

“Public education expenditure and crime among educated individuals: Time-series evidence from Azerbaijan”

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PUBLIC EDUCATION EXPENDITURE AND CRIME AMONG EDUCATED INDIVIDUALS: TIME-SERIES EVIDENCE FROM AZERBAIJAN

Abstract

This study aims to examine the relationship between public education expenditure, student enrollment, and crime among educated individuals in Azerbaijan over the period 1998–2023. Using annual time-series data, the analysis investigates whether education-related public investment and educational participation are associated with changes in criminal activity within the educated population. The empirical findings reveal the existence of a stable long-run relationship among the variables, indicating that education expenditure, student enrollment, and crime dynamics evolve in an interconnected manner over time. The results further demonstrate that both public education expenditure (Wald = 11.356, $p = 0.003$) and student enrollment (Wald = 27.576, $p < 0.001$) possess statistically significant predictive power in explaining variations in crime among educated individuals. In particular, the stronger statistical effect observed for student enrollment suggests that broader participation in the education system may play a particularly important role in shaping long-term crime patterns. Overall, the findings indicate that education policy extends beyond its conventional function of human capital development and may contribute to broader social outcomes, including the reduction of crime-related vulnerabilities. By providing empirical evidence from Azerbaijan as a transition economy, this study contributes to the growing literature examining the wider societal implications of education policy and its role in promoting long-term social stability and sustainable development.

Keywords

education expenditure, crime, student enrollment,
Toda–Yamamoto causality, time-series, Azerbaijan

JEL Classification

K42, C32, H52, I25

INTRODUCTION

The relationship between education, criminal behavior, and legal frameworks has gained increasing attention in both academic research and international policy discourse. Education is recognized as a fundamental human right under international law, obliging states to ensure its accessibility, quality, and inclusiveness through effective policy design and public expenditure. Foundational instruments such as the Universal Declaration of Human Rights and interpretive frameworks like the Abidjan Principles on the Right to Education highlight the central role of state intervention in promoting equitable education systems (Abidjan Principles, 2019).

From a policy perspective, education is increasingly incorporated into crime prevention strategies aimed at strengthening the rule of law, enhancing social stability, and promoting youth inclusion. Access to quality education expands socio-economic opportunities, supports social integration, and is associated with lower involvement in criminal activities (United Nations Office on Drugs and Crime, 2026). Public investment in education therefore serves not only as a driver of human capital development but also as a mechanism contributing

to social cohesion and crime mitigation. In Azerbaijan, where education policy is closely linked with broader development objectives, this relationship is particularly relevant in the context of achieving the Sustainable Development Goals, especially SDG 4 (Quality Education) and SDG 16 (Peace, Justice, and Strong Institutions) (United Nations, 2015, 2024; UNDP, 2024).

Despite this growing recognition, an important scientific and empirical gap remains. While existing studies largely focus on the general population, limited attention has been given to crime dynamics among educated individuals, particularly in transition and developing economies such as Azerbaijan. This raises a critical question: to what extent does public education expenditure influence criminal behavior within already educated segments of society? Addressing this issue is essential, as rising education levels do not automatically eliminate criminal activity, especially under conditions of social inequality, changing cultural norms, and structural transformation (Aliyeva, 2023).

Nevertheless, no empirical study has specifically investigated the relationship between public education expenditure, student enrollment, and crime among educated individuals, leaving an important gap in understanding whether education policy functions not only as a mechanism of human capital development but also as a long-term instrument for reducing crime-related vulnerabilities within educated populations. In this context, the present study addresses the identified gap by examining the relationship between public education expenditure, student enrollment, and crime among educated individuals in Azerbaijan. By doing so, it contributes to both the scientific literature and policy debate by clarifying whether education-related investments function as an effective tool for influencing crime dynamics within educated populations.

1. LITERATURE REVIEW AND HYPOTHESES

The relationship between education and crime has long attracted attention in economics, criminology, and public policy, as education serves both as a mechanism for human capital formation and a means of promoting social stability and regulating behavior. From a theoretical standpoint, education reduces the likelihood of criminal activity by increasing legitimate income opportunities, raising the opportunity cost of engaging in crime, and strengthening adherence to social norms and institutions. These channels suggest that both individual educational attainment and broader public investment in education can play an important role in shaping crime dynamics.

