

Противодействие уклонению от уплаты налогов

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Original Paper

Sector-Specific Characteristics of Tax Crime in Russia

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ABSTRACT

The article discusses the hypothesis that fiscal crime has some sector-specific characteristics, which tend to become more pronounced as new technologies emerge and develop. These characteristics should be taken into account when devising policies targeted at fighting tax evasion. To test this hypothesis, we analyzed quantitative (the level of economic crime in Russia in general and for different types of economic activity) and qualitative characteristics of crime (structure, dynamics and nature of crime). We also conducted analysis of the correlation between these indicators and the structure of costs and financial performance of organizations. The research relies on crime statistics, which reflect the scale of tax evasion better than financial statistics (since the latter are influenced by a large number of factors and are subject to significant change even within one year). Pearson's and Spearman's correlation coefficients were used for verification. Sectors of economy were ranked in descending order according to the corresponding economic crime rates-and loss to gross value-added in the sector. The findings show that unlike the cases of tax evasion, the number of economic crimes does not closely correlate with the structure of costs. Most tax crimes and corporate tax evasion in particular are recorded in sectors with lower labour costs, social security contributions and other prime costs but with higher depreciation of fixed assets (capital intensive industries). Thus, the results of this study contradict the findings of international scholars that shadow economy is larger in highest paying industries. It is shown that the sectors with higher losses are characterized by higher crime rates, that is, the loss in many cases is connected to tax evasion and related economic crime. The research has brought to light certain sector-specific characteristics of tax evasion, which means that these characteristics should be taken into account in governance and policy-making as well as in further research on this topic.

KEYWORDS

tax evasion, tax crime, economic crime, sectors of economy, shadow economy

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Отраслевые особенности налоговой преступности в России

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АННОТАЦИЯ

Выдвинута гипотеза о том, что налоговая преступность имеет отраслевую специфику, углубляющуюся с развитием новых технологий и эти различия необходимо учитывать при формировании мер борьбы с уклонением от уплаты на-

логов. Для проверки выдвинутой гипотезы проведен анализ количественных характеристик преступности (уровень экономической преступности в России в целом, а также в разрезе видов экономической деятельности); качественных характеристик преступности (показатели структуры, динамики и характера преступности); проведена корреляция со структурой затрат и финансовыми результатами деятельности организаций. Использована криминальная статистика, которая лучше отражает изменения масштабов уклонения, чем финансовая (на которую влияют множество факторов, подверженных значительному изменению даже в пределах одного года). Для верификации использованы коэффициенты корреляции Пирсона и Спирмена. Отрасли экономики проранжированы по степени убывания экономической преступности в соответствие с величиной причиненного ущерба к валовой добавленной стоимости отрасли. Оценка показала, что количество экономических преступлений не имеет тесной связи со структурой затрат, в отличие от уклонения от уплаты налогов. Большее число как налоговых преступлений в целом так и преступлений по составу «уклонение от уплаты налогов и сборов с организаций» зарегистрировано в отраслях с меньшей долей затрат на оплату труда и социальных платежей, а также прочих затрат в себестоимости, но с большей долей амортизации основных средств (фондоемких отраслях). Это противоречит выводам о распространенности теневой экономики, прежде всего в зарплатоемких отраслях, полученных в зарубежных исследованиях. Показано, что большее число преступлений совершается в отраслях с большим размером убытков, то есть, размер убытка во многих случаях связан с уклонением от уплаты налогов и экономическими преступлениями. Проведенное исследование подтвердило наличие отраслевой специфики уклонения от уплаты налогов и налоговой преступности и необходимость учета этой специфики, как в деятельности государственных органов, так и в научных исследованиях.

КЛЮЧЕВЫЕ СЛОВА

уклонение от уплаты налогов, налоговая преступность, экономическая преступность, отрасли экономики, теневая экономика

1. Introduction

Despite the growing body of research on shadow economy and tax evasion, there are comparatively few studies on sector-specific characteristics of these phenomena, although historically, it was precisely these characteristics that the research on Soviet shadow economy initially focused on¹.

First and foremost, we need to answer the question if there are any sector-specific characteristics of tax crime, provided that all sectors of economy are determined by the same socio-economic and political factors and that in all sectors similar taxes are imposed.

¹ Sector-specific analysis of shadow economy was first conducted in the 1970s at the Research Technological Institute of Public Services (NITKHIB). The calculations were made to estimate the actual level of consumption of consumer services by taking into account the services offered by private individuals and adding them to the officially recorded turnover of services (see [1]).

In our previous research on shadow economy and tax evasion, we explored fiscal behaviours and the motives that drive them in Russia by applying experimental methods. The results of our experiments have shown that there is a certain level of unconditional compliance or non-compliance with tax legislation, regardless of the rigorosity of tax control and the amount of penalties imposed. In our experiments, the level of unconditional voluntary tax compliance varied between 25 and 35% (in Russia this level was higher than in Belarus) while the level of unconditional tax evasion was between 10 and 15% [2].

It is, however, highly doubtful that individual fiscal behaviour changes depending on the sphere of economic activity: in other words, it is unlikely that people's attitudes towards the tax system depend on the sectors of economy their employing enterprises belong to.

