

Economic Mechanisms for Preventing Tax Evasion and Financial Crimes: Cross-Country Evidence

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Abstract

This study explores the development and implementation of economic mechanisms designed to prevent financial crimes within the tax system, specifically focusing on the challenges faced by Ukraine as a transitional economy. Financial sustainability in emerging markets is fundamentally tied to the integrity of tax administration; systemic tax evasion and financial crimes create fiscal deficits that

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undermine structural reforms. Using a multi-disciplinary approach, this paper analyses the effectiveness of current preventive measures against international benchmarks established by the OECD and the European Union.

The research identifies critical structural vulnerabilities in the current tax system and proposes a modernized framework of "Economic Mechanisms" that includes digital transparency, risk-based auditing, and international information exchange protocols. The findings suggest that transitioning from reactive legal enforcement to proactive economic prevention significantly reduces the "tax gap" and enhances the state's fiscal resilience, safeguarding tax revenues, these mechanisms provide the necessary financial stability to support broader structural reforms and long-term economic growth. The study offers practical recommendations for policymakers to align national tax enforcement with global standards, ensuring corporate and state financial sustainability in volatile transitional environments.

Keywords: tax evasion; tax administration efficiency; shadow economy; corporate tax abuse; ICT in taxation; fiscal sustainability.

JEL Classification: H26; H83; O17; K42.

Introduction

Financial crimes in the tax system, including tax evasion, tax fraud, and other abuses, pose significant risks to the economic stability of the state. Tax crimes not only harm the filling of national budgets and the proper performance of state functions but also reduce its competitiveness and investment attractiveness (Popadynets et al., 2021). Therefore, the development of effective ways to prevent financial crimes in the tax system is a priority task of any state.

Criminal schemes in the tax system have undergone significant changes, which makes the search for effective countermeasures relevant. The researchers associate such mechanisms with the development of domestic and international cooperation and the harmonization of tax control practices (Turksen et al., 2023; Turksen & Abukari, 2021). Irawan (2022) noted that preventing tax evasion is based on efforts aimed at obtaining permanent benefits, rather than penalties. In general, the researchers agree that effective economic mechanisms for combating tax crime should be developed based on an integrated approach. Such an approach includes improving tax administration, introducing new technologies to increase the efficiency of the tax system, strengthening control over the shadow economy, and other measures to reduce tax losses.

Reducing tax crimes contributes directly to fiscal sustainability by decreasing structural revenue losses and stabilizing the tax base. In countries with limited access to capital markets and significant cyclical volatility, the inability to collect taxes efficiently increases budget deficits and accelerates reliance on external borrowing. Empirically, tax evasion and fraud contribute to the widening of the "fiscal gap", which must be compensated either through additional debt financing, higher taxation, or expenditure cuts. For transitional economies, including Ukraine, the reduction of tax crimes therefore serves not only as an anti-criminal policy tool but also as a macro-fiscal stabilisation mechanism, improving budgetary sustainability and lowering medium-term debt pressures. Strengthening compliance thus complements broader objectives of reducing sovereign risk premiums and mitigating long-term fiscal vulnerabilities.

From a regional perspective, tax enforcement mechanisms in Ukraine share functional similarities with other transitional economies of Eastern Europe. However, EU member states such as Poland, Lithuania and Romania have already implemented integrated digital tax compliance systems (e-invoicing, SAF-T reporting, risk-based audit selection, and real-time VAT validation), which reduced tax losses and improved compliance. Ukraine remains in the process of gradual convergence towards these standards. The comparison highlights those transitional economies that underwent EU-aligned reforms introduced risk-oriented enforcement models significantly earlier, prioritising tax digitalisation and compliance automation. This creates a relevant benchmark for assessing Ukraine's trajectory of tax enforcement development.