A substantial body of empirical research supports an inverse association between education and crime. Higher levels of schooling are generally linked to lower involvement in both property and violent offenses, largely due to improved labor market prospects and stronger social integration (Machin et al., 2011; Bell et al., 2018). However, this relationship is not uniform across all contexts. While education tends to reduce conven-

tional crimes such as theft and assault, it may be associated with greater tolerance toward certain non-violent or white-collar offenses, including tax evasion, indicating that its effects are multidimensional and context-dependent (Groot & van den Brink, 2010).

Beyond individual attainment, increasing attention has been given to public education expenditure as a macro-level determinant of crime. Higher levels of government spending on education are associated with improvements in school quality, broader access, and stronger long-term economic opportunities, all of which can contribute to lower crime rates (Yavuz & Susam, 2022; Ades & Mishra, 2021). Consistent with this perspective, evidence reported by the National Bureau of Economic Research indicates that increased school funding improves educational conditions and reduces the likelihood of criminal involvement, with students in better-funded schools being approximately 15% less likely to be incarcerated by early adulthood (Rivkin, 2022).

Recent contributions also highlight that the effects of education spending depend on its composition and timing. In particular, increases in opera-

tional expenditures, such as teacher salaries and classroom resources, have been shown to improve student outcomes, including higher test scores, reduced dropout rates, and greater participation in higher education, whereas additional capital expenditures, such as infrastructure investments, appear to have more limited direct effects on these outcomes (Baron, 2022). Complementing these findings, more recent quasi-experimental evidence suggests that increased public school funding during early childhood significantly lowers the probability of arrest in adulthood, and that the resulting social benefits, particularly through crime reduction, exceed the associated public costs (Baron et al., 2026).

Empirical evidence supports the broader crime-reducing role of education. For instance, studies using variations in compulsory schooling laws to address endogeneity demonstrate that higher educational attainment reduces the likelihood of arrest and incarceration. Evidence based on Census, FBI, and NLSY data indicates that increased male high school completion yields substantial social benefits, estimated at approximately 14–26% of private returns to education (Lochner & Moretti, 2004). However, these findings do not explicitly capture how public expenditure and enrollment expansion interact with crime outcomes among educated individuals.

The effectiveness of education in influencing crime is also shaped by behavioral and structural factors, including school participation, dropout rates, and early-life conditions. Policies that expand enrolment or extend compulsory schooling have been found to reduce crime in both the short and long term, although through different mechanisms. Short-term effects are often linked to keeping individuals engaged in school, while long-term effects reflect improved socio-economic opportunities (Bell et al., 2022; Hjalmarsson & Lochner, 2012). At the same time, factors such as absenteeism, poverty, and early exposure to crime may weaken these benefits, suggesting that complementary policies are necessary to fully realize the crime-reducing potential of education (Nguyen, 2019; Webbink et al., 2013).

Cross-country evidence further indicates that the relationship between education and crime varies

across institutional and developmental contexts. In developing economies, increased school enrolment appears to have a stronger effect on reducing property crime than violent crime, reflecting differences in economic structures and enforcement systems (Asante & Bartha, 2022). Similarly, long-term analyses show that investments in education and welfare tend to be more effective in reducing crime than purely punitive approaches, while excessive reliance on correctional spending may produce unintended adverse effects (Hazra & Aranzazu, 2022). Recent studies also emphasize that the strength and direction of the education–crime relationship depend on contextual factors, policy design, and methodological approaches, underscoring the complexity of causal interpretation (Carr et al., 2023; Wahab et al., 2025).

Despite the breadth of this literature, an important gap remains. Existing research has rarely examined public education expenditure, educational participation, and crime among educated individuals within a single empirical framework, particularly in transition and developing economies such as Azerbaijan. Given the country’s distinct institutional and socio-economic characteristics, the relationship between education and crime may differ from that observed in more developed contexts. While the literature broadly supports the role of education as both a personal and public mechanism for reducing crime, the specific pathways through which public education expenditure influences crime among educated individuals remain insufficiently explored in the Azerbaijani case. Despite the extensive international literature on education and crime, there is no existing empirical study that examines the joint dynamics of public education expenditure, student enrollment, and crime among educated individuals specifically in Azerbaijan. Addressing this gap requires an integrated empirical approach capable of capturing both short-run dynamics and long-run relationships.

