

# **The Effects of Unemployment and income on Crime: a Panel Data Analysis on Turkey**

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## **Abstract**

Today, the reason of the crime is a subject, that attract much attention from the researchers. It is accepted that the growth of the crime rates damages population by psychologically and economically. The issue of the relation between crime rates and economic variables is a famous hypothesis. Therefore the effect of the economic variables on the crime rates is the subject of many academic researches. But, research made in different countries and with different methodologies shows inconsistent results. Especially in the growing countries like Turkey, which economic parameters change rapidly, the investigation of the relation between crime and economic variables gives a different point of view about this issue. The objective of this paper is to analyze the relation between, various crime types and economic variables, unemployment and gross domestic product per capita. The second purpose of this paper is to determine the direction of the causality. The data set used in the study is the crime rates, unemployment and gross domestic product per capita series between 1990 and 2010.

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## 1. Introduction

As a consequence of the economical crisis being faced all over the world in recent years, the unemployment rate has increased gradually and it has developed an identity not only as an economical problem, but also as a principal social problem. With unemployment, the crime rate, also, has tended to increase. In fact, regarding E. Durkheim's statement, a society without crime shall not be considered as normal (Durkheim, 1966). Therefore, it is quite normal for a society to have crime and criminals. The important point here is to consider the variables to determine the criminality embodied by society; the elements causing the increase or decrease in crime rates; and the factors that push an individual into crime.

It is, now, an unquestionable truth that there exists interactivity between the economical conditions and the crime rates of the country. The point at issue, here, is about the power and direction of the interactivity between the economical factors and the crime phenomenon. When we analyze the relevant research, we see that crime is mostly associated with the income and unemployment variables. When we consider the aspect from the perspective of unemployment, it can be clearly observed that there exists a positive interactivity between unemployment and crime rate. The relevant arguments focus on the points that the crime is a consequence of unemployment, unemployment is a consequence of crime or that a third factor causes both unemployment and crime. (Papps and Winkelmann, 1999).

On the other hand, the existence of interactivity between the level of income and crime is being accepted, yet the arguments about the direction of the stated interactivity still continue. While there are declarations stating that the increasing income rate also increases individual prosperity and thus the tendency of an individual to crime decreases, there also exist declarations stating that the increasing income rate also increases the accumulation of wealth and thus the potential return of the crime and the tendency to crime increases as well. (Baharom and Habibullah, 2008).

In the following parts of this article, theories about crime and approaches analyzing the relationship between unemployment-income-crime will be considered on a preferential basis. Afterwards, some of the relevant literary studies and their conclusions will be mentioned. In the analysis part of the article, however, the relationship between income and crime through the panel data set containing the years 1990-2008 belonging to 26 sub-regions (NUTS2) and the relationship between unemployment and crime will be analyzed through the panel data set containing the years 1995 – 2008 belonging to 67 provinces (NUTS3).

Both the theoretical and the experimental analysis of the determinatives of the crime-related behaviours started with the 1968-dated study of Gary Becker. Therefore, it would be appropriate to claim that the theoretical framework of the relevant studies is based on the Rational Choice Model of Becker. Accordingly, the decision to commit a crime by an individual depends on the benefits and costs of the crime. In view of the model, all the potential criminals have a crime benefit function that contains the financial and the estimated physical benefits of the crime (b). A criminal individual faces the costs consisting of the activities powered by law.

The severity of the punishment is that it contains both pecuniary and imprisonment penalties. This is considered as a part of the total cost. The other part of the total cost, however, is the probability of being captured. Consequently, the costs shall be equivalent to the probability of being punished (p) and the duration of the punishment cost (c). Therefore, the expected net profit of the crime shall be equal to (b-pc).

The conclusion to be drawn from this equity is that the crime level shall increase as **b** increases or **p** or **c** decreases (Oliver, 2002). In accordance with the above-mentioned equity, the individual, while deciding to commit the crime, requires the following equation:

$$(b-pc)>0.$$

In the event that the benefits arising from the crime reduce and that the punishment costs increase, the crime rate shall decrease. Becker's

model was built considering the benefit, cost and the possibility of paying these costs. Yet, the model hardly contains the opportunity costs. In 1973, Isaac Ehrlich included the opportunity costs in the model through analyzing the effects of the income level and distribution.

