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Call for Papers
Volume XVI, Issue 1(19), Summer 2025
Journal of Research in Educational Sciences

The Journal is designed to promote scholars' thought in the field of education with the clear mission to provide an interdisciplinary forum for discussion and debate about education's most vital issues. We intend to publish papers that contribute to the expanding boundaries of knowledge in education and focus on research, theory, current issues and applied practice in this area.

The Editor in Chief would like to invite submissions for the **Volume XVI, Issue 1(19), Summer 2025** of the **Journal of Research in Educational Sciences** (JRES).

The primary aim of the Journal has been and remains the provision of a forum for the dissemination of a variety of international issues, empirical research and other matters of interest to researchers and practitioners in a diversity of subject areas linked to the broad theme of educational sciences.

The aims and scope of the Journal includes, but is not limited to; the following major topics as they relate to the Educational Sciences:

- Educational Psychology;
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- Learner's Needs in the 21st Century;
- The Role of Education in The Globalization World;
- Technology-Based Learning.

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The Cases of Criminality and Law Violations among Young People and Minors

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Abstract: The chosen scientific article mainly scrutinizes the cases of criminality and law violations among young people as well as minors, which were characterized as crucial social problems.
The study identified the main purpose of the spread of criminal cases among young people and the trend of their growth, as well as factors that actively influence this process.
The criminality and delinquency among young people and minors are treated as a cybernetic system, which is justified from the point of view of the systematic approach envisaging a socio-economic system with special complexity, dynamism, emergence, and stochasticity in the paper.
Global experience with juvenile offenders sheds light on the complex and varied needs of children in conflict with the law. Much of the growing literature on deviant behavior in juvenile offenders shows significant overlap between criminological, social, and medical research. Based on the econometric approach, multi-regression models of the dependence of criminality among young people on the influencing regressors of the environment were built, their qualitative characteristics were tested and mathematically justified that they are a suitable mechanism for optimal management and forecasting in the paper.

Keywords: youth and minors; crime and offences; criminality and delinquency; cybernetic system; econometric modeling; multi-regression model.

JEL Classification: E71; F61; H 41; K42; I12.

Introduction

One of the main obstacles that disrupt the formation of the young generation as decent citizens are criminality and delinquency among the youth and minors, which are considered social problems within society.

Consequently, the cases of young people's criminality have an increasing trend depicting the prognostic characteristic of criminality in the country.

Youth and juvenile delinquency should be identified as a complex, dynamic and probabilistic economic-cybernetic system open to environmental influences. Referring to this, it will be possible to quantitatively evaluate the dependencies between youth criminality and the factors affecting it with the help of relationship equations and to build optimal management strategies.

Delinquency and criminality among young people as a social problem. Azerbaijan is a part of the global world, in this respect, it is not isolated from many of the processes of the world. Unfortunately, some negative processes are also found in these worldly processes.

1. Literature Review

Juvenile and youth delinquency and delinquency issues are a constant concern throughout the civilized world (Rodríguez-Díaz et al. 2010). The main reason is that the young generation is the natural reserve power of the country's social development. On the other hand, the crimes committed by young people and the large scale of these crimes act as prognostic characteristics of criminality in society (Carney, M. & Buttell, F. 2003).

In the studies of V.A. Serebryakov, A.S. Shlyapochnikov, V.K. Zvirulya, M.M. Babaev, A.B. Sakharov, A.I. Dolgova, O.M. Minkovsky, A.A. Gabiani, R.G. Gachechiladze, A.V. Zavarzin, G.I. Zabryansky, S.P. Luknitsky, A. Leps, E.M. Mazin, E.E. Raski, E.N. Dzenis, G.G. Minberg, A.Z. Januaskas, Ya.I. Gilinsky, V. Fox, E. Shur and other criminologists, theoretical and methodological issues of the influence of individual social factors on crime were considered; the existence of certain correlation dependencies between the processes of urbanization and migration, age-sex and socio-professional composition of the population, types of settlements, the degree of their population, the existing social environment and other factors, on the one hand, and crime, on the other hand, was established.

Various aspects of juvenile delinquency are widely studied in both foreign and domestic sociology and criminology. Significant contributions to the development of this issue were made by foreign sociologists E. Durkheim, R. Merton, G. Becker, E. Giddens, A. Cohen, E. Sutherland, T. Sellin, N. Smelser, G. Schneider, E. Schur and others.