The primary aim of this study is to examine whether public education expenditure reduces crime among educated individuals in Azerbaijan, while accounting for the role of student enrollment within a multivariate time-series framework. The hypotheses are formulated as follows:

H1: Public education expenditure exerts a statistically significant Granger-causal effect on crime among educated individuals.

H2: Student enrollment exerts a statistically significant Granger-causal effect on crime among educated individuals.

2. METHOD

The study employs annual data from Azerbaijan covering the period 1998–2023 to examine whether public education expenditure mitigates crime among educated individuals. The dependent variable is the number of educated individuals involved in criminal activities (EDUCRI). In contrast, the key explanatory variables are the number of students enrolled in general education institutions (EDUSTU) and total government expenditure on education as a percentage of GDP (EDUEXP). To address potential heteroskedasticity and facilitate interpretation in terms of elasticities, EDUCRI and EDUSTU are transformed into their natural logarithms, denoted as LEDUCRI and LEDUSTU, respectively. The dataset is sourced from authoritative institutions, namely the World Bank (n.d.)

and the State Statistical Committee of the Republic of Azerbaijan (SSCRA, 2025), ensuring accuracy and consistency for empirical analysis.

In the official statistics of Azerbaijan, the EDUCRI variable refers to recorded offenders who possess a formal educational qualification. According to the classification employed by the State Statistical Committee, this category includes individuals with completed secondary, vocational, and higher education. The indicator represents the annual number of offenders within these educational groups and encompasses all recorded crime categories reported in the official database. The study focuses on this population because the existing literature has predominantly examined aggregate crime rates. In contrast, considerably less attention has been devoted to criminal activity among persons who have already attained formal education. Examining this category provides an opportunity to assess whether education-related public policies are associated with changes in criminal behavior within an educationally attained segment of the population.

Figure 1 illustrates the temporal dynamics of the key variables used in the analysis. The first