In his study, Ehrlich pointed out the effect of the average household income and unemployment on the crime rate. According to him, the unemployment rate of a society is the supplementary indicator of the reachable income opportunity in the employment market. According to the model, individuals share their time between legal activities and risky illegal activities. Should the legal income opportunities become lower than the potential earnings of the crime, criminality would increase. Another important factor is the increased rate of unemployment.

Ehrlich inferred in his study that the unemployment rate has a less important role in determining (effecting) crime. Those variables take place in the model as opportunity costs and the model of Becker, being extended with the opportunity costs become:

$$[b - (pc - o)].$$

Another theoretical approach to the subject belongs to Britt (1994). Britt states that there exist two fundamental approaches to analyzing the relationship between economical conditions and crime. The first one is the motivational theory and the second is the opportunity theory. Motivational theory refers to foreseeing a positive relationship between crime and economical conditions. In other words, in parallel with the degradation of economical conditions, the criminality of the individuals shows a tendency to increase. According to this theory, not having a particular job or prevention of the development/maintenance of the life standard causes the crime. Considering it with respect to the stated theory, it becomes possible to draw the conclusion that, during the economic recession periods, the legal increase or decrease in the income levels makes the individual turn to crime.

The opportunity theory, however, focuses on the relationship between increasing income and the increase in goods coming into circu-

lation in economical development periods with the crime rate. In this context, opportunity theoreticians claim that the increase in income and the goods coming into circulation increases the potential earning of the crime. The increase in income, in one sense, would require the goods coming into circulation to become plentiful. And that would cause the opportunity to commit a crime or suitable targets to increase. Concordantly, in contrast to the motivational perspective, the opportunity theory assumes that the crime rate would decrease in lower economical conditions.

Another significant point focused on by the related theoretical discussions, however, is the possibility of people needing a particular job or profession to commit crimes and the probability that unemployment does not have such an effect on the tendency to commit crime (Grogger, 1998; Freeman 1999). Gottfredson and Hirschi (1990), however, claim that individuals having a particular job feel more obliged to respect legal issues and thus would likely avoid criminal activities. Gottfredson and Hirschi, contrarily to that claimed by Grogger and Freeman, claim that the individual having a particular job would not display a tendency to commit crimes for the following reasons:

- A job is an activity that requires spending time and energy. So, the working individual would not busy himself with criminal behavior.
- A job is an activity that involves earning money. This situation reduces the necessity of the individuals to commit crimes.
- A job makes the individuals gain status and the sense of self confidence. For that reason, the individual who legally obtains a positive position or who earns economical and social respect would not need to identify him or herself with illegality. Moreover, the individual would avoid unlawful activities.
- In the event that the individual with a job commits a crime, he shall face the risk of losing his present job/profession. The risk

of losing his job may restrain the individual from committing a crime.

- Having a job or profession enables the individual to establish a particular personality in terms of responsibility and pedantry.

To generalize it within the scope of the above mentioned theories, it can be claimed that the unemployment factor stands as a significant reason for criminality or that it poses a significant risk for committing crimes because, first of all, unemployment has a corruptive effect on an individual's loyalty to social values and norms. On the other hand, since the increases in income also increase the potential benefit of the crime, it increases not only the income, but also the crime rate of the society.

## 2. Literature

Ehrlich (1973) also explored the educational level of the society related to the effect of the opportunity costs on economical conditions. Ehrlich discovered a significant and positive relationship between the academic year of the adult population and the crime rate (1969 USA data). He explains the situation in two different ways. If the educational level of the criminal increases, he may set to work in a more profitable crime sector. According to the other explanation, however, in accordance with the increasing average national educational level, the compensation of the crime increases, as well. Thus, the crime related benefit (b) would increase in parallel. While examining the relationship between crime and economical conditions, the existence of the police, and the condemnation and the intensity of punishment have a considerable effect on the crime related activity level.