In scientific works on criminal law by Vietnamese authors and editors, the issue of criminal liability of minors under 18 years of age is analyzed in accordance with the General Provisions of the Criminal Code. These are such Vietnamese authors, editors as: Nguyen Ngoc Kien, Nguyen Ngoc Hoa, Pham Van Beo, Tran Thi Quang Vinh, Cao Thi Oanh, as well as the works of such Russian scientists as F.R. Sundurov, I.A. Tarkhanov, V.V. Veklenko, I.Ya. Kozachenko, G.P. Novoselov, A.I. Bastrykin. At the same time, the diversity of scientific trends and schools has significantly complicated the structure of modern foreign sociology of crime.

Research shows that juvenile delinquency and delinquency have common roots, or rather, these acts follow patterns that can be considered common (Ellis, R. 2000, 329.). It is not surprising that the opportunities of older people in society are not the same, and there are sharp socio-economic differences in these opportunities. These differences affect children and young people in a unique way. The elderly and the young differ not only in terms of age but also in terms of different statuses. If the elderly citizen has a valuable social status, the condition of the minors is more in line with the dependent (Harder, J., 2005, 248). Age differences among society members ultimately lead to social differences and inequalities. As in most countries of the world, the young generation in Azerbaijan is dissatisfied not only with the false “incomprehension, being ignored,” not meeting the “behavior and presence standards” of the elderly but also with the inequality of opportunities compared to the elderly. These inequalities manifest themselves most in providing housing, finding a job, and having opportunities to protect one's interests. As a result, young people are more likely to break social norms and become victims of crime (Levin, A. & Mills, L., 2003, 467).

In all societies, there is a contradiction between the ever-increasing demands of people and the possibilities of meeting these demands. This contradiction is more acute for minors and young people (Roberts, A. & Springer, D., 2007, 172.), who are considered to be the most delicate and sensitive section of the population to the effects of the environment (Patterson, G., 2004, 275). With the rapid development of the physical, mental, and emotional capabilities of youth (Madden, R. & Wayne, R., 2003, 341.), the strengthening of their self-awareness and self-affirmation cannot find an environment for self-realization. So, in real life, they face low social perfection, little life experience, and little or not any professionalism, which leads to the formation of the status of incompleteness in a definite part of the young generation (Roberts, A., 2004, 45) in a complex manner.

2. Method also called Materials and Methods or Experimental Methods

An econometric study of factors affecting juvenile and youth delinquency. Thus, youth have a demand for public recognition and social self-affirmation. Failure to satisfy this demand gives rise to the "Herostratus complex" of activity in youth, that is, they resort to negative forms of social activity - violence, crime, and, in extreme cases, alcoholism and drug addiction. The Decree "On State Youth Policy", signed in 1999, defined the main strategic goals of state bodies for the implementation of youth policy in the Republic of Azerbaijan. On January 26, 2015, the "Strategy for the Development of Youth in Azerbaijan for 2015-2025" was approved. In this development strategy, which is considered a strategic roadmap for the formation of the youth of our country as worthy citizens with national and world values, youth development is considered as one of the essential components of the state social policy. The development strategy states that youth, who make up the majority of the population, are the main innovative potential and labor resource of the country. Therefore, one of the main directions of the state's youth policy is achieving success in the economic sphere.

As mentioned above, several factors influence crime among socially disadvantaged youth. If we approach crime among youth as an outcome factor then the number of 14 to 29-year-olds studying in higher education institutions, and the number of youths employed and unemployed between the ages of 15 to 27, as influential regressors, it can be explicitly observed that it directly affects this outcome indicator and cause its increase or decrease, the nominal average monthly wage in particular, the economic growth of GDP can be taken.

3. Case Studies

In connection with the increase in the number of works devoted to various manifestations of crime, and the continuing involvement of new branches of science in the research, the subject of the sociology of crime continues to expand and change, which complicates the development of an integrated paradigm. In general, the analysis of the development of foreign and domestic sociological thought on the problems of crime and deviant (including delinquent) behavior shows that in recent decades no new fundamental theories have appeared in this area. Apparently, this means that researchers have reached a certain threshold (level) of understanding crime. And, probably, the existing knowledge is insufficient to overcome it and move to a new level of understanding this phenomenon. That is why many researchers are turning to the problems of constructing social mechanisms, to the search for economical and effective measures to prevent crime, suggesting their optimal combination within the framework of resources available to society.