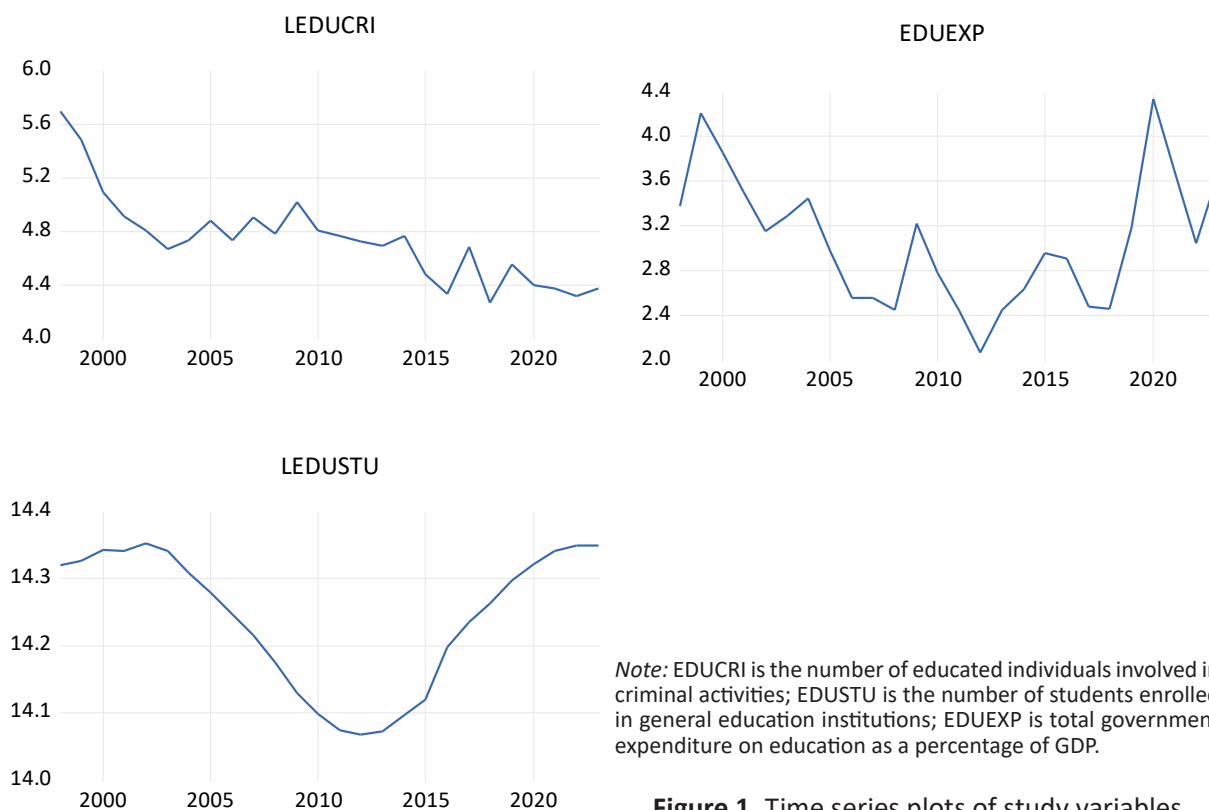


Figure 1. Time series plots of study variables

panel shows a general downward trend, indicating a gradual decline in the number of persons committing crimes among educated individuals (LEDUCRI) over the observed period, with minor short-term fluctuations. The second panel highlights substantial short-term volatility in student enrollment (LEDUSTU), with pronounced peaks and troughs reflecting cyclical variations in educational participation. The third panel depicts the government's total education expenditure (EDUEXP) as a smooth U-shaped trend, initially decreasing and subsequently recovering, suggesting a structural adjustment or policy-driven change over time. Collectively, these patterns provide context for the Toda–Yamamoto Granger causality results, showing that both educational investment and student participation co-evolve with trends in crime among educated individuals.

Table 1 presents the descriptive statistics of the variables. The LEDUCRI variable exhibits notable non-normality, as indicated by a Jarque–Bera probability of 0.042, reflecting right-skewness and elevated kurtosis. In contrast, EDUEXP and LEDUSTU display Jarque–Bera probabilities of 0.555 and 0.234, respectively, suggesting distributions that approximate normality. These results imply that crime among educated individuals is more variable and asymmetric, whereas education expenditure and student enrollment remain comparatively stable and normally distributed.

Table 1. Descriptive data of the variables

Statistic	LEDUCRI	EDUEXP	LEDUSTU
Mean	4.737	3.063	14.240
Median	4.727	3.010	14.270
Maximum	5.690	4.332	14.352
Minimum	4.262	2.067	14.068
Std. Dev.	0.336	0.585	0.103
Skewness	1.014	0.447	−0.506
Kurtosis	4.304	2.4652	1.715
Jarque–Bera	6.301	1.176	2.900
Probability	0.042	0.555	0.234

Note: LEDUCRI is the number of educated individuals involved in criminal activities; LEDUSTU is the number of students enrolled in general education institutions; EDUEXP is total government expenditure on education as a percentage of GDP.

To investigate the causal relationship between public education expenditure and crime among educated individuals in Azerbaijan, a Vector

Autoregressive (VAR) model is employed, following the framework introduced by Sims (1980). The VAR model captures the dynamic interdependencies among multiple time-series variables simultaneously, making it suitable for examining the feedback effects between LEDUCRI, LEDUSTU, and EDUEXP.

Prior to estimating causality, it is essential to determine the integration properties of the variables using the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1979), as the stationarity of the series dictates the appropriate testing procedure. If all variables are stationary, the standard Granger causality test (Granger, 1969) can be applied to identify directional causality among the variables. However, in the presence of mixed integration orders, as in this study where EDUEXP is I(1) while LEDUCRI and LEDUSTU are I(0), the Toda–Yamamoto (TY) approach (Toda & Yamamoto, 1995) is more appropriate. This method augments the standard VAR by adding $d_{\max}$ extra lags to account for the highest order of integration, ensuring that Wald tests for causality remain valid without requiring pre-testing for cointegration. The augmented VAR can be formally expressed as:

$$Y_t = \alpha^0 + \sum_{i=1}^p \alpha_i Y_{t-i} + \sum_{i=p+1}^{p+d_{\max}} \alpha_i Y_{t-i} + \varepsilon_t \quad (1)$$

where Y_t is a vector of endogenous variables, p is the optimal lag length determined by VAR lag selection criteria, and $d_{\max}$ represents the maximum order of integration among the variables.

