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THE EFFECT OF SOCIO-ECONOMIC FACTORS ON CRIME IN TURKEY

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ABSTRACT
All human populations have experienced crime in the past and in the present, and this trend will undoubtedly continue. Crimes are committed when people disobey the laws established by their different states for social, cultural, and economic reasons. Crime has a myriad of effects on the individual, society, and public order and is certainly a problem that needs to be tackled and prevented. While the phenomenon of crime, which has different types, affects social structures, it is also affected by social structures. In social life, many factors affecting crime can be mentioned. Therefore, research related to crime is an important subject of many scientific studies. The aim of this study is to analyze whether there is a relationship between crime and the independent variables including divorce rate, unemployment, migration, and education status (literate but no school completed) using dynamic panel data analysis via Stata 13 software. For this purpose, a panel data set was set up for 26 geographic regions of Turkey (due to Turkish Statistics Institution classifications) for the years 2008–2014, and the generalized method of moments (GMM) estimator was applied to dynamic models of panel data. The results of the study indicate that although divorce rate and education status are significant, the variables of unemployment and internal migration are insignificant in the effect on crime.

Keywords: Dynamic panel data, generalized method of moments, crime, Turkiye

TÜRKİYE'DE SOSYO-EKONOMİK FAKTÖRLERİN SUÇ ÜZERİNDEKİ ETKİSİ

ÖZ
Geçmişten bugüne insanlık var olduğu sürece suç vardır ve olmaya da devam edecektir. İnsanlar sosyal, kültürel, ekonomik gibi nedenlerle ilgili devletlerin koyduğu kurallara uymadıkları için suç işlenmektedir. Suçun birey, toplum ve kamu düzeni üzerinde sayısız etkisi vardır ve kesinlikle mücadele edilmesi ve önlenmesi gereken bir sorundur. Sosyal yaşantıda suça etki eden birçok faktörden söz edilebilir. Bu nedenle suç ile ilgili araştırmalar birçok bilimin önemli çalışma konuları arasında yer almaktadır. Çalışmada, Stata 13 programı kullanılarak dinamik panel veri analizi ile işsizlik, boşanma oranı, iç göç ve eğitim durumu (okuryazar ancak okulu tamamlamamış) değişkenlerinin suç üzerine etkisi incelenmiştir. Panel veri setini 2008-2014 yılları arasında Türkiye'deki 26 coğrafi bölge oluşturmaktadır (Türkiye İstatistik Kurumunun sınıflandırmasıdır.). Değişkenlerin suç üzerindeki etkisi dinamik panel veri modeline Genelleştirilmiş Momentler yöntemi uygulanarak belirlenmiştir. Çalışmanın sonuçları, boşanma oranı ve eğitim durumunun (okuryazar ancak okulu tamamlamamış) suç üzerinde etkili olduğunu ancak işsizlik ve iç göçün suç üzerinde etkisi olmadığını göstermiştir.

Anahtar Kelimeler: Dinamik panel veri, genelleştirilmiş momentler yöntemi, suç, Türkiye

INTRODUCTION

While crime affects the economic and social welfare of societies, it is also a phenomenon that is affected by the social and economic welfare of societies. Although crime is an important issue for every country, it is especially important for developing countries. There is an increasing trend in the number of committed crimes in Turkey, which is a developing country.

Along with globalization, which started in the early 1980s, not only in Turkey but also in other countries, the number of crimes committed is on the increase. In addition to the economic structure of a country, unemployment, poverty, income and expenditure distribution, wage level, divorce,

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immigration and urbanization, education levels, and similar socio-economic factors are effective on crime rates and types.

Economics of Crime reviews the theory of public enforcement containing fines and imprisonment, probability and severity, enforcement costs, enforcement errors, incentives of enforcers, and repeat offenders. This is intended for practitioners, economists and lawyers, students and scholars in the field of law and economics, criminology, and microeconomics who wish to learn the basics of the economics of crime, law enforcement, and criminal behavior (Eide et al., 2006). The literature on the crime economy began to expand following the 1960s in the USA and Europe and since the 1980s, the development in the crime literature has gained momentum (Özcan et al., 2015). Beginning with the work of Becker (1968) and Ehrlich (1975), econometric models describing the criminal behavior of individuals have been created by collecting data on various populations. Thus, a large empirical literature has emerged that aims to inform public policy (Kelaher et al., 2016). Researchers have tested models for evidence that potential and actual criminals were responding to the benefits and costs of crime. The factors that affect benefits and cost contain among other things income level, unemployment rate, divorce, demographic characteristics, income inequality, the severity of punishment, and probability of getting caught. By testing the significance of these factors, it is tried to understand how both economic variables and law enforcement affect criminal behavior (Han et al., 2013).