4. Research Results

The following table shows the statistical data reflecting the change in the number of criminals among the youth in the country and the influential indicators we took as regressors affecting this outcome indicator during the years 2005-2021 (Table 1).

As can be seen from Table 1, the authors did not include 2020 and 2021 statistics for the indicators of the number of young people between the ages of 15-29 who got a job and were given the status of unemployed, as the pandemic caused certain problems in the collection of these indicators.

Table 1. Statistics of the quantitative change of criminality among young people and the factors affecting

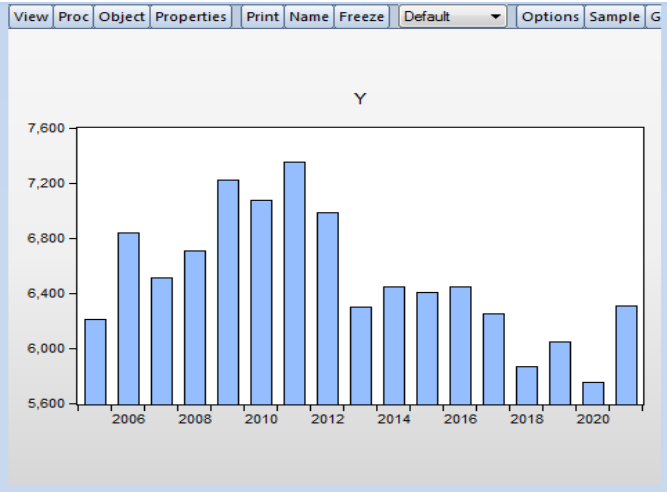
Year	Young people aged 14-29 who have committed a crime (persons)	Young people aged 14-29 studying in higher education institutions (persons)	Number of employed youths between the ages of 15-29 (persons)	The number of young people between the ages of 15-29 who were given the status of unemployed (persons)	Nominal average monthly salary (manats)	Economic growth of GDP by years (%)
2005	6208	129586	15201	26883	117.9	28
2006	6839	128680	15737	27126	119.8	34.5
2007	6508	129365	17442	25923	142.0	25
2008	6710	135232	13469	20560	268.0	10.8
2009	7223	138119	11642	19665	298.0	9.3
2010	7076	139151	12443	18874	325.0	5
2011	7351	141751	11947	18800	356.6	0.1
2012	6981	144296	11671	17916	396.0	2.2
2013	6301	150424	11703	17655	420.5	5.8

Year	Young people aged 14-29 who have committed a crime (persons)	Young people aged 14-29 studying in higher education institutions (persons)	Number of employed youths between the ages of 15-29 (persons)	The number of young people between the ages of 15-29 who were given the status of unemployed (persons)	Nominal average monthly salary (manats)	Economic growth of GDP by years (%)
2014	6441	157400	11670	14082	444.3	2.8
2015	6403	160392	11604	13891	464.4	1.1
2016	6444	162801	20542	15029	498.6	-3.1
2017	6249	166298	15934	15850	528.2	0.2
2018	5864	175138	14700	8790	544.1	1.5
2019	6044	185752	24033	23445	635.1	2.5
2020	5749	196170			707.7	-4.3
2021	6305	188944			732.1	5.6

Source: compiled by the authors based on Azerbaijan (2022).

A timeline representation of the change in youth crime from 2005 to 2021 is as follows (Figure 1).

Figure 1. Graph of the order of the dynamics of crime among young people



Source: compiled by the authors.

The graph illustrated in Figure 1 shows that in the period up to 2013, there was an increasing trend in criminality among youths, and in the following period, a decreasing trend was observed.

Thus, delinquency and criminality among young people, which is a serious social problem for society, can be studied as an economic-cybernetic system of complex, dynamic, and stochastic nature, which has complex direct, and opposite relations with many other characteristics of the environment. In this case, the subject of the research will be to carry out econometric modeling (Hacızalov Y., 2013) of the impact of the factors affecting criminality among young people on this complex system and to determine the quantitative characteristics of those effects based on these mathematical instruments (Dougherty, C., 2011). In our research, we will use the correlation-regression analysis method of econometric modeling (Stock, J., 2010), s it will build a linear multiple regression model (Harrington, E., 1965, p. 494-498) f the dependence of criminality among youth on the regressors that affect it in the form of - ($Y=b\_0+b\_1\ x\_1+b\_2\ x\_2+ \ldots+b\_n\ x\_n+e$), - parameterization and verification of that model will be carried out.