Before conducting the causality tests, the robustness and reliability of the VAR model are evaluated using several diagnostic procedures. These include the VAR Lag Order Selection Criteria to determine the optimal lag structure, the Roots of the Characteristic Polynomial to ensure model stability, the Residual Serial Correlation LM Tests to detect autocorrelation, the Residual Normality Tests to verify the normality assumption, and the Residual Heteroskedasticity Tests to identify any variance instability in the errors. These steps collectively ensure that the estimated model is well-specified and that the resulting causality inferences are statistically valid.

3. RESULTS

Table 2 presents the results of the ADF unit root tests for the variables under study. Both LEDUCRI and LEDUSTU are stationary at their levels, indicating that their statistical properties such as mean and variance are stable over time, whereas EDUEXP is non-stationary at level but becomes stationary after first differencing, showing it is integrated of order one, I(1). Since the dataset includes variables of mixed integration orders, the Toda–Yamamoto approach is appropriate for examining causal relationships, with the maximum order of integration ($d_{\max}$) determined as 1, ensuring valid inference without requiring pre-testing for cointegration.

The VAR lag selection criteria in Table 3 indicate that a lag length of 2 is optimal, as suggested by the FPE, AIC, SC, and HQ statistics. This implies that including two lags of the endogenous variables (log-transformed EDUCRI, EDUEXP, and LEDUSTU) provides the best balance between model fit and parsimony. Consequently, subsequent causality and impulse response analyses should be conducted using a VAR(2) specification to ensure robust and reliable inference.

The roots of the characteristic polynomial all lie within the unit circle (Table 4), as all moduli are less than one, confirming that the VAR model is stable. This stability indicates that shocks to the endogenous variables will not lead to explosive behavior and will eventually dissipate over time.

Therefore, the VAR(2) specification is appropriate for conducting reliable impulse response and causality analyses.

Table 4. Roots of the characteristic polynomial

Root	Modulus
$0.937186 - 0.289310i$	0.980825
$0.937186 + 0.289310i$	0.980825
$0.286772 - 0.714510i$	0.769911
$0.286772 + 0.714510i$	0.769911
0.726680	0.726680
$-0.553080 - 0.458897i$	0.718668
$-0.553080 + 0.458897i$	0.718668
$-0.393441 - 0.150213i$	0.421141
$-0.393441 + 0.150213i$	0.421141

Table 5 reports that the p-values for all lag orders exceed the 0.05 significance level, indicating the absence of serial correlation in the residuals. This finding suggests that the VAR model is appropriately specified in capturing the dynamic relationships among EDUCRI, EDUSTU, and EDUEXP. Consequently, the residuals exhibit white noise properties, reinforcing the robustness of the model and the validity of subsequent inference and impulse response analysis.

Table 6 indicates that all reported p-values exceed the 0.05 significance level, implying that the null hypothesis of multivariate normality of residuals cannot be rejected. The skewness and kurtosis statistics further confirm that the residuals are well-behaved and closely approximate a normal distribution. Moreover, the joint Jarque–Bera test supports the normality assumption, suggesting that

Table 2. Unit root test

Variable	Level / Difference	ADF Statistic	p-value	Lag Length	Result
LEDUCRI	At Level	−3.309	0.025*	1	Stationary
EDUEXP	At Level	−2.171	0.22	1	Non-Stationary
EDUEXP	1st Difference	−5.192	0.000*	1	Stationary
LEDUSTU	At Level	−3.435	0.020*	3	Stationary

Note: * MacKinnon (1996) one-sided p-values are reported. EDUCRI denotes the number of educated individuals involved in criminal activities; EDUSTU represents the number of students enrolled in general education institutions; and EDUEXP refers to total government expenditure on education as a percentage of GDP.

Table 3. VAR lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	11.30560	NA	1.00e−04	−0.692133	−0.544876	−0.653066
1	57.45464	76.91507	4.59e−06	−3.787887	−3.198860	−3.631618
2	86.81923	41.59983	8.77e−07*	−5.484936*	−4.454139*	−5.211465*

Note: * indicates the lag order selected by the respective criterion.