Crime is shaped not only by such factors as personal characteristics of offenders (in our case tax offenders), which act as

causes of crime, but also by specific conditions of the environment. Thus, we need to distinguish between the causes and conditions of crime. The causes of crime are understood as socio-psychological determinants which naturally engender crime and lead to the reproduction of crime. The conditions of crime do not engender crime themselves but are conducive to crime by intensifying the effect of the causes of crime². In other words, 'condition does not generate crime but affects the process of crime generation...'³. The domain in which causes are operative includes first and foremost the stage of motivation and decision-making, that is, causes operate when motives and goals are formed while those means of their achievement are selected that would be criminal. The choice of a specific type of misconduct is determined by the conditions of the environment. Thus, the causes and conditions of tax evasion play different roles: causes lead to consequences, while conditions are contributing factors. Together, they produce a joint effect.

Causes of tax evasion have a general and permanent character and are similar in all sectors of economy and for all types of economic activity. Conditions of tax evasion intensify the effect of causes by making non-compliance easier and can be sector-specific.

Our hypothesis is that tax crime can have sector-specific characteristics, which can become more pronounced due to the development of new technologies. These differences are linked to the conditions which are either conducive to tax evasion or prevent it in various sectors. These conditions should be taken into account in devising adequate policies to fight tax crime and in particular tax evasion.

The hypothesis is tested through the analysis of Russian legal statistics, which shed light on economic crime and tax crime in the country. We chose legal statistics for the following reasons. There is a variety of forms of tax evasion: starting from attempts to exploit loopholes in the

tax legislation through various schemes of tax abuse to concealing income or economic activities. In theory, what constitutes tax evasion appears to be quite obvious but in practice it may sometimes be difficult to distinguish between legal ways of reducing one's tax bill and illegal ones. Vagueness and lack of clarity of laws, taxpayers' illiteracy, inadequate qualification of tax officials, and legislative compliance practices can create problems. The usage of legal statistics enables us to deal with the problem of discrepancies and divergent interpretations since statistics reflect only tax crimes, that is, unlawful acts committed with the criminal intent.

The article is structured as follows. The second section contains a literature review with a special focus on the causes and conditions of tax crime. The third section describes the data and methodology of the study. The fourth section deals with the results and their discussion and the fifth, with the conclusions.

2. Studies of sector-specific characteristics of tax crime in different fields

Tax evasion is widely discussed in contemporary research literature. Our previous bibliometric analysis shows that there is a persistent interest in this topic. The number of publications on this topic both in Russia and in the world tends to increase exponentially, which corresponds to the general increase in the number of articles published worldwide. Figure 1 demonstrates the upward trend in the number of publications in the largest open-access digital libraries RePEc and SSRN (publications in English) and Elibrary (publications in Russian) as of the end of January 2017. For our analysis we chose the articles and other types of academic publications whose titles contained the phrase 'tax evasion'.

International studies of shadow economy mostly focus on tax evasion as such and its causes (over 60% of the articles we analyzed). It should be noted that economic studies, unlike criminological research, tend not to distinguish between the causes and conditions of tax evasion.

² Kuznetsova N. F., Luneev V. V. *Criminology: Textbook*. Moscow: Wolters Kluwer; 2004, p. 169.

³ Dolgova A. I. *Criminology: Textbook*. Moscow: Norma; 2005, p. 236.

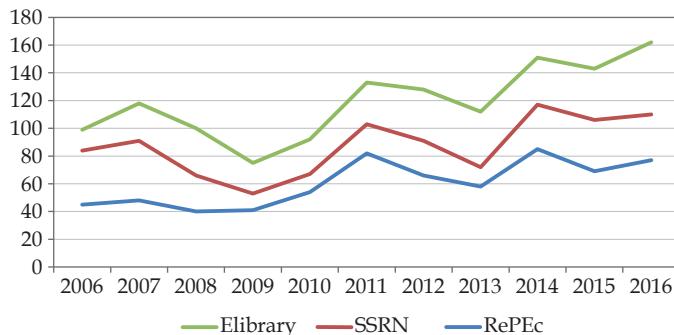


Figure 1. Dynamics of the number of articles on tax evasion in databases in 2006–2016 (units) [3; 4]

To explain the reasons for tax non-compliance we need to consider two levels: macro-level and micro-level. The macro-level deals with the conditions of crime occurrence and change. Economic development of a country or a region, poverty, inequality, demography, urbanization, state system, cultural traditions, religion, and so on are the variables that determine the level of crime on the macro-level. The micro-level is the level of individual choices and motivations to engage in unlawful behavior.

Let us look at the sector-specific characteristics of tax evasion from the perspectives of different theories. Since it is a rather broad topic, we are going to limit ourselves to specific examples of political, economic, economic and criminological theories.

In accordance with Stuart Hall's theory of ideology (1977), which followed the Marxist tradition, non-compliance is historically determined by asymmetrical, non-equivalent relationship between the state and its citizens [5]. Some Russian scholars have also adopted this approach: for instance, V. Pushkareva points to historical reasons behind tax evasion in Russia. The concept of the USSR as the first 'taxless' society in the world implied that Soviet citizens paid virtually no taxes (the income tax was withheld at source), which means that compliant taxpayer's mentality was not formed⁴. V. Radaev believes that the main reason for tax evasion is the impact of pow-

er groups within the ruling establishment and corruption. High taxes and complexity of the tax system contribute to maintaining the dependence relationship between citizens and the bureaucracy while the flow of bribes and related services partially acts as an informal substitute for tax payments, which is why the problem of tax crime should be considered in its connection to the interests of power groups [6].