In their studies researching the possible relationship between unemployment and crime, Elliott and Ellingwort (1996) used the data of 11713 households, belonging to the "England Crime Survey" of 1992. The rank correlation coefficient between the male unemployment rate and crime rate indicates a positive and significant relationship. In addition, in their regression analysis, they also discovered that the increase

in the unemployment rate, at a regional level, causes an increase in the crime rate (Data belongs to 572 regions).

In their studies, Paps and Winkelmann (1999) researched the relationship between unemployment and types of crime, using the panel data technique. In their study, in which a possible causal connection was investigated, using New Zealand's data, which includes 60 regions belonging to the period from 1984 to 1986, they obtained evidence proving that unemployment has a significant effect on both the total crime rate and various crime types.

In their analysis, Carmichael and Ward (2001) used the panel data set consisting of data from 42 countries from 1989 to 1996. According to the results of the regression model examined in a semi-logarithmic form and under fixed effects model, they discovered a significant and positive relationship between unemployment and total crime rate, robbery, fraud, and forgery crimes.

In his study performed in order to discover the determinatives of crime related behaviors, using the USA data from 1960 to 1998, Oliver (2002) used a model in a semi-logarithmic form. He gathered the variables in three groups, which are the economical variables, the disincentive variables and the demographical variables. Estimating that an educated population would demonstrate less tendency to crime, the ratio of the college graduates to total population, the ratio of the high school graduates to total population, the real GNP, the Gini coefficient in order to search the effect of the income distribution on crime and unemployment rate were the economical variables. The number of the police and the population rate in prison were identified as disincentive variables. The under 25 population rate played the role of the demographical variable. No significant relationship was discovered either in the unemployment rate or in other economical variables.

In their studies concerning the effects of the government programs in Sweden, aimed at business life, on unemployment and crime, Nilsson and Agell (2003) discovered that the unemployed population between the ages of 18 to 64 has a significant effect on the total criminal increase.

Moreover, they stated that the government programs aimed at business life had a reducing effect on unemployment.

### **3. Application**

#### **3.1. Purpose of the Study**

The effect of unemployment and income on crime has been discussed at theoretical and application levels by several researchers. The purpose of the present study, however, is to detect the validity of the relationship between income-unemployment-crime for Turkey, which was examined by the studies in the crime economy field and was tested for various countries.

#### **3.2. Data Set and Method**

In this study, the data about the number of the prisoners, the income per capita and the unemployment edited in the database of the Turkish Statistical Institute (TUIK) have been used. As stated above, all the theoretical approaches aimed to explain the relationship between income, unemployment and crime focus on the potential benefit of the crime. For that reason, in the study herein, while analyzing the stated theoretical relations, only the crimes raising economical benefits have been handled and the others have been ignored. The data related to robbery, muggings, fraud, bribe, embezzlement, money and goods smuggling crimes have been used within this study.

#### **3.3. Findings**

The static of the series before the panel co-integration test was checked via the Levin, Lin & Chu test. All the variables were differential statics and the test results related to their static relations are summarized below. In the study, the relationship between income and crime was examined on the basis of 26 regions according to the NUTS2 classification.



The crime and income relation variables of the 26 regions are static in the 1<sup>st</sup> differential (Chart 1). The unemployment – crime relationship, however, was examined in consideration of the data belonging to 67 provinces. The unemployment and crime variables are static in the 1<sup>st</sup> differential (Chart 1).

**Table 1.** Levin&Lin&Chu Panel Unit Root Test

	MODEL	t statistics
<b>Crime (26 Region) (1)*</b>	None	-61.0908**
	Intercept	-94.9064**
	Intercept-trend	-89.2907**
<b>Income (26 Region) (1)*</b>	None	-3.11195**
	Intercept	-1.71459**
	Intercept-trend	-5.04374**
<b>Crime (67 Province) (1)*</b>	None	-32.1954**
	Intercept	-30.0359**
	Intercept-trend	-26.1762**
<b>Unemployment (67 Province) (1)*</b>	None	-34.2401**
	Intercept	-30.1014**
	Intercept-trend	-26.5884**

\* indicates first differences.