Since people do not obey the rules set by the respective states due to such reasons as social, cultural, and economic, crimes are committed. This has unfortunately become one of the main issues countries have to take into account and take precautions.

LITERATURE REVIEWS

There are many theoretical and empirical studies examining the reasons behind committing a crime in the literature.

Since the work of Becker (1968) and Ehrlich (1973), an increasing amount of research has been devoted to socio-economic determinants of criminal behavior. Studies in the field of "Economics of Crime" have been stimulated both by recent social and economic problems and by the dramatic increase in crime rates in developed countries. The focus of these studies has shifted from testing the deterrence hypothesis to the analysis of demographic and socio-economic crime factors.

Sagi and Welford (1968) calculated offense-specific, age-specific crime rates to provide a more accurate view of the increase in recorded crime over the 1958-1964 period. From the results of the analysis, it was obtained that 30-50% of the increase in absolute crime between 1958-1964 can be attributed to the changing age structure in the United States. These results also show that because of the presence of a two-year cycle in recorded crime rates, any measure of the crime patterns must be interpreted with caution.

Levitt (1998) suggested that the disparity between victimization surveys and reported crimes also exists in the United States and that the rate of divergence is an increasing function of police officers per capita. On the other hand, he reported that murder rates are probably unbiased by police recording or under-reporting and therefore it is the most accurately recorded crime.

Blackmore (2003) analyzed the determinants of crime in South Africa using demographic, economic, and social variables with unbalanced panel data. The results show significant effects for the economically active population, the income per capita, unemployment rate, degree of urbanization, drug use, age structure, and the ratio of women to men variables. However, change in gross domestic product and education variables are insignificant.

Dursun et al. (2011) analyzed the relation between, various crime types and economic variables, unemployment and gross domestic product per capita, and determined the direction of the causality by using the data set which crime rates, gross domestic product per capita, and unemployment series between 1990 and 2010 for Turkey. At the end of the analysis performed, there exists a co-integration relation between crime-income and crime unemployment. Additionally, Pazarlıoğlu and Turgutlu (2007) analyzed the relation between, various crime types and economic variables, gross domestic

product per capita, and unemployment. As a result of this study, it has been determined that crime has a long-run and causality relationship with income and unemployment.

Frederick et al. (2016) analyzed the crime-unemployment (C-U) relationship by using a balanced panel dataset consisting of 67 counties from 1990 to 2009 by the Generalized Moments Method. The results of the analysis indicated a statistically significant impact of previous criminal activity on future crimes, but an insignificant relationship between the crime rate and the unemployment rate.

Wong (2011) investigated the interrelationships between single parenthood, divorce, and crime in both simultaneous and time-lag models by using song data between 1996 and 2000 from Canadian municipalities. The results indicated that single-parenthood and divorce have different and opposite relationships with crime, the relationship between crime and divorce is negative.

Taş et al. (2014) determined the effects of independent variables containing divorce rate, non-performing loans, and unemployment on crime by panel data models for 12 regions of Turkey between 2008 and 2011. The results indicated that if the unemployment rate increases 1%, the crime number for thousand people increases 0,03; if the non-performing loans per capita increase 100 Turkish Liras, the crime number for thousand people decreases 0,12, and if the divorce rate increases one per thousand, the crime number for thousand people increases 1,24.

Arnio and Baumer (2012) evaluated the merits of the typical "one-size-fits-all" or "global" approach to the demographic context and neighborhood crime rates in most neighborhood studies, by juxtaposing them with an alternative geographically weighted regression. The results show significant variation across Chicago census tracts in the estimates of foreclosure, logged percent black, and immigrant concentration for both burglary rates and robbery.

Wan et al. (2012) assessed the extent to which imprisonment duration, the probability of arrest, and the probability of imprisonment impact violent and property crime rates in New South Wales, Australia. The model parameters were estimated using the first-differenced generalized method of moments. The result of this study shows that the increase in arrest rates, which probably has the largest impact, increases the likelihood of receiving a prison sentence.

Ousey and Kubrin (2009) examined the longitudinal relationship between violent crime and immigration in US cities. The results of the study indicate the measure of illicit drug market arrests has a positive association with changes in crime rates, and that a consistent pattern of results is not repeated for most of the measures of economic deprivation, demographic transitions, and formal social control or labor market structure.

Debnath and Roy (2013) empirically investigated the relationship between interstate crime and immigration in India. When the results were examined, it was seen that there was no significant relationship between interstate crime and immigration. Therefore, they proposed adopting constructive means to control crime rather than addressing immigration.

Tekeli and Günsoy (2013) analyzed the relationship between education and economic crime by using the demographic data of convicts between 1990-2011 in Turkey, which are included in the justice statistics on the official website of the Turkish Statistical Institute. This research conducted on convicts sentenced to economic crimes displayed that economic crime stems from the low level of education.