Since the theory of ideology is not a new discovery but rather a reinterpretation of the questions discussed by Marx and Engels, it would be reasonable to remember at this point a well-known statement made by Thomas Joseph Dunning about the essence of capitalism. His words were quoted by Karl Marx in Capital⁵: 'With adequate profit, capital is very bold.... 300 per cent., and there is not a crime at which it will scruple, nor a risk it will not run, even to the chance of its owner being hanged. If turbulence and strife will bring a profit, it will freely encourage both. Smuggling and the slave-trade have amply proved all that is here stated...'⁶. Tax evasion can be included into this list

⁵ Marx K. & Engels F. *Capital. A Critique of Political Economy. Volume 1. Book I: The Process of Production of Capital.* In: Works. 2nd ed. Moscow: Gosudarstvennoe izdatelstvo politicheskoy literatury; 1960. Vol. 23, p. 770.

⁶ Dunning, Thomas Joseph. *Trade's Unions and Strikes: Their Philosophy and Intention*. London: Published by the author, and Sold by M. Harley, No 5, Raquet court, Fleet street, E.C., 1860. Available at: https://ru.wikipedia.org/wiki/Даннинг,_Томас_Джозеф#CITEREFTrade's_Unions_and_Strikes:_Their_Philosophy_and_Intention1860

⁴ Pushkareva V. *History of Financial Thought and Fiscal Politics: Textbook*. Moscow: Infra-M, 1996.

of 'crimes of capital' since its primary motive is to gain a certain financial advantage. Therefore, in the light of the theory of ideology, tax evasion can be differentiated according to the benefits gained and can have sector-specific characteristics.

M. Allingham and A. Sandmo (1972) [7], who adapted G. Becker's (1972) rational choice model of crime to study economic crime [8], developed the classical A-S model and came to a similar conclusion. This model was widely applied and developed in numerous neoclassical models, which supplemented it with various factors and assumptions. Traditionally, according to the classical model, the factors that affect tax evasion are as follows: audit probability; fine rates; tax rates; and the taxpayer's income. Sectoral differentiation is possible for the two of them: audit probability and the taxpayer's income. The study of G. Yaniv on cash-intensive businesses (firms that receive a large portion of receipts in cash) [9] may serve as an example of research focused on those businesses whose activities are shaped by differences in terms of revenues and the likelihood of a tax audit. There are also studies of tax evasion in monopolies (G. Yaniv [10], P. R. Kim et al. [11], S. H. Lee [12]).

The classical behaviourist model of tax evasion proposed by M. W. Spicer⁷ considers the impact of several non-economic factors on taxpayers' behaviour as well as the impact of penalties. Different authors, for example, S. E. Kaplan, P. M. J. Reckers [13], and M. W. Spicer [14], discuss such factors as taxpayers' perception of tax evasion as a serious problem (whether taxpayers consider tax evasion as a widely spread problem detrimental to economy or not) and characteristics of individual tax evaders. We believe that the key factors studied by behavioural economics are not sector-specific. For instance, tax amnesty, state spending policies, public morality and public disapproval, personal moral qualities, integrity and honesty of

fiscal authorities play the same role in all sectors of economy.

The issue of tax evasion is also addressed by the research on crime and the so-called white-collar crime in particular. V. Braithwaite [15] provides an overview of research literature on the factors that determine tax evasion and classifies tax evasion as a type of white-collar crime, pointing out the elusive nature of the latter, which changes depending on economic and social conditions. The main characteristics of white-collar crime, namely the preponderance of upper and middle-class delinquents, the motivation of financial gain, non-violence, systemic character, the breach of trust, and diffuse victimisation are also typical of tax evasion (H. Berghoff, U. Spiekermann [16]).

One of the theories that seeks to combine the approaches to white-collar crime developed in sociology, psychology, organizational behaviour, management, criminology and other spheres is the theory of convenience proposed by P. Gottschalk and L. Gunnestad [17]. They point out that convenience can be both an absolute and a relative construct. As an absolute construct, it is attractive to commit financial crime as such. As a relative construct, it is more convenient to commit crime than to carry out alternative actions to solve a problem or to gain benefits from an opportunity without resorting to criminal behaviour.

Criminological theories pay much attention to crime opportunities as a causative factor in the production of crime. Perspectives that address situational opportunity in crime include the rational choice theory, routine activity theory and situational crime prevention theory.

M. Felson and R. V. Clarke [18] identify two types of criminal opportunities: those that provide potential offenders with an easy access to the target of crime and those that are created by motivated offenders themselves. Easy access may involve new crime opportunities created by new social and technological trends (Internet, mobile telephones, companies and banks). The type of crime or product is less important than the illegal means of

⁷ Spicer M. W. A behavioral model of income tax evasion: The Ohio State University; 1974. Available at: <https://s3.amazonaws.com/academia.edu.documents/3951882/>

obtaining and using this product. Opportunities created by offenders often include bribery and extortion. J. S. Albanese [19] argues that new crime opportunities (Internet access, money laundering, political upheavals etc) may increase criminal motivation even among those who previously were not involved in any criminal activity. P. Horoszowski [20] describes the situations and events when people used extreme circumstances to commit a crime.