\*\* %1 significant level

The co-integration tests were realized after examining the stability of the data and their having the same co-integration roots by the unit root test. Seven sets of statistics were used in order to test the co-integrational relationship between the Pedroni variables. The rejection of the null hypothesis representing the situation not related to co-integration means that the panel data are co-integrative. This test allows the heterogenic in the vector of co-integration, not only the dynamic and stable effects are allowed to be different between the sections of the panel, but also the vector of co-integration are allowed to be different between the sections of the panel as an alternative hypothesis. (Güvenek and Alptekin, 2010). As an alternative to the test of Pedroni co-integration, the tests of Kao (1998) co-integration have been applied in research. The consequences of the test of co-integration are shown in the chart.

**Table 2.** Pedroni Residual Co-integration Test (Crime-Income Per Capita)

	<u>Statistic</u>	<u>Prob.</u>	<u>Weighted Statistic</u>	<u>Prob.</u>
Panel v-Statistic	15.20401	0.0000	-1.455063	0.9272
Panel rho-Statistic	-14.25204	0.0000	-2.380027	0.0087
Panel PP-Statistic	-39.21664	0.0000	-6.042741	0.0000
Panel ADF-Statistic	-4.898265	0.0000	-5.599843	0.0000
Alternative hypothesis: individual AR coefs. (between-dimension)				
	<u>Statistic</u>	<u>Prob.</u>		
Group rho-Statistic	-1.363043	0.0864		
Group PP-Statistic	-11.67579	0.0000		
Group ADF-Statistic	-5.135266	0.0000		

**Table 3.** Kao Residual Cointegration Test (Crime-Income Per Capita)

		<u>t-Statistic</u>	<u>Prob.</u>
ADF		5.700062	0.0000
Residual variance		0.249976	
HAC variance		0.059378	

**Table 4.** Pedroni Residual Cointegration Test (Crime-Unemployment)

	<u>Statistic</u>	<u>Prob.</u>	<u>Weighted Statistic</u>	<u>Prob.</u>
Panel v-Statistic	-4.405585	1.0000	-6.088237	1.0000
Panel rho-Statistic	-0.354416	0.3615	-0.241457	0.4046
Panel PP-Statistic	-10.48301	0.0000	-12.59300	0.0000
Panel ADF-Statistic	-11.12474	0.0000	-13.23852	0.0000
Alternative hypothesis: individual AR coefs. (between-dimension)				
	<u>Statistic</u>	<u>Prob.</u>		
Group rho-Statistic	3.042161	0.9988		
Group PP-Statistic	-16.89614	0.0000		
Group ADF-Statistic	-13.49139	0.0000		

**Table 5.** Kao Residual Cointegration Test (Crime-Unemployment)

		t-Statistic	Prob.
ADF		4.029399	0.0000
Residual variance		0.097032	
HAC variance		0.042318	

Considering the charts (Chart-2-3-4-5), there is a relation of co-integration between income-crime and unemployment-crime. The consequences of Pedroni co-integration are figured between income and crime in Chart 2. All the statistics have been found out significant and the relation of co-integration between the variables have been proved as the null hypotheses have been rejected. The null hypotheses have also been rejected in the test of Kao co-integration and the relations of co-integration between per capita income and crime have been detected. The consequences of the test of co integration between the unemployment and crime are shown in Chart 4 and Chart 5. The null hypotheses were not rejected in three tests of the pedroni co-integration. The test of Kao co-integration only points out the relation of co-integration. There co-integration equations which were presumed under static effects are used to figure out the relation between the variables. The expressions in parenthesis are standard errors of the co-efficient.

$$\text{Crime} = 5,183 + 0,116^* \text{income}$$

$$(0,040) \quad (0,006) \quad R^2:0,878 \quad F:123,84$$

$$\text{Crime} = 3,237 + 0,157^* \text{unemployment}$$

$$(0,150) \quad (0,0178) \quad R^2:0,936 \quad F:208,21$$

As it is conceived, increasing of unemployment causes increasing of crime. The relations between the variables are significant statistically in a correct direction. Likewise, the increase of income causes the increase in types of crimes. The increase of income per capita does not affect the decline of crime, moreover the potential crime rate increases with the rising of income.