Akdi et al. (2014) examined the events related to the official crime that has taken place between 2005:01 and 2011:12 in Turkey. The effect of the Unemployment and Consumer Price Index, which is disaggregated by education level, on the number of crimes was debated. It is seen that there is no long-run relationship among the number of crimes, total unemployment, and Consumer Price Index when they are evaluated together.

Ghasemi (2016) produced more accurate and reliable estimates of the deterrent effect of law enforcement in 90 counties of North Carolina between 2003 and 2012 by using dynamic panel data. After controlling for various socioeconomic covariates among the deterrent variables, the probability of conviction and arrest displayed deterrent effects on criminal behavior for different types of

property and violent crimes. Property crimes have relatively higher inertia than violent crimes. Therefore, their associated long-run elasticities in terms of important deterrence variables are greater.

Kang and Kang (2017) took into account environmental context information such as broken windows theory and crime prevention through environmental design to develop crime prediction models. They proposed a method of combining environmental context and feature-level data based on a deep neural network (DNN). Experimental results indicate that the DNN model is more accurate in predicting crime occurrence than other prediction models.

Ousey and Kubrin (2018) have addressed the question "Are immigration and crime-related?" to create a deeper understanding of the immigration-crime relationship. They synthesized a new generation of migration crime research focusing on macrosocial units using a two-pronged approach that combines the qualitative narrative analysis method with the quantitative strategy of systematic meta-analysis. The findings showed that the migrant-crime association was negative but very weak.

Alves et al. (2018) used a random forest regressor to predict crime and measure the impact of urban indicators on homicides. The results determined the importance of urban indicators in predicting crime, revealing that illiteracy and unemployment were the most important variables for describing homicides in Brazilian cities.

Leiva et al. (2020) analyzed the relationship between migration and crime through a dynamic Spatial Durbin Model (SDM) that explains possible bias for ignored variables, using 10 years of data from Chile from 2005 to 2015. Since the spatial model is dynamic and based on panel data, direct and indirect effects were determined on both a short (same period) and long-term (next period) basis. The results show that there is no statistical evidence to link the increase in the number of immigrants to the increase in any type of crime.

Using dynamic panel data analysis with Stata 13 software, the aim of this study is to determine whether there is a correlation between crime and the independent variables such as unemployment, divorce rate, migration, and educational attainment. Independent variables were determined by examining the studies on the factors affecting the crime in the literature. A panel data set was set up for 26 geographic regions of Turkey (due to Turkish Statistics Institution classifications) for the years 2008-2014 and the generalized method of moments (GMM) estimator was applied to dynamic models of panel data. According to the obtained results of the analysis, factors affecting crime will be determined in Turkey. Thus, it will be emphasized that solution-oriented and preventive policies should be developed in crime-related areas.

The remainder of the study is organized as follows: In the next section, Arellano and Bond's (1991) GMM estimator is presented. Then, the dataset and potential determinants of crime are briefly mentioned. Afterward, the findings obtained are reported and interpreted. In the conclusion section, there are concluding remarks and suggestions.

ARELLANO AND BOND (1991) GMM ESTIMATOR

Arellano and Bond (1991) argue that additional instruments can be obtained in a dynamic panel data model if one utilizes the orthogonality conditions that exist between lagged values of y_{it} and the disturbances v_{it}. We are interested in estimating the parameters of models of the form,

$$y_{it} = y_{it-1}\gamma + X_{it}\beta + v_{it} \quad i=\{1,\ldots,N\}, \quad t=\{1,\ldots,T\} \tag{1}$$

where $v_{it} = u_i + \varepsilon_{it}$ with $u_i \sim \mathrm{IID}(0,\sigma_u^2)$ and $\varepsilon_{it} \sim \mathrm{IID}(0,\sigma_\varepsilon^2)$, independent of each other and among themselves. By construction, $y_{it-1}$is correlated with the unobserved individual-level effect u_i. In order to get a consistent estimate of γ as $N \to \infty$ with T fixed, the first difference (1) is taken to eliminate the individual effects. The first difference of the model is given in Equation 2.

$$y_{it} - y_{i,t-1} = (y_{i,t-1} - y_{i,t-2})\gamma + (X_{it} - X_{i,t-1})\beta + (\varepsilon_{it} - \varepsilon_{i,t-1}) \tag{2}$$

Unit effects (u_i) are eliminated as a result of taking the difference (Özcan, 2014). However, the explanatory variable $(y_{i,t-1} - y_{i,t-2})$ is still related to the error term $(\varepsilon_{it} - \varepsilon_{i,t-1})$, so they are not orthogonal. This relationship arises from the correlation between $y_{i,t-1}$ and $\varepsilon_{i,t-1}$. Arellano and Bond (1991) suggested transforming the differenced model given in Equation 2 using the instrumental variable matrix and then estimating this transformed model using the generalized least squares estimator. For this reason, the Generalized Moments Estimator is known as the "Two-Stage Instrument Variable Estimator" (Tatoğlu, 2013). The moment conditions are used by determining the lagged values of the dependent variable, and the first differences of the exogenous variable also have the attribute of the instrumental variable (Drukker, 2008). Thus, the moment conditions use as much information as possible to obtain an efficient estimator (Özdemir, 2019).