Within the framework of crime opportunity theory, D. B. Cornish and R. V. Clarke [21] formulated the following principles underlying the relationship between crime and crime opportunity:

1. The occurrence of a crime to a great extent depends on opportunities or conditions of the environment.
2. Crime opportunities are specific.
3. The occurrence of a crime is not random in time and space.
4. Crime opportunities depend on routine activities of daily life.
5. One crime creates opportunities for another.
6. Some products offer more tempting crime opportunities.
7. Social and technological change engenders new crime opportunities.
8. It is possible to reduce offending by reducing the opportunity for crimes to occur.
9. Reducing the opportunity, however, does not entirely eliminate the possibility of crime.
10. Search for ways to consistently reduce crime opportunities can help achieve crime reduction on a larger scale.

Principles (2, 4, 5, 6, 7) can be used to study the sector-specific characteristics of tax crime.

Based on the situational crime prevention theory, Ceccato and Benson [22] investigated tax evasion in Sweden while S. H. J. Robben et al. [23] proved experimentally that greater opportunity to evade taxes will lead to increased evasion.

Following the logic of crime opportunity theory, it can be said that tax crime can be differentiated according to sectors of economy and the corresponding crime opportunities and potential gains from crime. From the perspective of this theory, it can be said that what is important is not only the fact of crime as such but also the offender's access to opportunities to benefit from its results. This can also refer to tax crime since it makes sense to dodge taxes only if the money generated this way is available for later use.

Economic crime and corruption are examples of crime opportunities for dodging taxes created intentionally by motivated offenders. By using a sample of 120 countries, I. Amara and H. Khelif [24] have found that the level of financial crime has a positive correlation with tax evasion and this correlation is stronger in high corruption environments. L. M. Tedds [25] used detailed information on firms around the world to investigate factors that affect their under-reporting behaviour. Regression results indicate that government corruption has the single largest causal effect on under-reporting – the percentage of sales not reported to the tax authority is 51.3%. J. K. Amoh and A. Ali-Nakyea [26] 's study of emerging economies found that the majority of such countries tend to have more than one type of dominating corruption dimension, which act as tax-evading triggers. A. Argentiero, B. Chiarini, and E. Marzano [27] investigated the impact of tax evasion

Table 1

Studies of sector-specific differentiation in tax evasion

Areas of analysis	Conditions for committing crimes	Criminal environment	Expertise and technology
Principles of analysis	Crime opportunities depend on routine activities of daily life Some products offer more tempting crime opportunities	One crime creates opportunities for another	Crime opportunities are specific Social and technological change engender new crime opportunities
Indicators	Economic conditions within the sector: profitability, cost structure	Economic crime rates in the sector	Technological development, innovation, etc

on criminal activities in Italy by using annual data for Italian provinces from 2006 to 2010 to show that tax evasion positively affects the rate of economic crime.

The above-described approaches can be summarized in the following scheme of factors affecting non-compliance and tax crime (Table 1).

3. Methodology and data

This research relies on Russian legal statistics, describing the level of economic crime in the country, in particular tax crime. We consider three data sets: on economic crime; fiscal crime; and tax evasion. The statistical data are provided for specific Russian regions and cover 85 federal districts, including 22 republics, 9 krais, 46 regions, 3 cities of federal significance, 1 autonomous region and 4 autonomous districts. The data on Zabaikalsky krai and the Republic of Buryatia are included into the data on the Siberian Federal District.

The legal statistics comprise the data provided by the Office of the Prosecutor General, Supreme Court and Ministry of Internal Affairs of the Russian Federation.

The statistical data of the Office of the Prosecutor General⁸ for 2009–2018 include the following indicators: the number of recorded economic crimes and the number of detected economic offenders.

The data of the Supreme Court Justice Department include reports on the number of people convicted for all types of crime from January to December of 2017⁹.

The data of the Ministry of Internal Affairs on economic crime were provided by the Ministry's Main Information and Analysis Centre. Upon request we were given access to the information about the number of recorded crimes in the reporting period; material damage recorded for closed criminal cases; compensation for criminal damage; and the number of detected offenders.

For our analysis we also used the data of the Federal State Statistics Service: gross regional product for specific Russian

regions¹⁰; the average annual number of employees in different spheres of economic activity in Russia¹¹; sectoral structure of gross value added (GVA) (in current prices; as percentage of total)¹²; adjustment of GVA for economic operations unobservable through direct statistical methods¹³.

We analyze qualitative and quantitative characteristics of crime: the former refer to the level of economic crime (in absolute and relative terms) in Russia in general and in specific regions and spheres of economic activity while the latter, to the structure, dynamics and nature of crime.

This research contains descriptive analysis of the following datasets: gross data (consolidated figures) on the country in general, for specific Russian regions and types of economic activity. The research also comprises the analysis of the structure and dynamics of crime indicators; correlation analysis of crime indicators with shadow economy estimates (based on the data of the Federal State Statistics Service); results of organizations' financial performance in different types of economic activity. We use Spearman's and Pearson's correlation coefficients for verification.

Before correlation analysis, we checked the data for normality of distribution through the Kolmogorov-Smirnov normality test and histograms. If $p > 0.05$ for variables (the probability of error is insignificant), then the data follow a normal distribution, which means we can apply parametric tests. In this case we apply Pearson's coefficient for correlation analysis. In other cases we use non-parametric tests. Out of the possible indicators (Kendall's coefficient of concordance τ and Spearman's rho), we chose Spearman's rho since it enables us to take into account more accurately the quantitative degree of correlation between variables. When the sample size is $n < 30$, we also used Spearman's rank correlation coefficient, since in this case the

¹⁰ http://www.gks.ru/free_doc/new_site/vvp/vrp98-17.xlsx

¹¹ http://www.gks.ru/free_doc/new_site/population/trud/05-05_2017.xls

¹² http://www.gks.ru/free_doc/new_site/vvp/tab-vrp2.htm

¹³ http://www.gks.ru/free_doc/new_site/vvp/vvp-god/tab14-19.htm

sample can be described as small. In order to bring the indicators to a common scale, the indicators were normalized.