Table 1. Tax Enforcement Mechanisms in Ukraine and Selected Eastern European Transitional Economies

Country	Digital enforcement tools	Risk-based audit	VAT control model	Compliance automation	Status
Poland	SAF-T, e-invoicing	Yes	Split payment	High	EU standard
Lithuania	SAF-T	Yes	Real-time	High	EU standard
Romania	SAF-T	Yes	Partial	Medium	Converging
Ukraine	Partial (e-VAT, e-excise)	Limited	Registry-based	Low-Medium	Converging

Source: formed by the author

Therefore, it is important to study the relationships between potential factors influencing tax evasion in order to determine priority areas of counteraction. So, the aim of the research was to analyse the impact of macroeconomic and institutional factors on tax losses and the effectiveness of preventing financial crimes in the tax system. The aim involves the fulfilment of the following research objectives:

- Assess the relationship between macroeconomic indicators of the impact of the institutional environment and the volume of tax losses;
- Determine the impact of indicators of tax administration efficiency on the volume of tax losses;
- Analyse indicators of corporate taxation efficiency.

1. Literature Review

From a theoretical perspective, the economic foundations of tax evasion can be traced back to the seminal Allingham–Sandmo model (1972), which conceptualises tax evasion as a rational decision under uncertainty. In this framework, taxpayers maximise expected utility by weighing the potential benefits of evasion against the expected costs, determined by the probability of detection and the severity of penalties. Consequently, economic mechanisms aimed at curbing tax crime must operate by either reducing the expected benefits of non-compliance or increasing the expected costs associated with detection and punishment.

Building on this theoretical foundation, a substantial body of empirical research has examined the determinants of tax evasion and financial crimes within tax systems. Numerous studies highlight the close relationship between tax crime, the shadow economy, and corruption (Melnyk et al., 2022). Popescu (2021) argues that the expansion of the shadow economy is largely driven by the proliferation of phantom companies, although the study does not provide robust quantitative evidence to substantiate this claim. The growth of the shadow economy, in turn, creates additional opportunities for tax crimes. Similarly, Němec et al. (2021) and Bak et al. (2024) demonstrate that increases in the shadow economy are accompanied by elevated levels of corruption, which directly stimulate tax evasion.

However, these findings may be strongly influenced by the institutional and economic specificities of the analysed countries, particularly the Czech Republic and Ukraine, thereby limiting their generalisability. Tiutiunyk et al. (2022) show that high levels of shadow economic activity significantly undermine national tax competitiveness and erode public revenues, yet their analysis is confined to European Union countries. Likewise, Buszko & Skorwider-Namiołko (2021) emphasise the importance of scrutinising the interaction between taxation efficiency and the shadow economy, calling for stronger policy interventions. Nonetheless, the regional focus of these studies raises concerns regarding the external validity of their conclusions.

Another strand of literature explores the relationship between economic development, corruption, and the shadow economy. Neog & Gau (2021), analysing BRICS economies, find that economic growth, trade openness, and anti-corruption efforts enhance income levels, while the persistence of the shadow economy impedes effective corruption control. Similar to earlier studies, their conclusions are limited by regional scope, preventing broader generalisation. Overall, the existing evidence consistently confirms the detrimental impact of shadow economic activity and corruption on tax compliance and fiscal performance. Yet, relatively limited attention has been devoted to designing coherent and comprehensive policy frameworks to address these challenges.

An exception is provided by Ciucci (2024), who identifies education as a key instrument for reducing both the shadow economy and tax evasion. Empirical findings confirm a strong inverse relationship between educational attainment and informal economic activity. Nevertheless, the study predominantly focuses on educational policy, offering limited insight into broader economic mechanisms for combating tax crime.

Another important research direction concerns the role of economic freedom. Challoumis & Constantinou (2024) argue that European Union governments seek to mitigate tax evasion by balancing economic freedoms with the principles of fair taxation. Stratmann (2024) demonstrates that higher levels of economic freedom stimulate economic prosperity, drawing on evidence from Indian reservations. Ahmad et al. (2021) identify a direct relationship between economic freedom and fraud, including tax fraud, while Freytag et al. (2022) report an inverse relationship between economic freedom and the size of the shadow economy. These divergent findings highlight substantial inconsistencies regarding the role of economic freedom in shaping tax compliance behaviour.

A further line of inquiry investigates the impact of tax administration expenditures on evasion rates, with particular emphasis on digitalisation. Saleem et al. (2024) find that ICT investments significantly enhance the efficiency of tax authorities by enabling the deployment of advanced software solutions. Similarly, Remeikienė et al. (2022) conclude that ICT spending reduces the shadow economy in both the short and long term. However, these studies largely overlook other critical expenditure categories, such as operational costs, capital investments, staff remuneration, and training, which may also exert a substantial influence on administrative effectiveness.