Suppose initially that the X_{it} are all correlated with u_i for the model given in Equation 1. In this context, the form of the optimal matrix of instruments depends on whether the X_{it} are predetermined or strictly exogenous variables. If the X_{it} are strictly exogenous, i.e. $E(X_{it}\ \varepsilon_{is}) = 0$ for all t, s, then all the X_{it}'s are valid instruments for all the equations. On the other hand, if the X_{it} is predetermined, in the sense that $E(X_{it}\ \varepsilon_{is}) \neq 0$ for *s*<*t* and zero otherwise, then only $[X_{i1}, \ldots, X_{i(s-1)}]$ are valid instruments in the differenced equation for period *s* (Arellano ve Bond, 1991). The first difference model transformed with instrumental variables is given in matrix form in Equation 3.

$$Z'\Delta y = Z'\Delta y_{-1}\,\gamma + Z'\Delta X\beta + Z'\Delta\varepsilon \qquad (3)$$

where ΔX is a stacked *(T -2)N x k* matrix of observations on ΔX_{it}. The GMM estimator is given in matrix form in Equation 4.

$$\hat{\delta}_{GMM} = (\Delta X'Z(Z'\widehat{\Omega}Z)^{-1}Z'\Delta X)^{-1}(\Delta X'Z(Z'\widehat{\Omega}Z)^{-1}Z'\Delta y) \qquad (4)$$

where $\widehat{\Omega}$ is the variance-covariance matrix of the error terms (Tatoğlu, 2013; Yıldırım ve Kostakoğlu, 2015).

The Arellano and Bond approach is an estimator designed for situations with:

1. Small *T*, large panels: few time periods and many individual units.
2. A linear functional relationship.
3. One left-hand variable that is dynamic, depending on its past realizations.
4. Right-hand variables that are not strictly exogenous: correlated with past and possibly current realizations of the error.
5. Fixed individual effects, implying unobserved.
6. Heterogeneity, heteroscedasticity, and autocorrelation within individual units' errors, but not across them.

Arellano and Bond's (1991) GMM estimator exploits lagged values of endogenous variables as instruments. The use of these internal instrumental variables is relatively scarce in empirical crime studies.

The Data And Socioeconomic Determinants Of Crime

The data set is a balanced panel of the 26 geographic regions of Turkey for the years 2008-2014 obtained from the Turkish Statistical Institute. In this scope, socio-economic determinants of crime in Turkey are created as unemployment, divorce rate, migration, and education status. The regions of Turkey have been classified as Level 2, and they consist of 26 sub-regions in line with the Nomenclature of Territorial Units for Statistics (NUTS). Regional units have been defined at Level 2 as 26 sub-regions by grouping the provinces with similar economic, social, cultural, and geographical characteristics based on specific population size.

The effect of education, unemployment, migration, and divorce on crime is briefly explained.

Among all socioeconomic determinants, education has a special significance as the root of all other causes. The level of education is important in explaining the relationship between education and crime. As the level of education increases, the rate of crime against property decreases. It should be accepted that high education level alone is not a factor in preventing crime. Another factor that needs to be discussed about the relationship between education and crime is school. Factors such as attitudes towards school, academic success, attitudes of school management towards children, educational system, relationships among students, school environment, dismission from school, and sense of discipline of school management. There are several reasons to believe that education will influence subsequent crimes. First, schooling increases the returns on legal work, raising the opportunity costs of illegal behavior. In addition, the penalty for a crime typically requires incarceration. Schooling makes this 'lost time' more costly by raising wage rates. Second, education can directly influence the psychic or financial rewards that result from the crime itself. Finally, schooling can change preferences in indirect ways, which can affect delinquent decisions. For example, education can increase one's risk aversion or patience. (Lochner and Moretti, 2004).