4. Results

According to the data provided by the Legal Statistics Portal of the Office of the Prosecutor General¹⁴, the number of economic crimes in 2009–2018¹⁵ demonstrated a clear downward trend, both in absolute and relative terms (rate per 1,000 employees).

According to the Supreme Court Justice Department's¹⁶ 'Consolidated Statistical Data on Convictions in Russia' for 2017, crimes covered by Article 171.2 'Illegal Gambling Organization and Operations' account for the largest share of economic crimes – 21.6%. These are followed by those under Article 175 'Acquisition or Sale of Property Known to be Illegally Obtained' – 20.7%. Crimes covered by Article 199 'Corporate Tax Evasion' rank sixth in terms of the number of convictions (4.6%). Crimes under the following articles make significant shares of the general number of economic crimes: 21.6% – Article 171.2 'Illegal Gambling Organization and Operations'; 20.7% – Article 175 'Acquisition or Sale of Property Known to be Illegally Obtained'; 10.8% – Article 173.2 'Fraudulent Use of Documents to Establish (Set up or Reorganize) a Legal Entity'; 8.7% – Article 171.1 'Manufacture, Purchase, Storage, Transportation and Sale of Unmarked Goods and Products without the Marking and/or Labelling Prescribed by the Russian Legislation'; and 8.4% – Article 186 'Fabrication or Use of Counterfeit Money or Securities'. Tax convictions account for 8.5% of the total number of economic convictions. Crimes under Article 199 'Cor-

porate Tax Evasion' make up the largest share of convictions for tax crimes.

For our analysis we used the number of economic offences in relative terms – the number of offenses in a sector of economy per number of people employed in this sector. The results of our analysis are shown in Table 2.

Table 2
Crime rates in different sectors
of Russian economy in 2017
(per 100,000 employees in each sector)

№	Sectors of economy	Types of crime		
		Eco-nomic	Tax	Tax evasion
1	Agriculture, forestry, hunting, fishing and fish farming	72.07	6.46	2.03
2	Mineral extraction	31.24	5.95	1.69
3	Manufacturing	22.01	7.02	0.86
4	Supply of electricity, gas and vapour; air conditioning and water supply; sewage; waste collection and recycling; decontamination	29.89	2.10	0.76
5	Construction	102.63	13.52	8.93
6	Wholesale and retail trade	96.17	19.69	2.73
7	Transport	82.82	5.15	1.83
8	Hospitality and catering	22.75	1.50	0.54
9	Information and communications	43.00	0.48	0.41
10	Finance and insurance	1722.94	6.74	0.70
11	State administration and defense; social security	249.64	9.24	4.21
12	Education	60.60	0.05	0.00
13	Health care and social services	54.11	0.38	0.02

Note: the sectors with the highest detected crime rates are highlighted by green colour; the lowest – red; the sectors ranking in between – yellow and orange.

In our calculations of the indicator for the manufacturing sector we took into account only the following types of activity: food production and tobacco production; chemical industry; production of vehicles and transportation equipment (these

¹⁴ Legal Statistics Portal of the Office of the Prosecutor General of the Russian Federation. Available at: <http://crimestat.ru/opendata>

¹⁵ The data for 2008 proved to be unsuitable for our analysis since the total for each federal district differed substantially from the figure for the country in general. Some differences are also found in the data for 2008–2018 but they are not that significant. We supposed that the extent of difference may depend on the number of crimes in the transport sector.

¹⁶ <http://www.cdep.ru/index.php?id=79> (last accessed date: 20.02.2019)

spheres were chosen because they were covered by the data made available by the Ministry of Internal Affairs).

We divided the sectors of Russian economy with the highest crime rates as of 2017 into groups according to types of crime (see Table 3).

The highest crime rates are characteristic of the financial sphere. It should be noted that the crimes in this sphere also included those unrelated to taxation.

In construction, transport and trade, the economic and tax crime rates are also high. As for manufacturing (our calculations of this indicator do not take into account all types of production), it has high rates of tax crime, especially tax evasion.

Such types of activity as education, health care, production and distribution of electricity, gas and water have comparatively low tax crime rates. This can be explained by the fact that the share of state and municipal organizations in these spheres is quite significant, which is why taxpayers do not tend to evade their tax duties as the money saved through tax evasion cannot be converted into personal income. Interestingly enough, the sphere of

state administration and social security has a relatively high level of recorded crime (in a different interpretation of this indicator).

We believe that the differences between these state sectors can stem from the scale of crime, that is, the damage per one crime. The sphere of production and distribution of electricity, gas and water is characterized by the largest-scale crime while the sphere of health care and education mostly suffers from minor crimes, offenses and violations. The same refers to the sphere of state administration and social security. This is confirmed by the data shown in Figure 2. In this figure, the economic sectors are ranked according to the damage per one economic crime.

The most substantial material damage – 50.0 billion roubles – was observed in the financial sphere and in construction – 44.1 billion, which is 1.31% and 0.79% of GVA in 2017 in the respective sectors of economy. The ratio of crime damage to GVA for these types of economic activity is the highest. Figure 3 shows the ranking of sectors of Russian economy according to the material damage caused by economic crime.

