# The Relationship between Crime and Public Order and Safety Expenditures in Turkey

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## Abstract

*The aim of this paper is to analyze relationship between crime and public order and safety expenditures in Turkey. OLS and LM-Error results in the study are presented for the year 2013 at the NUTS3 level. According to the results, the increase in crime numbers in Turkey causes the increase in public order and safety expenditures. According to the results of the LM-Error model, contiguity relations of provinces in Turkey cause public order and safety expenditures to increase in neighboring regions.*

**Keywords:** crime, public order and safety expenditures, spatial econometrics

**JEL Classification:** L22, L25

### *1. Introduction*

Security is one of the most basic public needs. When a social phenomenon such as crime increases security risk public order and safety services demand of citizens may increase. Increasing crime rates invariably result in calls for more police protection which requires the allocation of additional scarce resources to policing and public order (Kollias et. al., 2013).From this viewpoint, the aim of this paper is determined to analyze relationship between crime and public order and safety expenditures in Turkey. The literature on the relationship between crime and public order and safety expenditures can be summarized as follows:

Kolliaset. al. (2009) studies the relationship between security spending in Greece and internal terrorist activity for the 1974–2004 period. They find spending on infrastructure, technology and capital equipment can potentially prove to be an effective counterterrorist policy option. Detotto and Manuela (2010) analyze the causal and temporal relationships between crime and the economic indicators related to the aggregated demand function in Italy period of 1981:1-2005:4. They find, in the short run, crime positively effects GDP and government expenditure, while has a crowding out effect on exports. In the long run, crime positively leads imports and inflation, whereas negatively investments and government expenditure. Drakos and Konstantinou (2011) explore the dynamic impacts of terrorism and crime risks on public order and safety spending across European countries during the period 1994-2006. Their findings suggest that both a shock in terrorism risk or in crime, significantly increase the subsequent trajectory of public order and safety spending. As a by-product they find that public spending is ineffective in reducing observed crime or terrorism risks.

Turk (2011) in his study evaluates crimes in Turkey by GIS. Kolliaset. al. (2013) evaluates the effectiveness of public order spending on recorded crime in Greece. Results show that public order outlays do not have any crime reducing impact. Kennedy (2014) studies the relations between crime trends and the level of public safety resources in Kenya the period 1980-2012.As a result, the effect of an increased public order spending on crime is significant and correlate much more strongly with crime as well as the real per capita income. However it is evident that an increase in expenditure does not reduce crime in Kenya.

Račkauskas and Liesionis (2013) analyze to find how government expenditure for the sectors of defense, public order and safety influence the economic situation and national security in Lithuania. They show that government expenditure for defense is decreasing, but for public order and safety it is increasing several recent years.

If there is better economic situation in the Lithuania and government assigns more funds for this sector, there is higher safety in the Lithuania. Isik et.al. (2016) investigates the effect of terrorism on public expenditure except military expenditures over the period 2002-2014 for the 30 member countries of The Organization of Islamic Cooperation. According to the results, the terrorism has positive effect in Afghanistan, Bahrain, Bangladesh, Qatar, Egypt, Pakistan and Uganda; negative effect in Azerbaijan, Algeria, Indonesia and Jordan on public spending. Ozcelik and Onder (2016) examine terror risk on defense expenditures using multiple regression models for 126 countries. According to the results, defense expenditures increase in the terror risk growth. Berrittella and Provenzano (2016) investigate what components of the public spending imply a decreasing effect on the organized crime and what components create opportunities for the organized crime, discussing also the role of government efficiency using a sample of 112 observations covering 2010-2013 and including EU Member States. Results of paper show that organized crime mainly operates in the distribution of the public spending for health, housing and community amenities and authors find there is a decreasing effect on organized crime of the public expenditure devoted to education and to create morality values.

Broadly, the relationship between terrorism and defense spending has been analyzed in the literature. Public order and safety expenditure is used as independent variable in the relationship between crime and public order and safety expenditures also. Specific to Turkey, there has not been determined study analyzing the relationship between crime and public order and safety expenditures. At this point it is thought that this study can contribute to the literature. Data and empirical framework, estimation results and conclusion sections will be presented in the next sections.

## *2. Data and Empirical Framework*

Crimes data are taken from Turkish Statistical Institute and data of public order and safety expenditures are taken from General Directorate of Public Accounts. Analysis of this study is performed for 2013 since the latest crime statistics in Turkey was published by Turkish Statistical Institute in 2013. The number of crime is collected by prisoners' crime committed region. Logarithmic and NUTS3 dataare used in the analysis.Analyzes are run with GeoDa program.

According to Waldo Tobler (1979), the basic law of geography is as follows: everything is related to everything else, but near things are more related than distant things. Therefore, similar values belonging to a variable usually appear in close locations, and this causes spatial clustering. For instance, the crime rates in cities surrounding a city with a high crime rate may be high or, the income levels in cities surrounding a city with a low income level may be low (Anselin 1992).

The critical point in spatial analysis is the relation of observations in space. The spatial weight matrix is a tool that is necessary for determining the effect of the neighborhood relation on the spatial data set. In general spatial statistics literature neighbors are studied in binary terms (0-non-neighbour, 1-neighbour). In this paper one basic method is used to account for neighborhood relations, namely proximity (border sharing). Proximity based weight matrix is constructed on rook and queen neighborhood definition. If the regions share a border that has no corners, they are rook neighbors. The queen neighborhood determines neighboring units as those that have any point in common, including both common boundaries and common corners (Anselin, 2005). Since Turkey's general structure of province borders form from queen neighborhood, in this study queen weight matrices arebuilt as per these concepts. Furthermore, studies carried out in Turkey for the provinces or regions of Turkey most frequently use the queen-based contiguity matrix. Gezici and Hewings (2004, 2007) noted that "in Turkey, all neighbors have common boundaries rather than nodes". Hence queen-based contiguity matrix is used for this study.