Tax audits constitute another extensively studied policy instrument. Belnap et al. (2024) report that audits negatively affect short-term firm revenues but ultimately lead to organisational improvements and enhanced tax efficiency. Blaufus et al. (2023) find that more aggressive auditing strategies stimulate organisational reforms and increase compliance, although their study does not adequately account for cross-country institutional differences.

Advani et al. (2023) and Hebous et al. (2023) document significant post-audit improvements in declared tax liabilities and compliance in the United Kingdom and Norway, respectively. Kasper and Alm (2022) further demonstrate that audit effectiveness critically determines compliance outcomes. However, limited attention has been devoted to the mediating role of digital technologies in shaping audit efficiency. In contrast, Irawan & Utama (2021) observe an insignificant effect of tax inspections on evasion, attributing this outcome partly to corruption perceptions, yet without systematically examining potential mediating factors.

Corporate tax evasion has also received considerable scholarly attention, given its substantial contribution to aggregate tax losses and the availability of sophisticated tax optimisation schemes (Siglé et al., 2022). While Gechert & Heimberger (2022) find no statistically significant relationship between corporate tax rates and economic growth, their analysis insufficiently addresses the broader macroeconomic consequences of corporate tax avoidance and evasion on fiscal sustainability and economic stability.

Overall, the reviewed literature provides valuable theoretical and empirical insights into the mechanisms underlying tax crime. Nevertheless, the findings remain fragmented and often contradictory, particularly regarding the roles of economic freedom, the shadow economy, and audit effectiveness. This fragmentation underscores the need for a more integrated analytical framework. Accordingly, the present study seeks to extend existing research by simultaneously examining the complex interplay among shadow economy dynamics, economic freedom, corruption, tax administration efficiency, audit intensity, and tax policy parameters. Such a comprehensive approach is essential for designing effective and evidence-based economic mechanisms to combat tax crime and minimise fiscal losses.

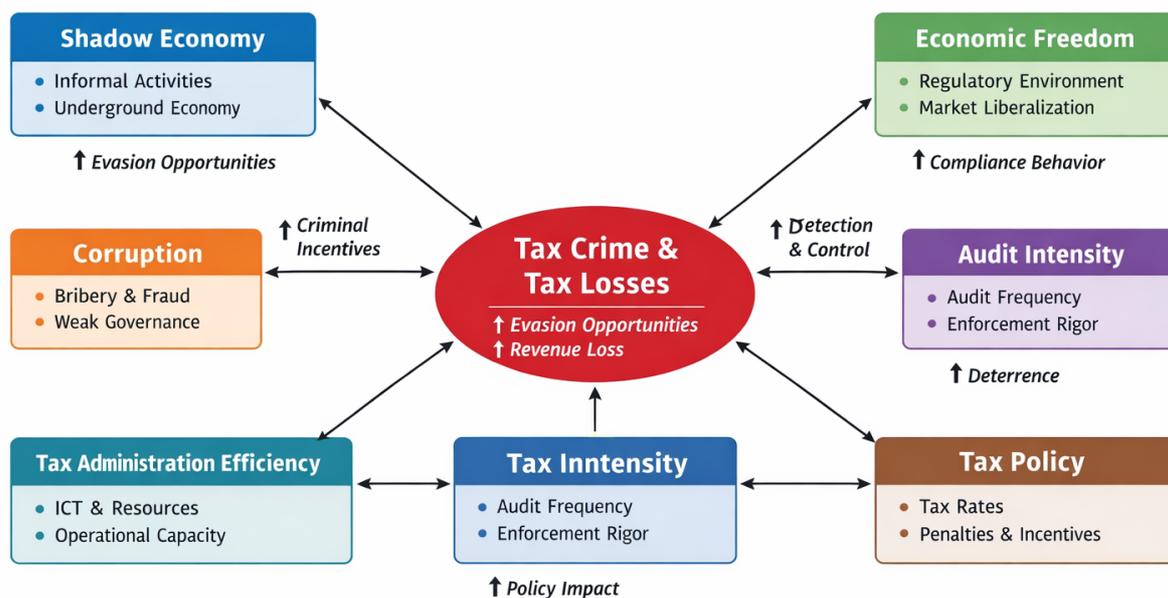
To synthesise the fragmented findings of the existing literature and to provide a coherent analytical structure, this study develops a conceptual framework that captures the multidimensional determinants of tax crime and tax losses. As illustrated in Figure 1, tax crime is modelled as the outcome of the complex interaction between shadow economy dynamics, economic freedom, corruption, tax administration efficiency, audit intensity, and tax policy parameters. Specifically, the shadow economy is assumed to directly increase opportunities for tax evasion by facilitating informal economic activities and weakening institutional oversight. In parallel, **corruption** exacerbates tax crime by undermining governance structures, weakening enforcement mechanisms, and distorting incentives within tax administrations. These factors jointly contribute to expanding evasion opportunities and increasing fiscal losses.