Sectors of Russian economy with highest crime rates

Economic crime	Tax crime	Tax evasion
• finance	• wholesale and retail trade	• construction
• state administration and defense; social security	• construction	• state administration and defense; social security
• construction	• state administration and defense; social security	• wholesale and retail trade
• wholesale and retail trade	• manufacturing	• agriculture, forestry, hunting, fishing and fish farming
• transport	• transport	• transport

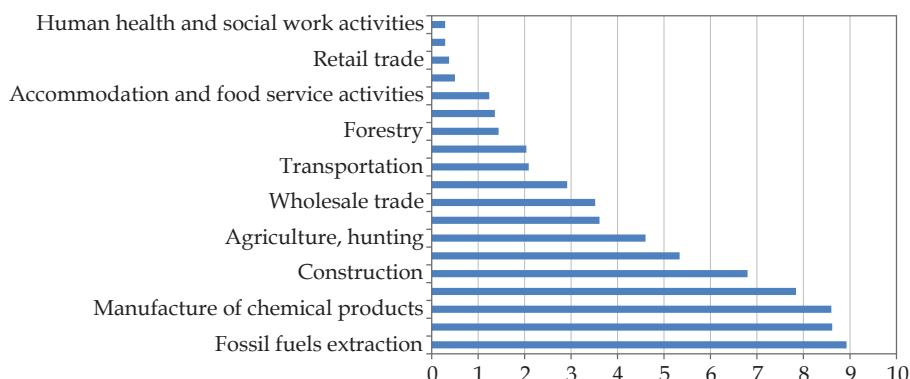


Figure 2. Damage per economic crime in 2017, (thousand rbs)

Correlation analysis shows that the percentage of the compensation for the damage caused by economic crime is in inverse proportion to the number of crimes per number of employees in the sector; the number of detected offenders per number of employees in the sector (that is, how widely spread this type of crime is in the sector); and the ratio of criminal damage to the sector's GVA (that is, the scale of damage caused by the crime). The percentage of the compensation for criminal damage has virtually no relation to the amount of damage per crime (that is, the scale of crime).

In order to estimate the interrelation between the indicators characterizing the scale of shadow economy and the level of economic crime, we conducted a correlation analysis of the selected indicators. To estimate the shadow economy in the country we need the indicator 'Adjustment of Gross Value Added for Economic Operations Unobservable through Direct Statistical Methods', which shows the share of Russia's GDP – the figure obtained by the Federal State Statistics Service through calculations of non-observed economy in addition to the data on officially registered activities of economic units. The correlation analysis was based on the following indicators:

- adjustment of GVA for economic operations unobservable through direct statistical methods, in % of GDP;
- ratio of material damage to the sector's GVA;
- number of recorded economic crimes per average annual number of employees;

- number of recorded tax crimes per average annual number of employees;

- number of recorded cases of corporate tax evasion per average annual number of employees;

- number of detected economic criminals per average annual number of employees.

Since the sample is small ($12 < 30$ observations), the analysis used Spearman's rho. Table 4 illustrates the results of the correlation analysis. The table includes only the coefficients with values > 0.3 (that is, those that show medium and strong correlations).

All the medium and strong correlations were positive, which means that there is a direct connection between the indicators.

The results show a strong correlation between the following indicators (significant at the 0.05 level):

- 'Adjustment of Unobservable Economy for the Sector's GDP' (financial indicator, %) and 'Damage Caused by Economic Crime/Sector's GVA' (financial indicator, %);

- 'Adjustment of Unobservable Economy for the Sector's GDP' (financial indicator, %) and 'Number of Tax Crimes per 1,000 Employees in the Sector' (quantitative indicator, units);

- 'Number of Tax Crimes per 1,000 Employees in the Sector' (quantitative indicator, units) and 'Number of Recorded Corporate Tax Crimes per 1,000 Employees in the Sector' (regarding the latter re-

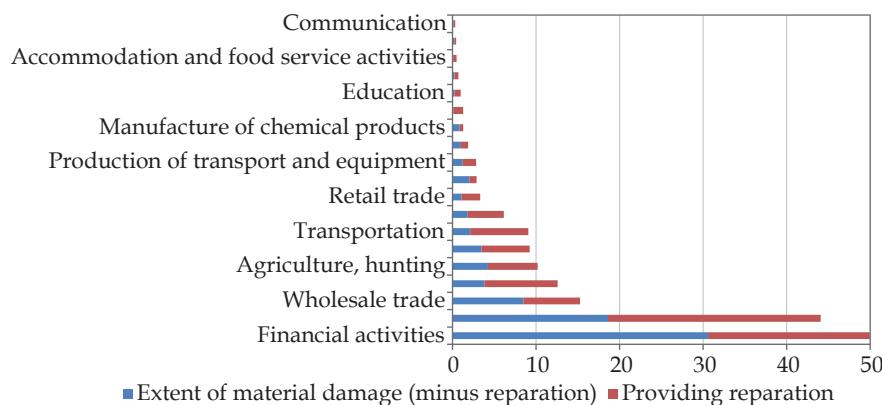


Figure 3. Material damage in different types of economic activity in 2017, bln rbs