Unemployment is one of the most important social problems. If the person cannot find a job in the working force, personal and social problems arise. An unemployed person may feel themselves under psychological pressure and feel forgotten. Additionally, they may feel that they have suffered in society. Social tensions increase in societies with a large number of unemployed people, and these can lead to social jolts. Since unemployed people cannot make a living, resort to illegal ways and they increase the crime rate. The existence of a strong relationship between unemployment and crime rates has been hypothesized for over a hundred years in the social science literature (see, e.g., Bonger, 1916; Ehrlich, 1975; Ferri, 1881; Fleischer, 1966; Glaser and Rice, 1959; Phillips et al., 1972; Sellin, 1937; Thomas, 1925). Much of the current interest in the U-C relationship was stimulated by Brenner's (1971, 1976, 1978a, 1978b) studies of the social consequences of national economic policy (Cantor and Land, 1985).

Migration has been an important source of adaptation, human survival, and economic exchange across regions for centuries. Unquestionably, the most prominent questions are about whether immigration increases crime. Today, more than ever, migration forms a central part of the goods, global flow of people, ideas, and practices. Due to the increasing trend of immigration, there are some serious concerns about the impact of immigration on crime, and social security. While it cannot be determined whether immigrants are more likely than locals to engage in illegal activities, there is broad consensus on some stylized facts instead. Firstly, as noted by Albrecht (1997) and Barbagli (2008), second-generation immigrants have higher crime rates than natives. Secondly, more recent immigrants are involved in criminal activities much more than previous waves of immigration. Thirdly, foreign nationals tend to supplant locals in criminal activities to some extent in what is called the "substitution effect", well known in the sociology of crime and documented by Barbagli (2008). Finally, as suggested by Lynch and Simon (1999), there seems to be a general pattern in which immigrants have lower domestic crime rates in "immigrant" countries than in countries with less liberal policies (Mariani, 2010).

Divorce Rate (marital and family breakdown) can influence delinquency and crime for three reasons. Firstly, individuals from single-parent or unstable families tend to have higher rates of delinquency and crime. Secondly, a significant number of disrupted families in the community can support and decrease participation in formal organizations and in the end debilitated the community's formal mechanism of social control. Thirdly, disrupted families can contribute less to the community's informal mechanism of social control in keeping an eye on strangers, keeping an eye on properties in the neighborhood, intervening in local disturbances, and supervising young people. The remaining link in the indirect effects model is a positive relationship between crime and family disruption. High levels of family disruption can facilitate crime by reducing informal social control networks in society. Examples of informal social control include taking responsibility for supervision of general youth activities, neighbors taking note of or questioning strangers, and responding to local unrest. Indeed, recent research indicates that family disruption increases the prevalence of unsupervised youth peer groups, which in turn increases crime rates at the local community level (Sampson and Groves, 1989).

MODEL SPECIFICATION AND ESTIMATION METHODS

We apply a dynamic panel data model to extract more precise and reliable estimates of the effect of independent variables including unemployment, divorce rate, migration, and education status on crime.

To address heteroskedasticity, measurement error, serial correlation, and endogeneity, the generalized method of moments (GMM) method with the first difference transform presented by Arellano and Bond (1991) is used to find efficient estimators. C_{it} is the number of people in the penitentiary, U_{it} is the unemployment rate, M_{it} is internal migration, E_{it} is the education status, D_{it} is the divorce rate. The dynamic empirical model to be estimated is as follows:

$$C_{it} = C_{it-1}\gamma + \beta_1 U_{it} + \beta_2 M_{it} + \beta_3 E_{it} + \beta_4 D_{it} + u_i + \varepsilon_{it} \quad (4)$$

where $i = 1, \ldots, 26$ and $t = 2008, \ldots, 2014$ denote geographic regions and time dimensions of the panel data set, respectively. u_i is a geographic region-specific effect and ε_{it} is the error term.

All the variables were used as natural logarithmic values in the model. The estimations performed were conducted through Stata 13 software. The advantages of logarithm in reducing the range of the data and improving reporting bias in crime data are listed by Choe (2008) and Patalinghug (2011). Coefficients yielded by the double log specification can be commented as elasticities. Moreover, the coefficients estimated from the model capture the short-term effect of a 1% change in the regressor on the crime rate ceteris paribus due to the inclusion of the lagged dependent variable according to Buonanno and Montolio (2008) and Saridakis and Spengler (2012). They clarify that a long-run elasticity can be computed by dividing an estimated coefficient by one minus the coefficient C(-1).

Table 1 provides the results that were estimated using robust standard errors, considering the two-step Arellano-Bond generalized method of moment (GMM) estimator and the warning that "two-step GMM standard errors are deviant, and robust standards errors are recommended." As can be seen, although the parameter estimates are the same, in those cases where Windmeijer WC-robust standard errors are used instead of standard errors, the unemployment variable is not significant in explaining the change in the crime rate.