Table 5. VAR residual serial correlation LM tests

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	8.118	9	0.5223	0.917	(9, 19.6)	0.5308
2	13.379	9	0.1462	1.708	(9, 19.6)	0.1537
3	4.005	9	0.9111	0.412	(9, 19.6)	0.9132
4	8.847	9	0.4515	1.016	(9, 19.6)	0.4606

Table 6. VAR residual normality tests

Test Type	Component	Statistic	Chi-sq / JB	df	Prob.
Skewness	1	0.308	0.364	1	0.5462
	2	0.602	1.388	1	0.2388
	3	-0.074	0.021	1	0.8853
	Joint	—	1.773	3	0.6209
Kurtosis	1	2.960	0.002	1	0.9685
	2	3.163	0.025	1	0.8732
	3	3.367	0.129	1	0.7195
	Joint	—	0.156	3	0.9843
Jarque–Bera	1	—	0.366	2	0.8329
	2	—	1.413	2	0.4933
	3	—	0.150	2	0.9278
	Joint	—	1.929	6	0.9261

the VAR model satisfies the essential distributional requirements for reliable statistical inference.

Table 7 reports a p-value of 0.5511, which exceeds the 0.05 significance level, indicating no evidence of heteroskedasticity in the residuals. This result suggests that the variance of the residuals remains stable over time, supporting the adequacy and robustness of the VAR model. In the absence of heteroskedasticity, the model's statistical inferences and corresponding confidence intervals can be considered reliable.

Table 7. VAR residual heteroskedasticity test

Test Type	Chi-sq	Df	Prob.
Joint Test	105.464	108	0.5511

Table 8 presents the results of the Johansen cointegration test, providing strong evidence of long-run equilibrium relationships among the variables.

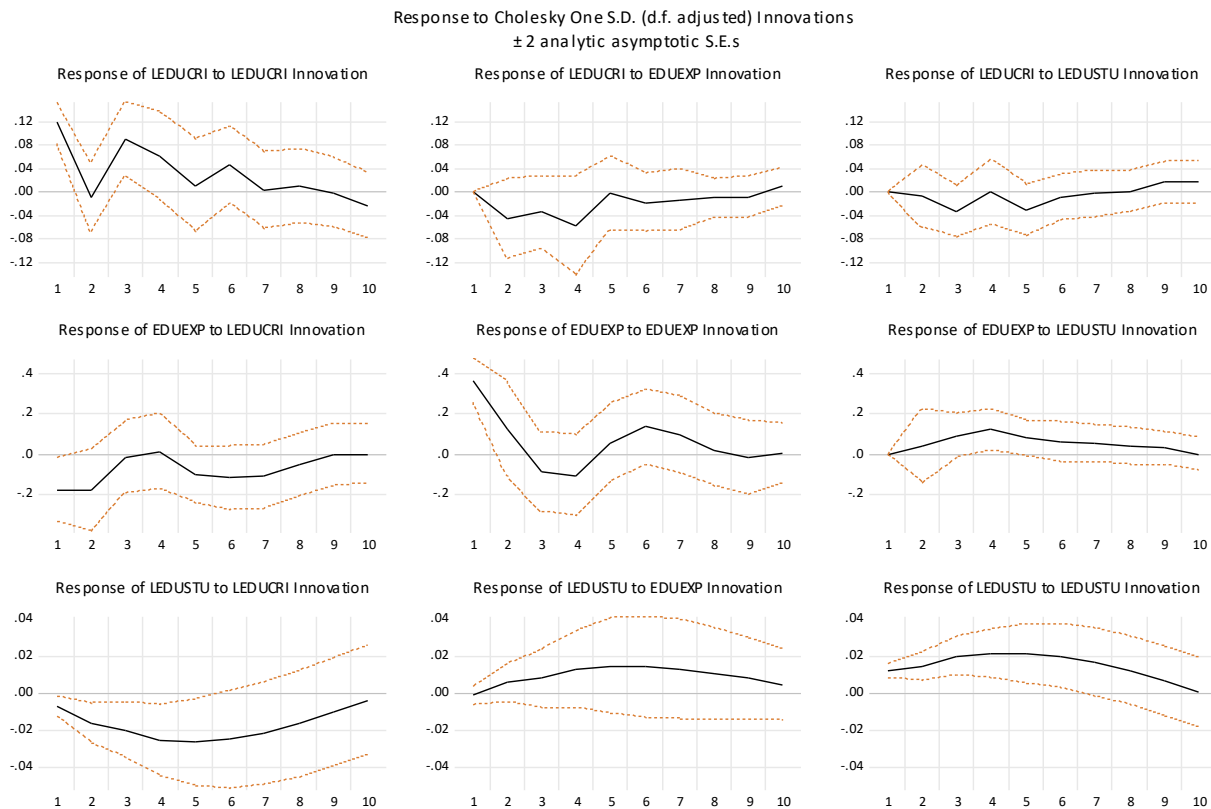
Table 8. Johansen cointegration test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.	Max-Eigen Statistic	0.05 Critical Value	Prob.
None *	0.768	48.874	29.797	0.0001	32.118	21.132	0.0010
At most 1 *	0.523	16.755	15.495	0.0321	16.306	14.265	0.0253
At most 2	0.020	0.449	3.841	0.5026	0.449	3.841	0.5026

