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Determinants of the Russian Shadow Economy by Considering the Supply Chain Management Effects

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Abstract- **The shadow economy in Russia is the most serious problem that destroys the political system and poses a serious threat to the economic security of the country. One of the main solutions to overcome this problem is using the supply chain management strategy in the economy. The aim of this article was to identify the determinants of the shadow economy in Russia and to evaluate their impact on the size of the shadow economy in 2005– 2018. To analyze the existing problem, the authors conducted an expert survey and used its results to define the key socioeconomic determinants of the shadow economy. The econometric analysis was performed to identify specific statistically significant factors and their impact on the shadow economy.**
Key words: shadow economy, supply chain strategy, Russia, economic security, determinants of the shadow economy, management.

1.   Introduction

The shadow economy as a complex institutional system is one of the most important problems for most countries nowadays. Informal economic relations have penetrated into all spheres of human life, forming new rules of conduct. They may modify under the impact of external conditions and actively develop into new manifestations. Some varieties of the underground economy are recognized as threats to the national economic security and are global problems of our time. The issues of the shadow economy [1, 2, 3, 4], its formation, functioning and development have been explored by many researchers in various areas [5, 6, 7]. This phenomenon is hard to categorize due to the lack of agreement on the components of this activity, as well as a wide range of approaches to determining the criteria for its description [8; 9]. The shadow economy can be found in any economic system, but its size in different countries may vary. The negative impact of the informal economy manifests itself in various socioeconomic deformations: an increase in the tax burden [10], a decrease in budget revenues, structural crises, inefficiency of macroeconomic regulation [11], stimulated inflation, worse investment climate [12], distorted social values, the substitution of social institutions and many other aspects. Thus, it is necessary not only to measure the degree of the shadow economy, but also to identify the factors causing it. The main determinants of the shadow economy are usually identified as: the tax burden and social security [13], high unemployment [14], inefficient government policies [15], and non-competitive environment [16, 17]. The size of the shadow economy in the European Union (hereinafter—the EU) is currently estimated at more than EUR 2.1 trillion (18% of GDP), and this figure has been decreasing since 2011. However, according to various estimates, the shadow economy in Russia ranges from 20 to 40% of GDP. The underground economy creates serious risks and obstacles to ensuring the national economic security. All this emphasizes the relevance of this issue for the Russian Federation. The research goal was to identify the determinants of the shadow economy in Russia, and for this purpose we put forward the following objectives:

1. To specify the concept of the shadow economy;
2. To analyze the research papers exploring the determinants of the shadow economy;
3. To study the factors underlying the shadow economy in Russia by conducting an expert survey and an econometric analysis.

2.   Literature Review

Researchers have proposed various approaches to defining the phenomenon and content of the shadow economy. According to the most popular definition, it is unregistered economic activities that

make a contribution to the officially calculated gross national product [18]. [13] gives a narrow definition of the shadow sector: the researcher understands it as a set of goods and services, the profit from which is deliberately hidden from the authorities to avoid paying income tax, VAT or other taxes, social insurance contributions, which do not comply with certain legal norms of the labor market, such as minimum wages, maximum work hours, and safety regulations. We believe that the shadow economy should be defined as a system of special economic relations that are formed between individuals, groups of individuals, and institutions for production, distribution, redistribution, exchange, and consumption of material goods and services. These relations are determined by the general economic situation, the living standard of the population, and the restrictions imposed by the state. The existing scientific approaches to the content of the shadow economy name the following determinants of this phenomenon: the general condition and development of the economy, the complexity of the tax system [13], the unemployment rate, the level of self-employment, the level of bureaucracy [11], and demographic indicators. In this regard, excessive state regulation of the economy plays a special role. The empirical results obtained by [16] from 25 OECD countries for the period from 1995 to 2005 show that the poor work of state institutions and administration, as well as a large number of inspections significantly increase the shadow sector. There are other factors that underlie the shadow economy: inequality in the distribution of incomes among the population, and the spread of digital technologies in society [19, 20] believes that the determinants associated with an imperfect tax system and labor market play a bigger role in less developed countries or emerging economies, while in more developed countries, the size of the shadow economy depends on business and labor market regulations. We cannot agree with this statement, since each country is unique, like every person. Each country has its own history, culture, and traditions which also play a decisive role in the development/opposition of the shadow sector. Researchers fail to notice less visible, but perhaps more important factors: institutional, cultural, and "cognitive." The strength of their manifestations affects the informal economy: on the one hand, these factors help counteract informal activities and prevent the criminalization of society; on the other hand, they contribute to the formation of the