Table 1. Estimation results of the Arellano and Bond Estimator

Method	**Two-Step GMM**		**Two-Step GMM Robust**	
Variables	Coef.	p-value	Coef.	p-value
C_{it-1}	0.713	0.000	0.713	0.000
U	0.097	0.000	0.097	0.124
M	0.187	0.169	0.187	0.525
E	1.639	0.000	1.639	0.000
D	1.724	0.000	1.724	0.001

As seen in Table 1, the Cit-1 coefficient was found to be positive and significant at the 5% level with an estimated elasticity of 0.713 by the GMM estimation for this model as consistent with the expectations. Unemployment (U) and migration (M) are not statistically significant at the 5% level once the dynamics of the crime are considered. Thus, unemployment and migration do not influence an individual's decision to commit a crime in Turkey. Education Status (E) and divorce rate (D) are statistically significant at the 5% level with positive coefficients. A 1% increase in the literate but no school number of people increases the number of people in the penitentiary by 1.6%. Similarly, if the divorce rate increases 1%, the number of people in penitentiary increases 1.7%. Results of the model specification test of the Arellano and Bond Estimator are given in Table 2.

Table 2. Model Specification of the Arellano and Bond Estimator

Method	**Two-Step GMM**		**Two-Step GMM Robust**	
Wald Test	203.13	p: 0.000	203.13	p: 0.000
Specification Tests				
Sargan J Test	24.812	p: 0.036	-	-
Serial Correlation				
First Order	-4.104	p: 0.000	-3.604	p: 0.0003
Second Order	1.847	p: 0.064	0.941	p: 0.346

In Table 2, according to the Wald test results, it is seen that the null hypothesis that all estimated coefficients are zero at the 5% significance level is rejected. The Sargan J-test results show that the rejection of the null hypothesis of valid over-definition constraints supports the general validity of the instruments for all GMM models, reflecting the findings of Buonanno and Montolio' (2008) and Sarıdakis and Spengler (2012). As expected, Arellano-Bond serial correlation tests show the existence of first-order serial correlation, but not the second-order autocorrelation, which is cited as evidence of correctly determined moment conditions in this model by Buonanno and Montolio (2008).

CONCLUSION

In every region of Turkey, there is a heated discussion about the growth in recorded crime statistics. People are social beings, therefore occasionally they might choose to break the rules for whatever reason. Because of the potential harm that these actions could do to other individuals as well as the potential to disturb the peace and social order, these actions are classified as crimes. The causes of crime, the reasons why certain states have higher crime rates than others, and the economic, social, and political elements that contribute to crime have all been topics of discussion and investigation in the past and present. The fact that there have been so many factors leading to criminal behavior gives a hint that crime should not be considered within the specific area of sociology alone.

Strong support for an interdisciplinary model of criminal behavior that stresses the importance of demographic, economic, and social variables in its construction was provided by the panel data study on crime in the Turkish region. This study examines the relationship between crime and the independent variables (unemployment, divorce rate, migration, and education status) for 26 geographic regions of Turkey using a panel data set for the years 2008-2014.

The findings of the study presented evidence that specifying a dynamic model and controlling for heteroskedasticity, measurement error, serial correlation, and endogeneity within a GMM framework reduces possible bias in results. The unemployment rate and migration do not impact crime in Turkey. There are many debates in the literature about the mechanisms by which unemployment and immigration affect crime. However, this analysis clearly shows that a change in unemployment and migration is not associated with crime in Turkey. The criminal motivation effect of unemployment may have been neutralized in Turkey. The reason for these results could be the effect of unemployment insurance applications in Turkey. On the other hand, education status and divorce rate affect crime in Turkey. The rise in education status is likely to increase the inclination to commit a crime. An inverse relationship is expected between educated individuals and crime in a society. In other words, it is stated that there is a decrease in crime rates in parallel with the increase in education level and there is a negative relationship between these two variables (Wong, 1995). Contrary to the expected sign (negative) regarding these variables, the increase in the level of education did not cause a decrease in the crime rate. Similarly, Cömertler and Kar (2007) concluded that the level of education positively affects the amount of crime, while Güvel (2004) concluded that education has almost no effect on total criminal activities. The fact that the level of education does not emerge as a tool in crime prevention requires a review of the quality of education. In this context, it is obvious that it would be beneficial to develop alternative variables that could be developed regarding the quality of education. Additionally, education affects the criminal activity of rational criminals by determining the expected rewards from legal and illegal activities (Cömertler and Kar, 2007). Another factor is the divorce rate. Changes in family structure are an important factor linked to changes in crime. Divorce

rates are positively related to crime. It is undeniable that children raised by divorced parents tend to commit a crime. The divorce of the mother or father causes emotional gaps that hinder the psychological development of the child. In these cases, it is the case the child's need for love and protection cannot be satisfied and he is deprived of the necessary example to establish identification. In addition, when the eldest child of the family has to replace the father or mother who moves away from the family, they may encounter some psychological problems (Konanç, 1974, p.549). The fragmented family structure disrupts the functioning of the child's socialization process and can lead to faulty and incomplete socialization. One of the consequences of this is a crime (Akalın, 2000, p. 525). Additionally, there is an increase in the rate of homicides committed against divorced women (Yıldırım, 2018)