As mentioned above, many factors have an impact on the level of crime among young people to one degree or another. It is practically impossible to undertake all influencing factors in the econometric study of this social problem. Therefore, in our research, we will use the socioeconomic factors reflected in table 1 as regressors affecting the level of criminality among young people. Note that our study has a more social nature.

One of the basic principles of econometric modeling (Studenmund, A., 2010.) is that the indicators involved in the study of the problem should be identified as endogenous (explanatory) and exogenous (explanatory) parameters (Gujarati, D. & Porter, D., 2009). In the research process, the indicators reflected in Table 1 were identified in the form of endogenous (Y) and exogenous (x_i) parameters as follows:

- Endogenous parameters:
  - the number of persons who have committed a crime among 14-29-year-old youth in the country (*Y*);
- Exogenous parameters:
  - the number of 19-29-year-olds studying in higher education institutions (x_1);
  - number of employed youths between the ages of 15-29 (x_2);
  - the number of young people between the ages of 15-29 who were given the status of unemployed (x_3);
  - nominal average monthly salary by country (x_4)
  - Economic growth of GDP in % by years (x_5).

Thus, the purpose of the econometric research we will conduct is to determine the dependence of the number of youth offenders in the country on the influential regressors we classified above.

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + e \quad (1)$$

It will be to quantitatively evaluate the linear multiple regression model and based on this econometric model to quantitatively evaluate the effect of explanatory regressors xi on the dependent variable Y. The authenticity of the results obtained from the econometric analysis is directly related to the stationarity of the time series of the factors involved in the research process. Thus, the results obtained on the basis of non-stationary time series are not adequate enough for real conditions. Therefore, in this study, the stationarity of the time series reflected in table 1 was tested by the correlogram method (taking into account the small number of observations) and all the time series are stationary according to the 1st differences. It has been determined that they are appropriate for conducting econometric studies.

The table below shows the statistics of parameterization of the dependence of the number of youth offenders on influential regressors (1) to the linear multiple regression model (Sevüktekin, M., 2014.) with the help of the EViews software package (Table 2).

Table 2. Linear multivariate regression model parameterization statistics

Variable	Coefficient	Standard error	t-statistic	p-value
C	11858.68	3713.383	3.193496	0.0109
x_1	-0.045058	0.038280	-1.177069	0.2694
x_2	-0.005932	0.042336	-0.140106	0.8917
x_3	0.030599	0.038413	0.796595	0.4462
x_4	3.069828	5.310047	0.578117	0.5774
x_5	-20.67576	33.38156	-0.619377	0.5510
	Value			
R-squared	0.731878			
Adjusted R-squared	0.582922			
S.E. of regression	283.5361			
Sum squared residual	723534.6			
Log likelihood	-102.1630			
F-statistic	4.913372			
Prob (F-statistic)	0.019118			
Mean dependent var	6576.133			
S.D. dependent var	439.0356			
Akaike info criterion	14.42173			
Schwarz criterion	14.70495			
Hannan-Quinn criterion	14.41871			
Durbin-Watson stat	2.305159			

Source: compiled by the authors.

Then the linear multivariate regression model of the dependence of the number of criminals among youth in the country on the selected influential regressors will be as follows:

$$Y = 11858.68 - 0.05x_1 - 0.01x_2 + 0.03x_3 + 3.07x_4 - 20.68x_5 \quad (2)$$

Without touching on the quality of this multivariate regression model let us give a preliminary economic interpretation. Based on this model, the number of students studying in higher education institutions in the country, the number of employed youths, and the economic growth of GDP over the years have an effect on the incidence of crime among young people in the direction of decrease, while other explanatory variables have an effect in the direction of increase. The second one is (2) verification of the multivariate regression model and its

evaluation in the chosen study. As is known, the most common indicator of the regression model is the determination coefficient R^2. According to the above statistics, the value of the determination coefficient is equal to $R^2=0.73$. Therefore, 73% of the variation of the dependent variable Y is explained by the regression we studied. On the other hand, $F\_fakt=4.91 > F\_crit=3.48$ was obtained, which means that the actual value of the Fisher criterion is greater than its theoretical value. Hence, the multiple regression model (2) is significant. (2) since $|t\_fakt| < t\_crit$ for the values of the coefficients of the multiple regression model, these coefficients are also insignificant. Therefore, model (2) is not adequate to real conditions and certain changes should be made on it.