"shadow" culture and the institutionalization of the underground economy. Long-term studies [13, 21, 22] revealed that the shadow processes can be found in all economic systems, regardless of the level of socio-economic development, political structure, or type of social relations. The main differences of the shadow sector in different countries are associated with its size, forms, degree of transparency and inclusion in the global criminal economy, as well as the degree of social and legal control over it. The modern Russian economy is extremely instable, and the key reason for this is informal activities in almost all spheres of Russian social life. According to the studies of The Association of Chartered Certified Accountants [23], at the beginning of 2018, Russia ranked fourth among the five largest shadow economies in the world, with its share constituting 39% of GDP. Economists have proposed various socioeconomic, demographic, political, legal and other indicators to study their impact on the shadow economy. Therefore, it is necessary to explore the main factors contributing to the development of the informal sector in the Russian economy.

3.   Materials and Methods

In June and July 2019 we conducted a sociological study to identify factors contributing to the informal activities. The target sample included 120 respondents. The expert group was formed in two stages. The selection criteria at the first stage were:
a) Occupation (this group consisted of experts in the economic, legal, psychological and social sectors);
b) Work experience (it was assumed that the average work experience of an expert had to exceed 5 years).
At the second stage, the competence of the experts was determined using the self-assessment method. Each of the potential experts was offered a self-assessment card consisting of three questions. Using a rank scale, each potential expert assessed their theoretical knowledge, practical experience, and ability to predict the sequence of events. The ranking scale contained the following positions: "low" (0 points), "medium" (0.5 points), and "high" (1 point). The coefficient of the expert competency level was calculated by the formula:
$K = (K1 + K2 + K3) / 3$,
where K is the level of competence,
K1 is the numerical value of the expert's assessment of their theoretical knowledge,

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K2 is the numerical value of the expert's assessment of their practical experience,

K3 is the numerical value of the expert's assessment of their forecast ability.

It was assumed that the expert evaluation would be conducted by the people whose coefficient of competency on the shadow economy was at least 0.5 points. The average aggregate competency index of the respondents was 0.75 points. Thus, 120 people participated in the study.

To compare the influence of different factors on the shadow economy, we carried out economic modeling using the method of typological regression. Thus, we constructed multiple regression models for homogeneous groups distinguished by multivariate classification based on cluster or discriminant analysis.

To perform a regression analysis from a $(k + 1)$-dimensional population $(Y, X1, X2, ..., Xj, ..., Xk)$, we drew a sample of n size and each i-th observation (object) was characterized by the values of the variables $(yi, xi1, xi2, ..., xij, ..., xik)$, where xij is the value of the jth variable for the i-th observation $(i = 1, 2, ..., n)$, and yi is the value of the resultant attribute for i-th observation.

The most commonly used multiple linear model of regression analysis is:

$$y = \beta_0 + \beta_1 x_{i1} + \beta_j x_{ij} + ... \beta_k x_{ijk} + \varepsilon i,$$

where εi is random observation errors, independent of each other, with a zero mean and $\sigma 2$ variance.

This model is valid for all $i = 1, 2, .., n$; it is linear to unknown parameters $\beta 0, \beta 1, ..., \beta j, ..., \beta k$ and arguments. Multi collinearity is one of the reasons why it is not always possible to use regression analysis effectively. It arises if statistical linear relationships between explanatory variables are fairly close. The level of the shadow economy in Russia was used as a dependent variable in the regression equations. The indicators characterizing the country's economic development, innovation, trade, entrepreneurship, and the labor market were used as regressions. After removing some statistical indicators to exclude multi collinearity, we performed the correlation.

4. Results

During the survey, the experts identified the following groups of factors that underlie the development of the shadow economy:

- Economic;
- Political;
- Demographic;
- Social.