Contributions of this study to the empirical literature: Firstly, it takes advantage of the region-level panel in analyzing the relationship between crime and the independent variables including divorce rate, migration, education status, and unemployment over 7 years for 26 geographic regions of Turkey. Secondly, it advances the methodology used by other crime analyses by estimating a dynamic model with GMM to take into account heteroskedasticity, endogeneity, serial correlation, and measurement error. Thirdly, the inclusion of the lagged dependent variable in the model indicates whether and to what extent past criminal behavior encourages additional criminal acts.

It is very important to find mutual influences in order to prevent crime. Conventional wisdom can propose that crime is a symptom or consequence of underlying social problems containing, but not limited to unemployment, poverty, inequality, discrimination, racial relations, family disruption, and low education, etc. Therefore, the underlying problems must be identified and deal with them to reduce crime. However, the findings show that crime is potentially the cause as well as the result of other problems. That is, crime is not just a symptom or consequence. It is a problem in itself that deserves a more direct approach. Maybe, it is as important to deal with a crime directly as it is to deal with the underlying problems of crime. In any case, much research is needed to understand the relationship between crime and its related issues. In the future, the results of this analysis can supply beneficial guidance to government-level decision-makers as they implement and develop policy measures to combat crime.

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Uzun Öz

Günümüzde suç olgusu toplumların çözüm bekleyen en önemli sorunlarından biridir. Yanlızca az gelişmiş ya da gelişmekte olan ülkelerin sorunu olmayıp gelişmiş ülkelerin de önemli sorunlarındandır. Farklı türleri olan suç olgusu sosyal yapıları etkilerken aynı zamanda sosyal yapılardan da etkilenmektedir. Bu nedenle sosyal sistemi ve bireyi korumak için çok fazla çaba harcamak gerekmektedir. Bu konuya olan ilginin artması hem bireyin suç işlemesine neden olan faktörleri belirlemek ve buna karşı önlemler almak hem de çözümler ortaya koyarak toplumu suçtan arındırmak için oldukça önemlidir. Suç olgusu üzerinde ülkenin ekonomik yapısı dışında eğitim düzeyleri, göç ve kentleşme, işsizlik, gelir ve gider dağılımı, yoksulluk, ücret seviyesi gibi birçok sosyo-ekonomik faktörler de etkilidir. Bu çalışmada, suçu etkilediği öngörülen faktörlerden eğitim düzeyi, iç göç, işsizlik ve boşanma oranları ele alınmıştır. Tüm sosyo-ekonomik faktörlerde özel bir öneme sahip olan eğitim, tüm diğer nedenlerin de kaynağını oluşturur. Suç ve eğitim ilişkisini açıklamak için eğitim düzeyi önemlidir. Eğitim düzeyi artıkça suç işleme oranında azalma olduğu görülmektedir. Sadece eğitim düzeyinin suçu önleyen bir faktör olmadığı kabul edilmelidir. Suç ve eğitim ilişkisini açıklayabilmek için okul faktörü de göz önüne alınmalıdır. Akademik başarı, okulla ilgili tutumlar, eğitim sistemi okul yönetiminin çocuklara yönelik tutumları, okul ortamı, öğrenciler arasındaki ilişkiler, okul yönetim disiplini ve okuldan ayrılma gibi faktörlerde suça teşvikte önemlidir. Giderek artan göç eğilimi, sosyal güvenlik ve suç üzerindeki etkisi ile ciddi endişeleri arttırmaktadır. Şüphesiz en dikkat çekici sorular göçün suçu artırıp arttırmadığı konusunu içermektedir. Suça teşvikte en önemli sosyal problemlerden bir diğeri işsizliktir. Birey çalışma gücüne sahip olduğu hâlde iş bulamadığı durumlarda kendini psikolojik baskı altında hisseder. Bu nedenle kişisel ve sosyal sorunlar ortaya çıkar. Çok sayıda işsiz bireyin bulunduğu toplumlarda sosyal gerilimler artar. Geçimini sağlayamayan işsiz kişiler yasa dışı yollara başvururlar ve suç oranını artırırlar. Aile ve evliliklerin bozulması da farklı nedenlerle suça teşvikte etkilidir. Bozulmuş ailelerden veya tek ebeveynli ailelerden gelen bireyler yüksek oranda suça katılma eğilimindedirler. Bölünmüş ailelerin önemli bir bölümü resmî örgütlere katılımı veya desteğinin azalması toplumun resmî sosyal kontrol mekanizmasını zayıflatır. Bunun yanı sıra bozulmuş aileler yabancılarla görüşme, mahallede mülkleri gözetme, gençleri denetleme ve yerel rahatsızlıklara müdahale etme bakımından toplumun gayriresmî kontrol mekanizmasına katkıda bulunmada isteksizdirler. Bu durum toplumun kolektif etkinliğinin zayıflamasına neden olur ve suça teşviki arttırır. Boşanmış ailede yetişen bireylerin suça eğilimli olmasının yanı sıra boşanan kadınların da kadın cinayetlerine maruz kalması suç oranını arttırmada yadsınamaz bir gerçektir. Bu çalışma için kullanılan veriler Türkiye İstatistik Kurumundan elde edildi. Analiz için Türkiye İstatistik Kurumu sınıflamasına göre Türkiye'nin 26 coğrafi bölgesine yönelik 2008-2014 yılları için dengeli panel veri seti oluşturuldu. Tüm değişkenler doğal logaritması alınarak kullanıldı. Suç değişkeninin (bağımlı değişken) gecikmeli değişkeninde suçu etkilediği öngörülerek dinamik panel veri modeli kuruldu. Bu model için bağımsız değişkenler olan eğitim düzeyi (okuma yazma bilen ancak okulu tamamlamamış), iç göç, işsizlik ve boşanma oranının suç üzerindeki etkisini daha kesin ve güvenilir tahminlerini çıkartmak için içsellik, ölçüm hatası yanlığı, değişen varyans ve