Note: The null hypothesis is rejected at the 5% significance level. The Johansen cointegration test identifies two cointegrating equations (CEs). MacKinnon et al. (1999) asymptotic p-values are reported. Note: ** indicates rejection of the null hypothesis at the 5% significance level. The Johansen cointegration test identifies two cointegrating equations (CEs). *MacKinnon et al. (1999) asymptotic p-values are reported.

The trace statistic (48.87, $p = 0.0001$) and the maximum eigenvalue statistic (32.12, $p = 0.0010$) both exceed their respective critical values, leading to the rejection of the null hypothesis of no cointegration. Furthermore, the presence of a second cointegrating vector is supported by a trace statistic of 16.76 ($p = 0.0321$) and a maximum eigenvalue statistic of 16.31 ($p = 0.0253$), both significant at the 5% level. These findings confirm the existence of two cointegrating equations, indicating that education expenditure, student enrollment, and crime among educated individuals share stable long-run relationships. Consequently, although short-run deviations may occur, the variables tend to move together over time and adjust toward their long-run equilibrium.

Figure 2 presents nine line plots depicting dynamic relationships, each consisting of a central trajectory (black line) accompanied by variability bounds (orange dashed lines). Several panels dis-



Note: EDUCRI is the number of educated individuals involved in criminal activities; EDUSTU is the number of students enrolled in general education institutions; EDUEXP is total government expenditure on education as a percentage of GDP.

Figure 2. Impulse response functions with confidence intervals from the VAR model

play upward trends, indicating growth or increasing effects over time, whereas others exhibit downward or oscillatory patterns, reflecting decline or instability. In some cases, the confidence bands remain relatively narrow, suggesting stable and precise estimates; in others, they widen, signaling heightened uncertainty or volatility. Overall, the grid demonstrates heterogeneous dynamics across the analyzed scenarios, highlighting that the system exhibits both consistent and divergent responses depending on the specific variable or condition under consideration.

Table 9 reports the results of the Toda–Yamamoto Granger causality test conducted to assess the predictive relationships among the selected educa-

tional variables. The findings indicate statistically significant Wald statistics for both EDUEXP and LEDUSTU as explanatory variables of LEDUCRI, with *p*-values falling below conventional significance levels. The model specification incorporates two lags ($K = 2$) and three degrees of freedom in the Wald test, consistent with the Toda–Yamamoto augmentation procedure to account for potential integration orders.

The empirical results support both research hypotheses. The Toda–Yamamoto Granger causality test indicates that public education expenditure and student enrollment exhibit statistically significant predictive relationships with crime among educated individuals, thereby providing empirical support for *H1* and *H2*.

Table 9. Toda–Yamamoto Granger causality test results

Causal Direction	Wald Statistic	P-value	Lags (K)	df
EDUEXP → LEDUCRI	11.356	0.003	2	3
LEDUSTU → LEDUCRI	27.576	0.001	2	3

Note: EDUCRI is the number of educated individuals involved in criminal activities; EDUSTU is the number of students enrolled in general education institutions; EDUEXP is total government expenditure on education as a percentage of GDP.