Furhtermore, the stepwise elimination of variables algorithm to obtain a regression model in which all coefficients are significant. Here, the variables x_2 and x_4 from the model are removed and the regression equation again for the remaining variables are built.

$$Y = 10396.76 - 0.03x_1 + 0.03x_3 - 39.18x_5 \quad (3)$$

The quality of the multivariate regression model we built (3) is higher than the quality of the regression model (2), as only the explanatory variable x_3 is insignificant in this model. As it is known, the subject of linear regression analysis is the evaluation of linear dependencies between indicators of economic systems. However, such dependencies do not exist a priori. Therefore, during an econometric study, it is necessary to convert non-linear dependencies between indicators into linear dependencies. Note that this approach is possible in many cases and allows for defining management decisions that are quite adequate to real-life conditions. The simplest example of linearizing a non-linear regression model is logarithmization, or rather, the regression equation baseline model in the form of:

$$Y = b_0 + b_1x_1 + b_2x_2 + \ ... + b_nx_n + e \quad (4)$$

is to bring it to a logarithmic equation in the form:

$$\log(Y) = b_0 + b_1\log(x_1) + b_2\log(x_2) + \ ... + b_n\log(x_n) + e \quad (5)$$

If we conduct research based on this model, the logarithmic regression equation will be obtained as follows. When constructing the model, we do not logarithmize the economic growth indicator of GDP, because this time series is expressed as a percentage.

$$\log(Y) = 15.89 - 0.65\log(x_1) + 0.07\log(x_3) - 0.01x_5 \quad (6)$$

According to statistics (6), the value of the coefficient of determination for the logarithmic multivariate regression model was equal to $R^2=0.73$. More precisely, 73% of the variation of the dependent variable is explained by regression. On the other hand, since $F\_fakt=9.92 > F\_crit=3.59$, regression equation (6) is significant. Of the coefficients of the equation, only x_3 is not significant, because the condition $|t\_fakt| < t\_crit$ is fulfilled for it at the limits of probability $P>0.05$. So, let's continue the process of improvement of (6) regression model.

The econometric studies sometimes use models in which the dependent variable Y depends not only on the current values of the factor variables but also on their previous values. The structure of such a model will be as follows.

$$Y_s = b_0 + b_0x_t + b_1x_{t-1} + \cdots + b_kx_{t-k} + \varepsilon_t \quad (7)$$

Here, the coefficients $b\_1,b\_2,...,b\_k$ reflect the share of the past values of the actual variables in the formation of the current value of the dependent variable. The set of values of the factor variable $x\_(t-k),...,x\_(t-1),x\_t$ forms a dynamic series or a lag whose value is equal to k. Therefore, the econometric model we have described above is called a distributed lag model or simply a lag model.

Let's construct a lag model for the logarithmic multiple regression model. The statistics of the process of transformation of the logarithmic regression model into the lag model are reflected in Table 3.

According to the statistics in the Table 3, we get:

$$\log(Y) = 20.01 - 0.96\log\big(x_1(-1)\big) + 0.02\log(x_2) - 0.01\,x_5(-1) \quad (8)$$

$R^2=0.77$ was obtained for the multiple regression model, which means that 77% of the variation of the dependent variable is explained by regression. $F\_fakt=11.05 > F\_crit=3.59$ shows that the logarithmic multiple regression model can be considered as a significant model. Since $|t\_fakt| > t\_crit$, the value of the three coefficients of equation (8) can be considered significant at the $P\leq0.05$ confidence level. Hence, the overall quality of the model has improved significantly. Based on the outcomes of the evaluation of the test regressors, the H_0 hypothesis about the adequacy of the linear specification to real-life conditions is rejected in favor of the alternative hypothesis about the adequacy of the logarithmic specification. The H_0 hypothesis about the adequacy of the logarithmic specification cannot be rejected by the alternative hypothesis. Thus, the logarithmic specification should be considered the superior specification.

Examination of the correlogram of the residuals of the multivariate regression model shows that there was a significant additive jump in 2013. Therefore, considering this additive jump, let's transform the econometric model (8) into a dummy variable regression model (Table 4).