At the same time, 89% of the experts claimed that economic and managerial factors played the key role. These included the imperfection of the tax policy, which primarily manifests itself in high taxes, the complicated bureaucratic procedure for their payment and misuse; increasing pressure on small and medium-sized businesses, which in turn leads to fierce market competition. Analyzing the answers of the respondents to the question about the forms of the shadow economy, we obtained the following results (several options could be chosen): tax evasion (48.4%), formal payment to employees (32.3%), secondary employment (41.1%), bribery (77.4%), and illegal migrant labor (19.0%). A more detailed analysis of the respondents' answers allowed us to identify the main reasons for tax evasion in the Russian Federation:

- High taxes (62%);
- A complicated bureaucratic procedure for calculating and paying taxes (18%);
- Taxes are not used for their intended purpose, they are spent for other purposes than declared (18%).

Some respondents could not give an answer (2%).
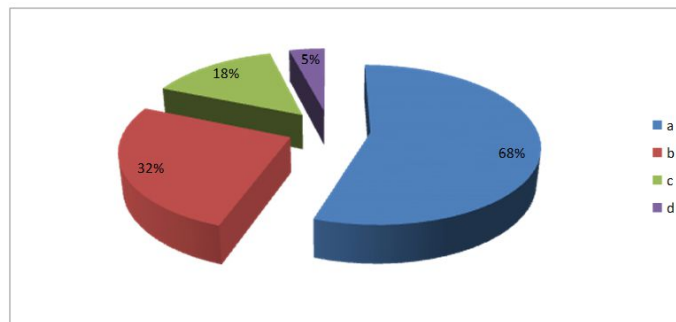
Figure1. The main reasons for tax evasion in the Russian Federation (according to the experts)
(where, a is a complicated bureaucratic procedure for paying taxes; b—taxes are too high; c—taxes are not used for their intended purpose, but spent on other purposes than stated; d—no answer given).

Rising unemployment, increasing poverty, corruption in the main areas of social life, the lack of social mobility, according to experts, represent a combination of demographic and social factors. At the same time, 74.2% of the experts claimed that the key factor influencing the shadow economy is the development of the secondary (hidden, informal) employment market. This means, services provided for an additional fee (tutoring, sewing, and repair of household and computer equipment), renting residential and non-residential premises, selling home-made products, etc. For instance, 85% of the respondents either provided services of secondary employment or used them. The experts noted that these factors are directly connected with hiring employees as a handshake deal without concluding an employment contract, discrepancies between real and formal terms of payment, and working off the books. The survey results were used as the basis for further study of the socioeconomic factors of the shadow economy in Russia. We used correlation analysis and a step-by-step regression analysis algorithm with the subsequent exclusion of minor regressions. Regression analysis was carried with the data for the period from 2005 to 2018. The paired correlation coefficients between the factor attributes and the effective indicator ranged from 0.21 to 0.94, which indicated that there was no multicollinearity. The close relationship between all factors and the effective indicator was confirmed by the multiple correlation coefficient (R = 0.942). Excluding the effect of multicollinearity, the following results were obtained.

Table1. The results of the regression analysis of the impact of the considered factors on the level of the shadow economy in Russia for the period from 2005 to 2018.

Independent variable (x)	The Peason's value	Coefficient	t-statistics	Probability
The tax burden	0.895781	0.2417	2.157812	0.2911
Per capita cash income	0.834273	0.4055	3.247351	0.0594
Average annual number of people employed	0.912876	0.9662	3.154925	0.0749
Investment in housing construction	-0.741242	-0.1310	-3.018942	0.4671
Retail trade turnover	-0.732895	-0.5074	-0.873641	0.1832
Investment in fixed assets	-0.789101	-0.0638	-1.694234	0.3645
R-squared	0.942			
F-statistik	94.012			
Prob (F-statistik)	0.009489			
Akaike info criterion (AIC)	-0.781492			
Schwarz criterion (BIC)	-0.702543			

As can be seen, per capita cash income and the average annual number of people employed had a positive impact on the resulting indicator. Three indicators had a negative impact on the size of the shadow economy: investment in fixed assets, investment in housing construction, and retail trade turnover.