4. DISCUSSION

The empirical findings indicate that public education expenditure and student enrollment possess statistically significant predictive power for crime among educated individuals in Azerbaijan. Within the Toda–Yamamoto framework, these results suggest the existence of dynamic relationships between the educational variables and crime outcomes; however, they should not be interpreted as definitive evidence of direct causal effects or effect magnitudes. The Toda–Yamamoto Granger causality test demonstrates that both government spending on education and student enrollment in general education institutions have predictive power over crime among educated individuals, indicating that changes in educational investment and participation are statistically associated with subsequent variations in crime patterns within educated segments of society. These results align with broader theoretical and empirical evidence that education functions as both a human capital investment and a socioeconomic factor associated with wider behavioral and institutional dynamics. The results indicate statistically significant predictive relationships, suggesting that past changes in education expenditure contain useful information for forecasting crime among educated individuals. However, these results do not imply a structural or behavioral causal effect.

A limitation of the study is the relatively small sample size resulting from the availability of annual data for Azerbaijan. The analysis is therefore restricted to the longest consistent time series currently obtainable for the selected variables. As additional observations become available in future years, subsequent research may re-examine these relationships using extended datasets and alternative modeling approaches. Nevertheless, the present findings provide an initial empirical contribution to an underexplored area of research in the Azerbaijani context.

Using conventional econometric approaches, previous research has demonstrated that public expenditure exerts heterogeneous effects on socio-economic development (Hasanov et al., 2025; Giyasova et al., 2025). Examining legal and social dimensions within an identical methodological framework constitutes a

timely and significant area of academic inquiry, particularly within the context of Azerbaijan (Gulaliyev et al., 2025). The findings also resonate with the specific socioeconomic and cultural context of Azerbaijan. Mammadov (2020) found that higher education levels were negatively associated with crime, reinforcing the conclusion that educational attainment may be associated with lower levels of criminal involvement in specific population groups. Similarly, Shahbazov and Afandiyev (2021) highlighted that socioeconomic factors, including higher pupil admission rates to universities, were positively associated with property crime mitigation across Azerbaijani cities, suggesting that broader educational access may coincide with differences in regional crime patterns. Collectively, these studies indicate that educational factors in Azerbaijan remain closely associated with broader crime-related dynamics, although the magnitude and mechanisms may differ across crime categories and population groups.

Gendered disparities in education also influence crime outcomes, particularly given entrenched societal norms. Hasanova and Aghazada (2024) documented persistent violations of female education rights in Azerbaijan, stemming from patriarchal traditions, religious influences, and gendered career expectations. These systemic barriers to female educational participation suggest that educational inequality may interact with wider socioeconomic conditions shaping long-term social outcomes.

From a policy perspective, the results underscore the dual role of education in Azerbaijan: as an instrument for human capital development while also representing an important social indicator associated with broader societal dynamics. By enhancing both the quantity and quality of educational provision, the state can simultaneously address social inequities while potentially influencing wider long-term socioeconomic patterns observed across society. The evidence suggests that investments in education yield not only economic and developmental benefits but may also be statistically associated with broader social outcomes, reinforcing the importance of considering educational expenditure within wider public policy discussions.

Overall, the findings provide robust empirical support for considering education expenditure and student participation as statistically relevant factors when examining crime dynamics among educated populations. This aligns with interna-

tional evidence and underscores the value of context-specific policy measures that consider socioeconomic, cultural, and gendered factors influencing educational access and criminal behavior in Azerbaijan.

CONCLUSION

The aim of this study was to examine whether public education expenditure and student enrollment are statistically associated with crime among educated individuals in Azerbaijan. The empirical findings indicate that both variables exhibit statistically significant predictive relationships with crime outcomes, while the identification of two cointegrating relationships confirms the existence of a stable long-run association among the variables within the examined period. Although the results provide evidence of long-run interdependence and dynamic linkages, the applied methodological framework does not permit conclusions regarding the magnitude, direction, or structural mechanisms underlying these relationships. Therefore, the findings should be interpreted as evidence of statistically significant associations rather than direct causal effects.

Taken together, the results suggest that education-related indicators are closely connected with broader social dynamics and may provide valuable information for understanding long-term patterns associated with crime among educated populations. In this context, the study highlights that educational expenditure and participation should not be viewed exclusively through the lens of human capital development, but also as important socioeconomic variables associated with wider societal outcomes. As one of the first time-series studies addressing this relationship in Azerbaijan, this paper contributes to the limited literature on education and crime in transition economies and provides a foundation for future studies employing alternative datasets and methodological approaches to further explore the mechanisms underlying these observed associations.

AUTHOR CONTRIBUTIONS

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