Table 4
Correlation coefficients of economic crime indicators

	Non-observed economy	Crime damage to GVA	Number of economic crimes per number of employees	Number of tax crimes per number of employees	Cases of tax evasion per number of employees	Number of economic offenders per number of employees
Non-observed economy		.761** (.004)	.561 (.058)	.879** (.000)		
Crime damage to GVA	.761** (.004)			.538 (.071)	.517 (.085)	
Number of economic crimes per number of employees	.561 (.058)			.427 (.167)	.497 (.101)	
Number of tax crimes per number of employees	.879** (.000)	.538 (.071)	.427 (.167)		.902** (.000)	.476 (.118)
Cases of tax evasion per number of employees		.517 (.085)	.497 (.101)	.902** (.000)		.524 (.080)
Number of economic offenders per number of employees				.476 (.118)	.524 (.080)	

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

lationship, the analysis of the data from 'Consolidated Statistical Data on Convictions in Russia' showed that the percentage of convictions under Article 'Corporate Tax Evasion' is the highest among other kinds of tax crime, for example, in 2017 it was 53.7%).

Thus, we found that of all the given indicators, the indicator 'Number of Tax Crimes per 1,000 Employees in the Sector' (quantitative indicator, units) can be used as one of the indicators of shadow economy.

The indicators 'Damage Caused by Economic Crime/Sector's GVA' (financial indicator, %) and 'Number of Tax Crimes per 1,000 Employees in the Sector' (quantitative indicator, units) have a medium correlation, which can be interpreted as a sign that criminal statistics provide a more accurate picture of shadow economy while financial statistics can be affected by multiple factors and are prone to change even within one year.

We also estimated the correlation between the number of recorded crimes and GRP of Russian regions with the help of Pearson's correlation coefficient. First, we excluded all zero values from the sample.

The analysis was carried out by using standardized data and showed that all the significant relationships between the indicators were direct. The correlation coefficient for the total score was 0.910. The results are shown in Table 5.

The strongest correlation is observed in the financial sphere and trade. An insignificant correlation is found in manufacturing, agriculture and mineral extraction.

We also conducted analysis of the number of recorded crimes for different types of economic activity and compared them with the data on organizations' financial performance. The data on the number of recorded crimes were compared with the data on organizations' financial performance in different types of economic activity in 2016.

Since the sample is small ($N = 8 < 30$), we calculated Spearman's rho correlation between each component of the costs and the number of crimes recorded in this sector and the crime damage. Table 6 shows correlation coefficients with absolute values > 0.3 . There are no coefficients > 0.7 (the correlation for these coefficients can be estimated as medium). Significance is specified in parentheses.

The results of analysis have shown that the number of economic crimes does not have a strong correlation with the structure of costs.

Most tax crimes and in particular cases of corporate tax evasion are recorded in the sectors with lower labour costs, social security contributions and other prime costs but with higher depreciation of fixed

assets (capital intensive industries). This contradicts the opinion of international scholars that high-paying industries tend to have larger shadow economies. We believe that the reason for this lies in the difficulty of detecting cases of non-compliance in high-paying spheres as well as in the small size of the sample used in these studies.

Table 5
Estimation of correlation relationships between the number of recorded crimes and GRP of Russian regions

Type of economic activity	Pearson's correlation coefficient	Significance level (2-Tailed)	Number of regions in the sample	Strength of correlation
Total number of recorded crime in all types of economic activity	0.910	0.000	80	very strong
Finance	0.934	0.000	80	
Retail and wholesale trade; vehicle repairs and maintenance; repairs of household and personal appliances	0.794	0.000	80	strong
Construction	0.677	0.000	79	noticeable
Transport and communications	0.657	0.000	79	
State administration and defense; mandatory social security	0.623	0.000	79	
Health care and social services	0.611	0.000	78	
Education	0.507	0.000	79	
Production and distribution of electricity, gas and water	0.429	0.000	72	moderate
Hotels and restaurants	0.388	0.004	54	
Manufacturing	0.219	0.058	76	
Agriculture, hunting and forestry	0.064	0.572	80	
Mineral extraction	0.028	0.834	59	
Fishing and fish farming	-0.107	0.546	34	

** Correlation coefficient is significant at the 0.01 level (2-tailed).

* Correlation coefficient is significant at the 0.05 level (2-tailed).

Table 6
Spearman's rho (components in the structure of costs in different sectors of economy; number of recorded crimes for types of economic activity according to the Russian Industry Classification System)

	Number of economic crimes	Number of tax crimes	Number of corporate tax crimes	Material damage
material costs		.310 (.456)	.357 (.385)	
raw materials and supplies				
fuel				
energy			-.371 (.365)	
labour costs		-.443 (.272)	-.491 (.217)	
unified social tax		-.524 (.183)	-.595 (.120)	
depreciation of fixed assets		.405 (.320)	.381 (.352)	
other costs		-.524 (.183)	-.500 (.207)	-.405 ()

** Correlation coefficient is significant at the 0.01 level (2-tailed).

* Correlation coefficient is significant at the 0.05 level (2-tailed).

**Table 7
Spearman's rho (organizations' financial performance; number of recorded crimes for different types of economic activity according to the Russian Industry Classification System)**

	Number of economic crimes	Number of tax crimes	Number of corporate tax crimes	Material damage
Balanced financial result (revenue minus losses)		.361 (.155)		.365 (.149)
Percentage of loss-making organizations				
Amount of losses	.355 (.162)	.627** (.007)	.553* (.021)	.789** (.000)
Profitability of products, services and works	-.821** (.000)	-.383 (.130)		-.495* (.043)
Return on assets of organizations	-.565* (.018)			

** Correlation coefficient is significant at the 0.01 level (2-tailed).

* Correlation coefficient is significant at the 0.05 level (2-tailed).