At the same time, economic freedom plays a dual role. While higher levels of market liberalisation and regulatory efficiency may foster voluntary compliance by reducing administrative burdens and transaction costs, excessive deregulation may also generate regulatory gaps that facilitate aggressive tax avoidance and evasion strategies. Consequently, its net effect on tax crime remains theoretically ambiguous and empirically contested, as reflected in the existing literature. The framework further highlights the importance of tax administration efficiency, operationalised through institutional capacity, digitalisation, and resource allocation. Enhanced administrative efficiency, supported by investments in ICT infrastructure and human capital, is expected to strengthen detection capabilities, improve risk-based targeting, and ultimately reduce tax evasion. Similarly, audit intensity, measured through audit frequency and enforcement rigor, directly affects the perceived probability of detection, thereby increasing deterrence and promoting compliance.

Finally, tax policy parameters, including statutory tax rates, penalty regimes, and incentive structures, shape taxpayer behaviour by influencing both the expected benefits of evasion and the expected costs of non-compliance. An optimal policy mix is therefore essential to balance revenue mobilisation objectives with compliance incentives.

Overall, the conceptual framework presented in Figure 1 provides an integrated analytical lens for examining the simultaneous and interactive effects of institutional, economic, and policy-related factors on tax crime and fiscal losses. This multidimensional approach enables a more comprehensive understanding of tax evasion dynamics and supports the formulation of more effective and evidence-based policy interventions.

Figure 1. Conceptual Framework of Economic Determinants of Tax Crime and Tax Losses



Source: Authors' conceptual framework.

2. Research Methodology

The research methodology consists of three stages. The first stage involved collecting data for analysis, the relevance of which was assessed based on availability and compliance with the research objectives. The second stage was the analysis of the data and generating tables with the results. The third stage provided for drawing analytical conclusions based on the results.

The sample of indicators for the study consists of quantitative indicators collected on the basis of their potential impact on the tax evasion rate (Table 1). These indicators describe the impact of macroeconomic and institutional factors on the amount of tax losses as a key indicator of the tax evasion rate in this research. The sample of countries for the study included 159 countries of the world, the indicators of which are available from official sources of information.