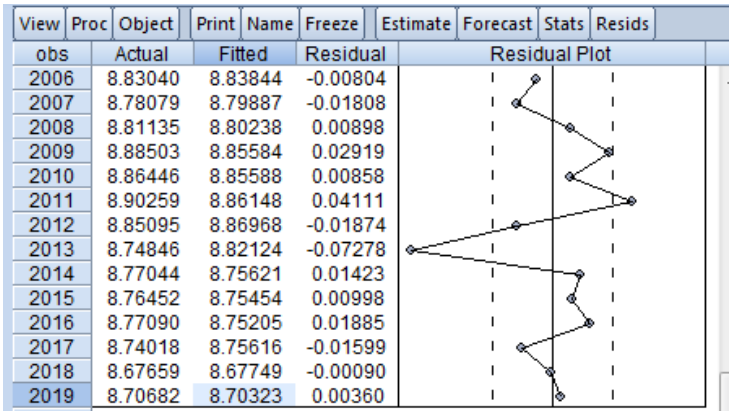
Table 3. Lag model construction statistics

Variable	Coefficient	Standard error	t-statistic	p-value
C	20.01384	2.084921	9.599329	0.0000
$log(x_1(-1))$	-0.957834	0.179653	-5.331588	0.0003
$log(x_3)$	0.021626	0.015281	1.415228	0.1874
$x_5(-1)$	-0.004969	0.001531	-3.245707	0.0088
	Value			
R-squared	0.768170			
Adjusted R-squared	0.698621			
S.E. of regression	0.036792			
Sum squared residual	0.013536			
Log likelihood	28.72489			
F-statistic	11.04500			
Prob (F-statistic)	0.001628			
Mean dependent var	8.793106			
S.D. dependent var	0.067018			
Akaike info criterion	-3.532127			
Schwarz criterion	-3.349539			
Hannan-Quinn criterion	-3.549028			
Durbin-Watson stat	1.626143			

Source: compiled by the authors.

In order to improve the quality of the research, if we analyze the residuals of model (8), we get the following result (Figure 2).

Figure 2. Statistics of the study of the residuals



Source: compiled by the authors.

According to the statistics in the table, the new version of the logarithmic multivariable regression model of the dependence of the number of crimes committed by young people in the country on influencing factors is as follows:

$$\log(Y) = 21.60 - 1.09\log\big(x_1(-1)\big) + 0.02\log(x_2) - 0.01\,x_5(-1) - 0.10\,F2013 \quad (9)$$

For this new version of the regression model, $R^2=0.92$ was obtained, which means that 92% of the variation of the dependent variable *Y* is explained by regression. The multivariate regression model (9) is a significant model because of the obtained statistics $F\_fakt=27,58 > F\_krit=4,35$. On the other hand, all the coefficients of the regression equation are also significant because $P \leq 0,05$ for the reliability level $|t\_fakt| > t\_krit$ obtained.

The purpose of econometric modeling is to obtain a regression equation that is adequate for today's conditions and to build an effective management strategy based on this model. Therefore, the model coefficiency should have a precise and logical economic interpretation. Based on the model (9), we can say that the number

of educated people and the level of economic growth of GDP affect the crime rate among young people between the ages of 15-29 with a certain delay. Thus, a 1% increase in the number of students reduces crime by 1.09 people, and a 1% increase in GDP reduces crime by 0.01 people. A 1% increase in the number of unemployed youths between the ages of 15-29 has an impact on crime. As the last model option, we will accept the multiple regression model (9).

Table 4. Dummy variable regression model statistics

Variable	Coefficient	Standard error	t-statistic	p-value
C	21.60055	1.306346	16.53509	0.0000
log(x₁(-1))	-1.092366	0.112423	-9.716559	0.0000
log(x₃)	0.024884	0.009219	2.699155	0.0244
x₅ (-1)	-0.006282	0.000969	-6.480452	0.0001
F2013	-0.104701	0.024239	-4.319592	0.0019
	Value			
R-squared	0.924564			
Adjusted R-squared	0.891037			
S.E. of regression	0.022122			
Sum squared residual	0.004405			
Log likelihood	36.58394			
F-statistic	27.57663			
Prob (F-statistic)	0.000046			
Mean dependent var	8.793106			
S.D. dependent var	0.067018			
Akaike info criterion	-4.511991			
Schwarz criterion	-4.283757			
Hannan-Quinn criterion	-4.533119			
Durbin-Watson stat	2.262305			

Source: compiled by the authors.