## Argumentation & Result

It's an unquestionable fact that the unemployment makes the individual to have tendency to crime. However, in consideration of the existing fact, it is not possible to analyze the social tendency of crime purely with the unemployment or other economic variables. In this research, the purpose is to point out that the unemployment is an important factor for the tendency to crime, not to correlate the fact of the crime with only unemployment. Thus, in analysis, the crime types offering economical income have been taken into account.

The interaction between the unemployment and crime rates can simply be explained as unemployment lessening the loyalty of the individual to social values and rules and eliminating the barriers between the individual and the illegal actions. That fact is a natural consequence of unemployment consisting of both social and economic costs. Consequently, the increase in the number of the individuals tending to crime and the increase in the number of the crimes committed charge the society for the costs such as the decrease of the respect to the legal order, the dissociation of the social structure and confidence, the passing of the economical savings illegally into other hands and/or their being defected.

In the end of the analysis performed, parallel results to theoretical declarations have been recorded. There exists a co-integration relation between income – crime and unemployment – crime. Considering the estimated regression equation results in order to find out the direction of the stated relation, the findings can be summarized as following:

- There exists a long-term co-integration relation between unemployment and crime and as the unemployment increases, crime rate increases as well. In other words, unemployment is a significant factor to determine the crime statistically.
- There exists a long term relation between income and crime and the crime rates increase as the income increases. Because the increase of income, in a way, means the increase of the social

wealth, which means the increase of the expected potential earnings through crime. Income per capita is a significant factor to determine the crime statistically.

Considering the consequences obtained through this study, it shall not be possible to claim that every unemployed person is a potential criminal. Yet, it has to be acknowledged that the tendency to crime has a strict relationship with the social unemployment and social income.

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### References:

- BAHAROM, A.H.; HABIBULLAH, M.S. (2008), "Is crime co-integrated with income and unemployment?: A panel data analysis on selected European countries", Munich Personal RePEc Archive, <http://mpra.ub.uni-muenchen.de/11927/> (22.05.2011).
- BECKER, G.S. (1968), *Crime and Punishment: An Economic Approach*: Journal of Political Economy, 76, 169-217.
- BRITT, C.L. (1994). : *Crime and Unemployment among Youths in the United States, 1958-1990: A Time Series Analysis*, American Journal of Economics and Sociology, 53, 1.
- CARMICHAEL, F., WARD, R. (2001), *Male Unemployment and Crime in England and Wales*, Economic Letters, 73, 111-115.
- DURKHEIM, *The Rules of Sociological Methods*, (Translated by Mueller), New York, 1966, 66-67, in SOKULLU-AKINCI, *Kriminoloji*, Istanbul, 2010, 41.
- EHRlich, I. (1973), *Participation in Illegitimate Activities: A Theoretical and Empirical Investigation*, The Journal of Political Economy, 81, 521-565.
- ELLIOTT, C., ELLINGWORTH, D. (1996), *The Relationship Between Unemployment and Crime*, International Journal of Manpower, 17, 81-88.

FREEMAN, R. (1999). : *The Economics of Crime*, Ashenfelter, O., Card, D. (ed.), in Handbook of Labor Economics, Elsevier, Amsterdam.

GOTTFREDSON, M.R., HIRSCHI, T. A. (1990): *General Theory of Crime*, Stanford, Stanford University Press,

KAO, C. and M.-H. CHIANG (1998), *On the Estimation and Inference of a Co-integrated Regression in Panel Data*, Working Paper, Center for Policy Research, Syracuse University.

LEVIN, A., LIN, C-F., CHU, C-S. J. (2002),: *Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties*, Journal of Econometrics, 108, 1-24.

OLIVER, A. (2002), *The Economics of Crime: an analysis of Crime Rates in America*, The Park Place Economist, 10, 30-35.

PAPPS, K., WINKELMANN, R. (1999). *Unemployment and Crime: New Evidence for an Old Question*,: [<http://www.nuffield.ox.ac.uk/users/papps/unemployment.pdf>].: 21.05.2011

PEDRONI, P. (1997) *Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests With an application to the PPP Hypothesis New Results*, Working Papers in Economics, Indiana University.

<http://www.tuik.gov.tr> (11.04.2011).