Table 1. Sample of Indicators for the Study

Indicator	Description
Tax Loss Indicators	
Total annual tax loss (USD million)	Total annual tax loss (\$ million) Shows the amount of taxes that the state loses because of various forms of tax evasion.
Total annual tax loss (% of GDP)	Previous indicator, expressed as a percentage of gross domestic product (GDP).
of which: Corporate tax abuse (USD million)	Share of total tax losses because of corporate tax abuse.
Macroeconomic indicators of the impact of the institutional environment on the tax system	
Informal Economy Sizes as a Percentage of GDP	Share of economic activity carried out outside the formal government agencies, expressed as a percentage of GDP
Corruption Perception Score (CPI)	Shows the level of corruption perceptions in states; can take values from 0 to 100, and the higher the score, the less corrupt the state agencies are.
Index of Economic Freedom (Overall Score)	Measures the level of economic freedom in countries based on such indicators as Property Rights, Government Integrity, Government Integrity, Judicial Effectiveness, Tax Burden, Government Spending, Fiscal Health, Business Freedom, Labour Freedom, Monetary Freedom, Trade Freedom, Investment Freedom, Financial Freedom.
Indicators of the impact of tax administration efficiency	
Tax administration operating expenditures	Tax administration expenses for current activities.
Tax administration salary expenditures	Expenses for tax administration employees' salaries.
Tax administration ICT expenditure	Tax administration expenses for purchasing, maintaining, and upgrading technology.
Tax administration capital expenditure	Tax administration capital expenses, which include investment in long-term assets, such as buildings, equipment, or other infrastructure projects, necessary to improve the functioning of tax authorities.
Audit hit rate	Shows the percentage of tax inspections that revealed tax violations.
Corporate taxation efficiency indicators	
Corporate Tax Rate	Corporate income tax deducted from profits.
The Tax Complexity Index	Measures the complexity of a country's corporate income tax system.
Share of active taxpayers in the total number of registered	The share of active taxpayers in the total number of registered taxpayers.
Share of payments made on time in total expected payments	The share of payments made on time in the total number of expected payments.
CIT assessments as percentage of CIT collected	Shows the accuracy and effectiveness of the tax administration's estimates of corporate tax collection

Sources: Author's compilation (OECD, TJN, Heritage Foundation, TI, World Economics (2021–2024)).

The main methods of the study were correlation and regression analyses. Correlation analysis was used to identify relationships between individual variables under study. Regression analysis using the multiple regression method supplemented the conclusions obtained during the correlation analysis by showing the simultaneous influence of several independent variables on the dependent one. The choice of the multiple regression method is explained by the expediency of its use for analysing the simultaneous influence of several independent variables on the dependent one. Comparative and descriptive analysis were applied to interpret the results in detail and explain the identified relationships.

A comparison between different indicators of the influence of the institutional environment on the tax system made it possible to determine which factors of the institutional environment have the greatest impact on tax losses. A comparison between the impacts of different types of tax administration expenses identified which of these types are the most effective in terms of minimizing tax losses. Descriptive analysis was used for assessing the statistical characteristics of the models, for example, for determining the explanatory power of the models by the coefficient of determination and the statistical significance of the variables by the p-value.

3. Results

The first stage of the analysis involved calculating correlations between the indicator of total tax losses in absolute and percentage values and the indicators that influence it. These include macroeconomic indicators of the impact of the institutional environment on the tax system and indicators of the impact of tax administration efficiency. Table 2 presents the results of the calculations.

Table 2. Results of the Correlation Analysis

Macroeconomic indicator	Informal Economy Sizes as a Percentage of GDP	Corruption Perception Score (CPI)	Index of Economic Freedom (Overall Score)	Tax administration operating expenditures	Tax administration salary expenditures	Tax administration and ICT expenditure	Tax administration capital expenditure	Audit hit rate
Total annual tax loss (USD million)	-0.354*	0.235*	0.222*	0.022	0.037	0.505*	0.013	0.192*
Total annual tax loss (% of GDP)	-0.093	0.043	0.013	-0.024	-0.013	-0.042	-0.030	0.207*

Note: * statistically significant relationship at $p < 0.05$

Source: Author's calculations OECD (2024); Tax Justice Network (2024a); Heritage Foundation (2024) Transparency International (2021), World Economics (2024).

Table 2 shows that the Total Annual Tax Loss has a weak but statistically significant correlation with the CPI, Index of Economic Freedom, and Audit Hit Rate. Total Annual Tax Loss demonstrated a statistically significant and moderate relationship with Informal Economy Sizes. The strongest correlation, which can be defined as "noticeable" according to the

Chaddock Scale, was observed between Total Annual Tax Loss and Tax Administration Information and Communications Technology Expenditure. The observed correlations are characteristic of the indicator expressed in absolute values. Total Annual Tax Loss, expressed as a percentage of GDP, is statistically significantly and weakly related to Audit Hit Rate only.

For a deeper understanding of the cause-and-effect relationships between the indicators, the correlation analysis was supplemented with regression analysis. This made it possible to assess whether the studied indicators really cause changes in tax losses, and not just correlate with them. The regression results are shown in Tables 3 and 4, the independent variables being the indicators of the impact of the institutional environment on the tax system and the indicators of the impact of the efficiency of tax administration, respectively.