Now let's check whether the autocorrelation of model (9) is present or not. For this purpose, we will use the Breusch-Godfrey test. The idea behind the Breusch–Godfrey test is that if there is correlation between neighboring observations, then

$$e_t = \rho_1 e_{t-1} + \rho_2 e_{t-2} + \ ... + \rho_k e_{t-k} + v_t, \ \ (t = \overline{1,n}) \qquad (10)$$

the value of the coefficient *e_t* in the equation will be significantly different from 0. Here, *ρ_k* are the random deviations of the initial regression model tested for autocorrelation. Then the hypotheses about the existence of autocorrelation are formed as follows:

H0: ρ_1= ρ_2= 〖…=ρ〗 _k=0 (no autocorrelation);

H1: ρ_k≠0 (k-order autocorrelation is present).

The application of the Breusch–Godfrey test is practically brought to the estimation of the auxiliary regression we applied above with the help of the method of least squares.

To test the hypothesis, you can use the F statistic, which compares the value of the coefficient of determination of the auxiliary model of the test with the coefficient of determination of the version of that model without lags of random deviations. If the condition of the existence of linear dependence between exogenous variables and random deviations of the ECM is satisfied, then the value of the coefficient of determination of the lag-free model will be quite close to zero.

The following table (9) shows a fragment of the statistics of testing the multivariate regression model for the existence of autocorrelation with the help of the Breusch-Godfrey test (Table 5).

Table 5. Statistics of the Breusch-Godfrey test

Test	Value
F-statistic	0.391020
Obs*R-squared	1.406901
Prob. F (2,7)	0.6903
Prob. Chi-Square (2)	0.4949

Source: compiled by the authors.

According to the statistics of the table above, the value of *Prob(F-statistic) of Fstat* is equal to *0.6903*, and this value is greater than the *α=0.05* confidence level indicator we conducted our research: *Prob(F-statistic)= 0.6903> α=0.05*. Therefore, the *H1* hypothesis about the existence of autocorrelation in model (9) is not accepted (there is no autocorrelation). This result is also in the table *Prob(Obs*R-squared)= 0.4949> α=0.05* is confirmed again.

One of the main assumptions of the ECM is that the variances of the random deviations for any observation should be constant. Otherwise, the properties of the values obtained with the EKCM will change. In the theory of econometric modeling, the fulfillment of this condition is called homoscedasticity, and its violation is called heteroscedasticity.

The following Table (6) shows a fragment of the statistics of testing the multivariate regression model for heteroscedasticity with White's test.

Table 6. White's test of the regression model verification statistics

Test	Value
F-statistic	0.732506
Obs*R-squared	3.438413
Scaled explained SS	0.962472
Prob. F (4,9)	0.5922
Prob. Chi-Square (4)	0.4873
Prob. Chi-Square (4)	0.9154

Source: compiled by the authors.

According to the statistics of the regression shown in the table, the value of *F-statistic Prob(F-statistic)= 0.5922* is greater than the value of *α=0.05*, which we accept as the confidence level. Therefore, the hypothesis of the existence of homokedasticity is accepted. On the other hand, according to the statistics of the White test shown in the table *Prob(Obs*R-squared)= 0.4873>α=0.05* condition is paid. Therefore, the conclusion that the multiple regression model (9) is a homoscedastic model is also confirmed by the *Prob(Obs*R-squared)* characteristic of that statistic.

Thus, the linear multiple regression model (9), which quantifies the dependence of the number of youth crimes in the country on the explanatory regressors affecting this social problem, can be considered a homoscedastic regression model without autocorrelation. The fact that this model has high-quality characteristics and, therefore, is quite adequate to real conditions, allows it to be used as an effective mechanism in optimal management development and forecasting strategies that ensure to reduction of criminality among young people.

5. Discussions

If there is heteroscedasticity in the econometric model, then the estimation of the regression model with ECM can lead to the following undesirable situations:

1. If the values of the parameters are not shifted and remain linear, they will lose their effectiveness. An increase in price dispersion reduces the probability of obtaining maximum accurate prices.

2. The variances of the parameter values will be calculated by sliding. Therefore, all the results obtained based on the relevant t and F statistics, as well as the interval values, will not be valid. As a result, values that are not truly statistically significant may be considered significant. White's test is mainly utilized to detect heteroskedasticity. According to this test, the residuals of the original model are determined and the auxiliary regression model of their squares is evaluated on all its exogenous variables, their squares, and their cross-products. If the number of parameters in the initial model is large enough, then the “no cross” variant of White's test, which does not take into account the cross products, can be used.