otokorelasyon varlığında etkin bir tahmin edici olan Arellano ve Bond (1991) tarafından önerilen birinci fark dönüşümü ile genelleştirilmiş moment yöntemi (GMM) kullanıldı. GMM modelleri için spesifikasyon testlerinden biri olan ve tahmin edilen modelde aşırı tanımlama kısıtlarının geçerliliğini, bir başka ifade ile kullanılan araçların geçerliliğini test eden Sargan testi yapıldı. Sargan testine göre araç değişkenlerin geçersiz olduğu görüldü. GMM robust tahmin edicide (vce (robust) seçildiğinden) Sargan test hesaplanamadı. Modelde otokorelasyonun varlığını sınamak için diğer bir spesifikasyon testi olan Otokorelasyon testi yapıldı. Birinci ve ikinci mertebeden otokorelasyonun varlığı "otokorelasyon yoktur" yokluk hipotezi ile test edildi. Bilindiği gibi birinci mertebeden otokorelasyon olması önemli değildir. Ancak Genelleştirilmiş momentler tahmin edicisinin etkinliği için ikinci mertebeden otokorelasyon olmamalıdır. Sonuçlarda beklenildiği gibi birinci mertebeden negatif otokorelasyon söz konusu iken ikinci mertebeden otokorelasyonun olmadığı görüldü. Analizler Stata 13 programı kullanılarak yapıldı. Türkiye'de boşanma oranı ve eğitim düzeyi (okuma yazma bilen ancak okulu tamamlamamış) ve gecikmeli suç değişkeni (geçmişte işlenen suçlar) suç üzerinde etkili olurken işsizlik ve iç göçün suç üzerinde etkisi olmadığı sonucuna ulaşıldı. Eğitim düzeyindeki (okuma yazma bilen ancak okulu tamamlamamış) %1'lik bir artış suç işleyen kişi sayısında %1.6'lık, boşanma oranındaki %1'lik artışta suç işleyen kişi sayısında %1.7'lik artışa neden olmaktadır. Ayrıca geçmişte işlenen suçlardaki %1'lik artışın da sonraki dönemlerdeki işlenecek olan suçu %0.7 oranında arttırdığı sonucuna ulaşılmıştır. Bu çalışma mevcut literatüre üç şekilde katkıda bulunmaktadır. İlki, Türkiye'deki 26 coğrafi bölgenin 7 yıllık bir sürede işsizlik, boşanma oranı, göç ve eğitim durumunun (okuryazar ancak okulu tamamlamamış) suç üzerindeki etkisini açıklamaktır. İkincisi, dinamik bir modeli, içsellik, ölçüm hatası yanlığı, değişen varyans ve otokorelasyon varlığında GMM ile tahmin ederek suç analizlerinde kullanılan metodolojiyi geliştirir. Üçüncüsü, gecikmeli bağımlı değişkenin modelde yer alması, geçmişteki cezai davranışların gelecekte işlenecek suça teşvik edip etmediğini ve derecesini gösterir. Bu analizin sonuçları devlet düzeyinde karar vericiler için ileride suçla mücadele politikası önlemleri geliştirip uygulamak için fayda sağlayabilir.