relatively, respectively. The early studies related to estimating the efficiency of the police sector were based on the application of econometric non-frontier models. Currently, analyzes conducted to measure the performance of police authorities focus on the DEA concept, a non-parametric frontier estimation methodology (Gomes, Mendes, & Carvalho, 2006). The application of DEA methodology to measure the performance of police in efficiency terms is on the rise in Europe, such as in England and Wales (see Thanassoulis (1995), Carrington, Puthuchery, Rose, and Yaisawarng (1997), and various papers by Drake and Simper (2000, 2002, 2003, 2005a, 2005b) and also in Spain (Diez-Ticio & Mancebon, 2002; García-Sánchez, 2009). Given that our analyzed data are cross-sectional with multiple inputs and outputs we will also apply the DEA methodology to evaluate performance measures of the police sector.

Recently, García-Sánchez (2009) conducted DEA analysis to estimate the efficiency of Spanish local police in matters of public and road safety. The research included 113 towns on the mainland with over 50,000 inhabitants in the year 2000. The main purpose of this research was to reduce the subjectivity in the statistical selection of variables prior to analysis and by applying the DEA technique to evaluate the influence each activity in the proposed area has on the overall performance of the police. Drake and Simper (2000, 2002, 2003) evaluate different measurement approaches of applying the DEA methodology to estimate the police sector. Drake and Simper (2005b) conducted DEA analysis on 41 police forces in the United Kingdom in which they evaluated two outputs (civilian days lost and aggregate offenses cleared) against four inputs (burglaries, vehicle crimes and robberies, and total budget). In particular, this article introduced a new data set of environmental, socio-economic, and demographic variables that could have an impact on DEA relative efficiency scores and rankings of police performance. The authors in this research confirmed that the omission of environmental variables can produce biased relative performance measures with respect to some police forces. In contrast, Sun (2002) and Carrington et al. (1997) found that most police departments are not significantly affected by environmental variables.

In the United States, Gorman and Ruggiero (2008) evaluated the efficiency of the state police service in 49 federal states in 2000. They also used a multiple-stage DEA model to determine police service provision, technical and scale efficiency. For the purpose of this analysis, they gathered demographic and economic information for each state which were composed into three outputs, e.g. they considered three types of crimes: murders, other violent crimes and total property crimes. The three discretionary inputs used in the research were the number of sworn officers, the number of other employees, and the number of vehicles. In addition,

¹ In 2010 the Slovenian Police was divided into 11 directorates whose task is to ensure the overall safety of people and property at the regional level. The largest was the Ljubljana Police Directorate which in 2010 employed 1588 staff, while the smallest was the Slovenj Gradec Police Directorate employing 229 staff (Ministry of the Interior, 2011a).

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