Conclusions and Further Research

The current state of criminality and delinquency among young people and minors in the Republic of Azerbaijan, the influence of the factors causing this social problem on the process was analyzed from the point of view of a systematic approach, and econometric modeling of existing quantitative dependencies in this field was carried out in the study. As a result of the conducted econometric analysis, a linear multiple regression model reflecting the dependence of the number of criminal cases among young people, which is taken as an endogenous parameter, on social regressors that actively influence this indicator was evaluated. It was revealed that the quality characteristics of the initial model are not satisfactory. By returning to the specification stage, a lagged logarithmic

relationship equation was established through the help of special tests, and it was determined that the Gauss-Markov conditions are satisfied for this model which can be considered a multicollinearity-free, autocorrelation-free, homoscedastic regression model. The adequacy of this model to real-life situations allows it to be referred to in the development of strategies aimed at reducing the number of criminals among young people.

Credit Authorship Contribution Statement

Leyla Huseynova: Writing – review and editing, Methodology, Supervision, Project administration;
Mehriban Aliyeva: Writing – original draft, Investigation, Visualization;
Elmira Gojaeva: Writing – original draft, Methodology, original draft, Data curation;
Esmira Ahmadova: Writing – review and editing, Formal analysis.
The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-Assisted Technologies

The authors declare that they have not used generative AI and AI-assisted technologies during the preparation of this work.

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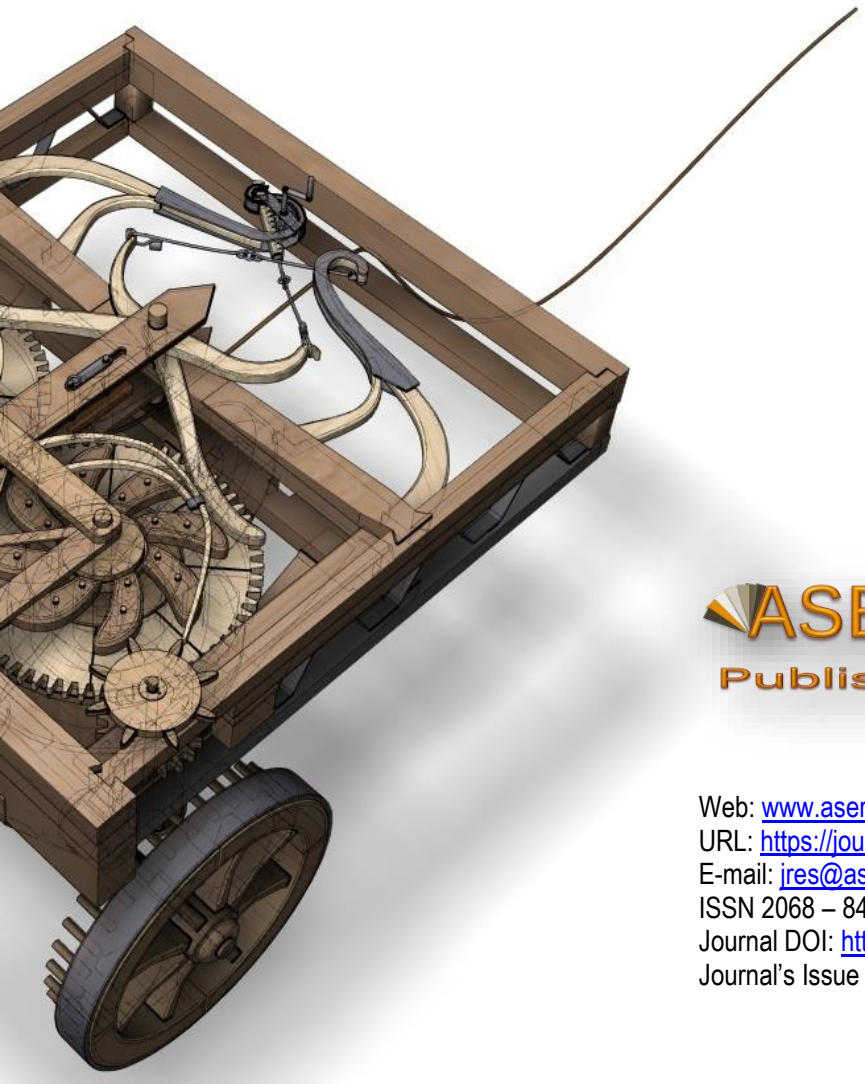

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