The number of recorded crimes in different types of economic activity (according to the Russian Industry Classification System) was compared with the indicators of organizations' financial performance in these sectors. This correlation analysis is aimed at showing the relationship between the level of crime and organizations' financial performance. Since the sample is small ($N = 17 < 30$), we calculated Spearman's rho between organizations' financial performance and the number of crimes recorded in the corresponding sector and criminal damage. Table 7 shows correlation coefficients with absolute values > 0.3 . Significance is specified in parentheses.

The results of our analysis have shown that the majority of economic crimes were committed in sectors characterized by higher losses (and, therefore, lower profitability). The same correlation is observed between each sector's losses and tax crimes, in particular corporate tax evasion, and criminal damage.

Finally, we conducted correlation analysis of the 2016 data on material damage in different types of economic activity in comparison with the data on organizations' financial performance. We calculated Pearson's coefficient of the correlation between each component of the costs and the crime damage in each sector. The results of the calculations are shown in Table 8.

**Table 8
Pearson's correlation coefficient (types of costs in different sectors; damage per one crime for types of economic activity according to the Russian Industry Classification System)**

Types of costs	Economic crime
Material costs	0.779
including:	
- raw materials and supplies	0.215
- fuel	0.660
- energy	0.581
Labour costs	-0.742
Social security contributions	-0.771
Depreciation of fixed assets	-0.040
Other costs	-0.675

Source: Russian Statistical Yearbook. 2017 (in Russian and English). Available at: http://www.gks.ru/bgd/regl/b17_13/IssWWW.exe/Stg/d03/24-32-37.doc

Major economic crimes tend to be observed in sectors with higher material costs (mostly fuel and energy costs). Minor economic crimes are committed in sectors with higher labour costs and social security contributions, which confirms the international research findings.

5. Conclusions

Based on our analysis of economic crime indicators, we ranked sectors of economy in descending order according to the significance of economic crime. The significance of crime is understood in this case as the ratio of the crime damage to GVA in a specific sector.

1. The sphere of finance ranks highest in gross indicators – the number of offenses and offenders – and in the scale of crime (per number of employees in the sector). The ratio of damage to GVA of this sector is also the highest among the other given sectors. The average damage caused by one crime is lower than average. The number of detected offenders per number of employees in the sector is also below average.

2. In construction the level of crime is below the average level. Crimes in this sphere were recorded in all the regions except one. The ratio of criminal damage to this sector's GVA is quite significant. The number of tax evaders in this sector is also high.

3. Agriculture, forestry, hunting, fishing and fish farming have the highest levels in relative indicators and the crime damage in this sector is also significant. The number of detected tax offenders per number of employees in the sector is high. This sector also has the highest number of tax evaders per number of employees.

4. The sphere of production and distribution of electricity, gas and water is characterized by the largest damage caused by one crime (major offenses), although there are comparatively few recorded crimes of this kind and the crime rates in the sector are also quite low. The number of detected tax evaders per number of employees in the sector is below average.

5. The sector of state administration, defense and social security ranks third in quantitative indicators although the damage caused by one crime is comparatively small (minor offenses). Crimes in this sphere were recorded in all the regions except one and the number of detected tax offenders and tax evaders was quite high.

6. Retail and wholesale trade ranks second after finance in gross indicators. The level of crime in this sector is quite high although the average damage caused by one crime is comparatively small (minor offenses). Crimes in the sphere of retail trade were recorded in all Russian regions; in wholesale trade, in all regions, except for two. Retail and wholesale trade is characterized by the highest number of detected tax offenders per number of em-

ployees. The number of tax evaders in this sector is also high.

7. Transport has high gross and relative values of the indicators. The sector is characterized by medium average damage per one crime. Crimes in this sphere were recorded in almost all the regions. The number of detected tax offenders as well as tax evaders in this sector is quite high.

8. In the manufacturing sector, the damage per one crime is heavy, which signifies large-scale crime. Economic crimes in the sphere of food and tobacco production were recorded in almost all the regions; in chemical industry and in production of vehicles and transport equipment, only in some regions. The number of detected offenders in this sector is significant (the analyzed data did not cover all the subsectors). The sector has a significant number of detected tax evaders.

9. In the sphere of hospitality and catering, the values of relative quantitative indicators are low. Crimes in this sector are recorded in more than a half of the regions.

10. The sphere of education has comparatively low values in quantitative indicators and the average damage caused by one crime is also small (minor offenses). Crimes in these sphere were recorded in all the regions except for two. This sector has the smallest numbers of detected tax offenders and tax evaders per number of employees.

11. Minor crimes (the smallest scale of damage) are prevalent in the sector of health care and social services. Crimes in this sphere were recorded in almost all the regions.

12. The sector of mineral extraction has the lowest crime rates. The average damage caused by one crime in this sector is above the average. As for mineral extraction (except for fossil fuels), tax crimes were recorded in 70% of Russian regions; in the sphere of fossil fuel extraction, tax crimes were detected only in a small number of regions in comparison with crime rates in other sectors.

13. The sphere of communications has low gross crime rates. The average damage caused by one crime is small (minor offenses). Offenses in this sector are recorded in almost all the regions.

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