Table 3. Regression Estimates for Institutional Determinants of Tax Losses (\$ million)

Macroeconomic Indicator	Coefficients	Standard error	t(130)	p-value
Intercept	13267.3	10364.00	1.28013	0.202777
Informal Economy Sizes as a Percentage of GDP	-0.336884	0.115127	-2.92618	0.004051
Corruption Perception Score (CPI)	0.037320	0.105464	0.35386	0.724015
Index of Economic Freedom (Overall Score)	-0.008538	0.108254	-0.07887	0.937255

Source: Author's calculations (OECD, TJN, Heritage Foundation, TI, World Economics (2021–2024)).

The results of the regression analysis show that only one variable has a statistically significant impact on Total Annual Tax Loss – Informal Economy Sizes as a Percentage of GDP. The impact is inverse, so, taking into account the regression coefficient, an increase in the shadow economy by 1 percent of GDP leads to a decrease in tax losses by about \$0.34 million. Table 4 presents the results of the regression analysis with indicators of the impact of tax administration efficiency.

Table 4. Regression Analysis of Tax Administration Efficiency and Tax Losses (\$ million)

Indicator	Coefficients	Standard error	t(150)	p-value
Intercept	-817720	651094.5	-1.25592	0.211099
Tax administration operating expenditures	-1750.53	961.503	-1.82062	0.070657
Tax administration salary expenditures	1036.45	589.679	1.75766	0.080846
Tax administration information and communications technology expenditure	1497.55	70.546	21.22817	0.000000
Tax administration capital expenditure	-433.31	426.371	-1.01626	0.311140
Audit hit rate	85.61	40.381	2.12000	0.035652

Source: Author's calculations based on OECD (2024); Tax Justice Network (2024a).

The resulting regression model with indicators of the impact of tax administration efficiency demonstrates significantly greater explanatory power than the previous one. The exacted coefficient of determination indicates that more than 75% of the variation in Total Annual Tax Loss can be explained by the independent variables included in the model. Statistically significant impact at $p < 0.05$ on the dependent variable are exerted by Tax Administration Information and Communications Technology Expenditure and Audit Hit Rate. There is an impact at $p < 0.1$ from the Tax Administration Operating Expenditures and Tax Administration Salary Expenditures.

At the next stage of the research, the Corporate Tax Abuse was analysed separately. This indicator accounts for a larger share of total tax losses (on average 72%), and it can be influenced by more specific factors than total tax losses. This proves the feasibility of conducting a separate stage of analysis for corporate tax abuse. Table 5 presents the results of the correlation analysis between Corporate Tax Abuse and corporate tax efficiency indicators.

Table 5. Correlation Results for Corporate Tax Abuse and Tax Efficiency Indicators

Indicator	Corporate Tax Rate	Tax Complexity Index	Active Payer Share	On-time payment rate	CIT assessments as % of CIT collected
Corporate tax abuse (USD million)	0.395076	0.265853	-0.208920	-0.101427	0.024172

Source: Author's calculations based on OECD (2024); Tax Justice Network (2024a); Tax Justice Network (2024b).

Correlation analysis did not reveal a statistically significant relationship between Corporate Tax Abuse and the studied corporate tax efficiency indicators. However, the impact from these indicators should be checked using regression analysis in order to assess the influence of several variables on Corporate Tax Abuse. Table 6 presents the results.

Table 6. Regression Estimates for Corporate Tax Efficiency and Tax Abuse

Indicator	Coefficients	Standard error	t(28)	p-value
Intercept	-4751.79	3972.159	-1.19627	0.241621
Corporate Tax Rate	0.377177	0.179671	2.09926	0.044934
The Tax Complexity Index	0.275601	0.177351	1.55398	0.131420
Share of active taxpayers in the total number of registered taxpayers	-0.141898	0.168162	-0.84382	0.405922
Share of payments made on time in total expected payments	0.040505	0.181693	0.22293	0.825210
CIT assessments as % of CIT collected	0.108480	0.178668	0.60716	0.548638

Source: Author's calculations based on OECD (2024); Tax Justice Network (2024a); Tax Justice Network (2024b).