5. Discussion

The expert survey showed that in Russia, the shadow economy manifests itself in various forms, the most common of which are bribery, tax evasion, and secondary employment. The experts noted that socioeconomic and managerial factors had the strongest influence on the size of the shadow economy. Thus, an increase in the shadow economy should not be exclusively associated with the inefficiency of law enforcement bodies and the imperfection of the legal framework, as some researchers believe [24]. It is necessary to consider the causes and conditions that lead to the emergence of the underground economy, namely, the socioeconomic policy of the state. This assumption necessitated performing an econometric analysis of socioeconomic indicators. Among many determinants analyzed in this research, several significantly impact the shadow economy: the tax burden, the dynamics of average per capita cash income of the population, the average number of the employed, investment in housing construction, retail trade turnover, and investments in fixed assets. Tax evasion and concealment of economic activity from control bodies leads to an increase in the tax burden on law-abiding entities, which results in even greater concealment of income. Some researchers believe that the tax burden has the greatest impact on the size of the shadow economy. The model presented in the study proves that this factor is the most significant in modern Russia. Arbitrary law enforcement and the excessive regulation of economic activity by the state create favorable conditions for corruption and the underground economy. We empirically established that the labor market is distorted by the shadow economy. The number of people employed in the informal sector is not decreasing. As a result, officially employed people are driven out from the sphere of legal and useful labor, which also leads to a decrease in tax revenue. The study showed a positive correlation between the average number of people employed and the size of the shadow economy. In a functional sense, the shadow economy is supplemental to the formal one in many aspects: income, employment, etc. It supplements the formal economy to the extent and level necessary to support the functioning

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of society. The research showed a positive correlation between the size of the shadow economy and per capita income of the population, which contradicted the researchers' opinion that the size of the shadow economy decreases with an increase in the level of per capita income [25-29]. In modern Russia, an increase in the income in the formal sector leads to an increase in the income in the shadow sector. Perhaps this fact explains the current paradoxical situation in the Russian economy, where real wages are increasing but real incomes are going down. Many researchers acknowledge the impact of fixed-asset investment on the shadow economy [14]. The shadow economy increases investment risks, reducing the investment activity of enterprises, which decreases the demand for investment goods and results in a decline in the investment sector. The study confirmed the negative correlation between the investments in housing construction and the size of the shadow economy. At present, the shadow economy is associated with significant income. A larger share of the population is attracted to it, and the shadow economy becomes an organic part of modern society. This entails serious economic and social consequences, reducing the controllability of the economy, increasing the differentiation of the population, undermining moral standards, and substituting many social institutions. The shadow economy negatively affects all spheres of society, destroying all social processes [30- 32].

6.   Conclusion

The shadow economy is one of the most serious problems both for Russia and for the world community. The conducted research allowed us to achieve the following results:

1. The definition of the shadow economy has been specified. It is understood as the system of special economic relations occurring between individuals, groups of individuals, institutional entities for production, distribution, redistribution, exchange and consumption of material goods and services. These relations are determined by the general state of the economy, living standards of the population and state restrictions.

2. The analysis of scientific publications revealed the main factors of the shadow economy in modern social processes. Among a wide range, the following general determinants should be distinguished: economic, managerial, political, legal, social, and demographic factors, as well as specific (narrow) ones—the development of computer technology, digitalization of the economy, and tax morality [33].

3. The obtained data of the expert survey and econometric analysis were used to analyze the determinants of the Russian shadow economy for the

period from 2005 to 2018. Most of the respondents noted the high importance of socioeconomic and managerial factors. Therefore, it was viable to perform an econometric analysis of socioeconomic determinants. Using regression analysis, we identified the main ones and determined their impact on the shadow economy.

4. The shadow economy determinants have both positive and negative influence. The following factors of the shadow economy have a positive impact on the resulting indicator: the average per capita cash income of the population and the average annual number of people employed. The influence of these factors should be confirmed with qualitative research methods.

The following statistical indicators have a negative impact on the level of the shadow economy: investments in fixed assets, investments in housing construction and retail trade turnover. This dependence can be used when developing government regulation measures aimed at reducing the shadow economy. The country needs a rational and adequate policy to fight the shadow economy, its size and further development.

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