The following linear model characterizes the relationship between crime and public order and safety expenditures in that the logcriminal variable is the independent variable and the logpuborsf is the dependent variable.

$$\text{logpuborsf} = \beta_0 + \beta_1 \text{ logcriminal} + \varepsilon \quad (1)$$

Since spatial interactions are also investigated in the study, it is necessary to integrate spatial weight matrices into the model. According to Elhorst (2014) "originally, the central focus of spatial econometrics has been on the spatial lag model (SAR) and the spatial error model (SEM) with one type of interaction effect". In this context, spatial lag and spatial error models are created.

Spatial Lag Model (SAR) $\text{logpuborsf} = \beta_0 + \beta_1 \text{logcriminal} + \rho W \text{logpuborsf} + \varepsilon$ (2)

Spatial Error Model (SEM) $\text{logpuborsf} = \beta_0 + \beta_1 \text{logcriminal} + \varepsilon; \quad \varepsilon = \lambda\varepsilon + \mu$ (3)

## *3. Estimation Results*

Empirical analysis results are shown Table 1 and Table 2 below.According to OLS results in Table 1, there is a statistically significant relationship between the number of crime and public order and safety expenditures, and the increase in the number of crimes leads to an increase in the expenditure of public order and safety.

Table 1 is here.

Also in table 1, as well as information is presented about SAR and SEM models which one should be run.The LM-Error model is statistically significant according to LM-Lag and LM-Error probability values. In this case LM-Error model is suitable to analyze the spatial interaction (Anselin, 2005).

Table 2 is here.

According to the results of the LM-Error model in Table 2, the relationship between crime and public order and safety expenditures is positive and statistically significant. It is necessary to look at the LAMBDA variable in order to be able to see the spatial interaction at this point. This variable is statistically significant and has a positive coefficient. According to this result, public order and safety expenditures in one region are influenced by public order and safety expenditures in neighboring regions in Turkey. An increase of 1% in public order and safety expenditures in a region causes in an increase of about 0.77% in the neighbors.

## *4. Conclusion*

One of the most important needs of individuals and communities is to live in safety. If safety risks increase, people can request more safety services from the government. In this case, the governments have to more safety expenditures from budget.

In this study, the relationship between crime numbers and public order and safety expenditures for the year 2013 was analyzed on provinces basis in Turkey. In addition, in the study used spatial econometrics to determine whether there are spatial interactions in public order and safety expenditures. According to the analysis results the increase in crime numbers in Turkey causes the increase in public order and security expenditures. Then citizens increase their demand for safety services from government depending on growing crime numbers to introduce safer life. According to the results of the LM-Error model contiguity relations of provinces in Turkey cause public order and safety expenditures to increase in neighboring regions.

At this point, if the government establishes social and economic measures to reduce crime numbers, public order and safety expenditure can be reduced. Thereby it can be lessened the burden on budget. In addition, since public spending and safety expenditures have spatial interactions among provinces, policymakers should consider spatial spillover effects.

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**Table 1: General Results**

| | | | | |
|---|---|---|---|---|
| **SUMMARY OF OUTPUT: ORDINARY LEAST SQUARES ESTIMATION** | | | | |
| Dependent Variable: logpuborsf | Number of Observations: 81 | | | |
| R-squared: 0.594662 | F-statistic: 115.899 | | | |
| Adjusted R-squared: 0.589531 | Prob(F-statistic): 3.71383e-017 | | | |
| Variable | Coefficient | Std.Error | t-Statistic | Probability |
| CONSTANT | 6.4409 | 0.175507 | 36.6987 | 0.00000 |
| logcriminal | 0.611043 | 0.0567587 | 10.7656 | 0.00000 |
| **DIAGNOSTICS FOR SPATIAL DEPENDENCE** | | | | |
| TEST | MI/DF | VALUE | PROB | |
| Moran's I (error) | 0.43900 | 6.41100 | 0.00000 | |
| Lagrange Multiplier (lag) | 1 | 1.38780 | 0.23878 | |
| Robust LM (lag) | 1 | 15.44160 | 0.00009 | |
| **Lagrange Multiplier (error)** | **1** | **35.00910** | **0.00000** | |
| Robust LM (error) | 1 | 49.06300 | 0.00000 | |

**Table 2: Spatial Error Model Results**

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|---|---|---|---|---|
| **SUMMARY OF OUTPUT: SPATIAL ERROR MODEL - MAXIMUM LIKELIHOOD ESTIMATION** | | | | |
| Dependent Variable: logpuborsf | Number of Observations: 81 | | | |
| R-squared: 0.803380 | | | | |
| Variable | Coefficient | Std.Error | z-value | Probability |
| CONSTANT | 5.89756 | 0.147483 | 39.9881 | 0.00000 |
| logcriminal | 0.79347 | 0.0436907 | 18.1611 | 0.00000 |
| LAMBDA | 0.778098 | 0.0719077 | 10.8208 | 0.00000 |
| **REGRESSION DIAGNOSTICS** | | | | |
| **DIAGNOSTICS FOR HETEROSKEDASTICITY** | | | | |
| **RANDOM COEFFICIENTS** | | | | |
| TEST | DF | VALUE | PROB | |
| Breusch-Pagan test | 1 | 2.4334 | 0.11878 | |
| DIAGNOSTICS FOR SPATIAL DEPENDENCE | | | | |
| TEST | DF | VALUE | PROB | |
| Likelihood Ratio Test | 1 | 43.7647 | 0.00000 | |