Regression analysis revealed that the only variable that has a statistically significant effect on Corporate Tax Abuse is the Corporate Tax Rate. The impact is direct, so an increase in the Corporate Tax Rate leads to an increase in Corporate Tax Abuse. According to the regression coefficient, an increase in the Corporate Tax Rate by 0.01 or 1% leads to an increase in Corporate Tax Abuse by \$0.377177 million.

The analysis shows that economic mechanisms for preventing financial crimes in the tax system should provide for a comprehensive approach. The most effective elements of such mechanisms are spending on ICTs, effective audit procedures, optimization of tax rates, and ensuring proper control over the shadow economy. This will increase the efficiency of the tax system, in particular, by reducing tax losses and corporate tax abuse.

4. Discussion

The conducted analysis confirmed the effectiveness of spending on ICTs, improved audit procedures, optimization of tax rates, and control over the shadow economy to increase the effectiveness of preventing financial crimes. At the same time, the study revealed certain contradictions with the studied of other researchers, in particular, in terms of the impact of the size of the shadow economy on tax evasion. The study of Němec et al. (2021) found confirmation that the growth of the share of the shadow economy and corruption is directly related to the increase in tax evasion.

Tiutiunyk et al. (2022) proved a significant inverse correlation between the share of the shadow economy and the tax competitiveness of countries. The researchers' conclusions are not confirmed by our calculations, which revealed a significant negative correlation between the shadow economy and tax losses. This can be explained by differences in the sample of indicators and countries. In particular, the tax loss indicator used in our study may demonstrate a negative correlation with the shadow economy because of the indirect impact of the institutional component. In other words, official tax losses may be underestimated because of the weakness of institutions in individual countries and the inability to take into account all sources of the shadow economy.

Some studies also take into account other factors that mediate the relationship between tax evasion and the shadow economy. So, according to Semenets-Orlova et al. (2022) and Ciucci (2024), an important predictor of reducing tax evasion and reducing the share of the shadow economy is the level of education. This indicator was not taken into account in our study, which focused mainly on economic aspects – the volume of the shadow economy, economic freedom, and corruption. Regarding the corruption rate, Neog & Gaur (2021) found that the size of the shadow economy hinders the effective combating of corruption, limiting the opportunities for profit.

In our study, correlation analysis showed a direct and statistically significant relationship between corruption and tax losses, but regression analysis taking into account several variables did not confirm these conclusions. The reason for this may be the difficulty of assessing the corruption component because of the hidden nature of corruption.

As in our study, some studies take into account the impact of economic freedom on tax evasion. The correlation analysis revealed that the level of economic freedom positively correlates with the amount of tax losses, that is, higher economic freedom means a higher tax evasion rate. Our results are consistent with the findings of Ahmad et al. (2021), who found that the level of economic freedom positively correlates with the spread of fraud, including tax fraud. Freytag et al. (2022) showed that a high level of economic freedom is accompanied by a decrease in the share of the shadow economy. This is also consistent with our results, but we found that a decrease in the share of the shadow economy is not a predictor of a reduction in tax losses.

Most of the studies are consistent with the author's conclusions on the impact of ICT spending and audits on improving the combating of tax crimes. Saleem et al. (2024) and Remeikienė et al. (2022) found that ICT spending has a positive impact on reducing the share of shadow economy and the efficiency of tax authorities. Hebous et al. (2023) and Belnap et al. (2024) expressed the opinion that tax audits can make a positive contribution to the efficiency of taxation. Blaufus et al. (2023) believe that aggressive audits can stimulate organizational changes, forcing companies to improve their own tax control systems.

Advani et al. (2023) found that tax audits limit false reporting, so the researchers share our opinion that more resources should be allocated to audits. At the same time, Kasper & Alm (2022) noted that the impact of tax audits on tax compliance depends on the efficiency of such audits. Irawan & Utama (2021) analysed the impact of tax audits and corruption perceptions on tax evasion. The researchers' findings differ from our results, as the researchers found that the impact of tax audits is insignificant. At the same time, corruption has a significant and direct impact on tax evasion. The differences in results can be explained by the fact that the researchers analysed the simultaneous impact of tax audits and corruption perceptions on tax evasion.

Therefore, the impact of corruption could have overshadowed the impact of audits. However, these variables were analysed in separate blocks in our study, which allowed for additional insights into the effectiveness of audits.

Some scholars focus on a deeper study of corporate tax abuse, which is also an important part of our study. The author's conclusions are confirmed in the work of Lampenius et al. (2021), who noted that the corporate tax rate has a negative impact on the tax base, increasing incentives for evasion. Zwick (2021) noted that the complexity of tax legislation can contribute to corporate tax evasion. Our research did not reveal a statistically significant effect of the complexity of tax legislation on corporate tax abuse at $p < 0.05$. However, such an effect was observed at a slightly lower level of significance and was positive, so its further study requires a deeper analysis.

The practical significance of the obtained results is determined the most effective directions for combating tax crimes, which should be taken into account in the process of developing appropriate economic mechanisms for countering violations.

The main limitation of the study is the lack of data on a number of indicators for individual countries. Therefore, the number of observations in the regression models (t) may vary depending on the availability of data for a particular stage of the analysis. Effective economic mechanisms to combat tax crimes should include:

- Developing strategies to reduce the shadow sector through improved administration among other methods;
- ICT spending and wages of tax administrations, which significantly reduces tax losses;
- Costs for conducting and improving the efficiency of audits and tax inspections;
- Determining the optimal corporate tax rate and ensuring that companies comply with their tax obligations.

Conclusions

Tax crimes have a significant negative impact on the economy and harm the national budgets, so finding effective mechanisms for combating such crimes is a relevant task. The results of the analysis have a significant impact on the development of effective mechanisms for preventing financial crimes in the tax system. From an economic perspective, a negative relationship between the size of the shadow economy and tax loss indicates that the decrease in the size of the shadow economy is accompanied by an increase in tax losses.

The values of the regression coefficient, an increase in the shadow economy by 1 percent of GDP leads to a decrease in tax losses by about \$ 0.34 million. At first glance, such results may be controversial, but have an economic explanation. The countries with a large shadow economy often have a slight level of tax losses, in particular, as a percentage of GDP, due to a number of factors. For example, in the official economy of such countries, the number

of taxable transactions is often minimal, limiting the number of losses. The reason may also be the insufficiently developed tax infrastructure, which prevents a full assessment of losses.

At the same time, this situation can be explained by a more accurate assessment of tax losses for countries with a small shadow economy and high tax losses. In countries with a small shadow sector, costs can be more significant because of the formation of a tax base at the expense of a corporate sector, which is characterized by high revenues. So, it cannot be argued that the obtained results indicate that the increase in the volume of the shadow economy causes a decrease in tax losses. Most likely, the revealed negative correlation can be explained by insufficient consideration of the specifics of the shadow economy in the official estimates of tax losses.

Therefore, obtained the results need further research to identify deeper cause and effect relationships between tax losses and the shadow economy. Despite the inverse correlation between tax losses and the shadow economy, effective economic mechanisms for combating tax crimes should take into account strategies to reduce the shadow sector. One of the potential areas is to improve administration.

Regarding the effectiveness of administration, it was found that the ICT spending of tax administrations and (to a lesser extent) wages significantly reduce tax losses. The effectiveness of tax audits was confirmed, indicating the expediency of spending on these measures. So, spending on technology, ensuring proper working conditions and wages for employees, as well as effective control should be key elements of economic mechanisms for combating tax crimes.

Credit Authorship Contribution Statement

Tychyna, D. contributed to the conceptualization of the study, development of the research design, supervision of the analytical process, and drafting of the original manuscript. Topchii, N. participated in the formulation of the theoretical framework, literature review, and interpretation of results. Moroz, Y., was responsible for data collection, data curation, and statistical analysis, including correlation and regression modelling. Paseka, M., contributed to methodological refinement, comparative analysis, and critical revision of the manuscript. Matsak, O. assisted in the empirical validation, data interpretation, and final editing of the manuscript. All authors contributed to the discussion of the findings, reviewed the manuscript critically for intellectual content, and approved the final version for publication.

Declaration of Conflict 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.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval Statement

Ethical approval was waived due to the use of secondary data sources and the retrospective nature of the study. All data used were either publicly available or derived using custom text-mining scripts, and no human participants were involved.

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