
Estimation of Undisclosed Household Earnings Based on the Pissarides-Weber Model Modification

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Abstract:

Purpose: The issue of undisclosed household earnings prevalence and volume quantitative characteristics in Russia is considered in this article.

Design / Methodology / Approach: The undisclosed earnings' prevalence econometric estimate was carried out on the panel data of the "Russian Monitoring of the Economic Situation and Health of the Population of the Higher School of Economics" (periods from 2000 to 2017) based on the Pissarides-Weber model modification, which describes the behavior of the consumer household taking into account undisclosed earning on the one hand and the relationship between income and consumption on the other hand.

Findings: The households share estimates that derive undisclosed earning and the undisclosed earning share showed that they were declined during the period under review, and their contribution to poverty and inequality was indicated.

Practical Implications: The presented results are important for adjusting the social and economic state policy, considering the undisclosed earnings' impact on the population well-being level.

Originality / Value: For the first time, an econometric assessment of the undisclosed earnings of the population was carried out using microdata covering a long period of time, the trends that indicate a decrease in the prevalence and volume of undisclosed earning among Russian households during the study period have been revealed.

Keywords: Households, undisclosed earning, disposable resources, expenditure, consumption, inequality, poverty.

JEL codes: C26, D14, D31, G02, I32.

Paper type: Research article.

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1. Introduction

The issue of undisclosed earnings of population is one of the actively discussed problems in Russia. In economic crisis escalation conditions, when the social obligations of the state to support the living standards of the most vulnerable segments of the population are multiply increased, the real volume clarification of disposable income of the population becomes especially relevant.

Shadow economy is closely related to the institutions of the state and society, its hierarchical structure is like the levels and forms of the legal economy with the exception of the criminal component. This ensures its resistance to external influences, the ability for self-organizing and development (Kormishkina and Lizina, 2009).

The income received by the population in shadow economy is associated not only with criminal activity, but also with massive tax evasion and the use of all kinds of methods to extract uncontrolled income. A part of the population receives remuneration for the services rendered in cash from hand to hand, without registering either with the tax authorities as individual entrepreneurs, or as employees of the registered enterprises and institutions. Those employed in commercial enterprises often receive part of their salary in “Envelopes”, educators have income from tutoring and many other types of informal income.

One of the possible approaches to identifying undisclosed earnings from a wide range of shadow incomes defines them as household incomes that are not considered by official reporting. This approach has its advantages since it makes possible to approach the undisclosed earnings’ estimation through the expenditures’ volumes and structure, which are stably fixed at the microlevel in household surveys.

The population’s monetary settlements digitalization acceleration will significantly bring many types of income out of the shadows, but this process is only gaining momentum and the question remains: where are the undisclosed earnings predominantly concentrated and what is their volume?

The article presents an estimate of the households share that constantly hide a part of their income from declaring, the volume of these incomes, their contribution to the poverty level and inequality for the period from 2000 to 2017.

2. Literature Review

The representatives of various fields of knowledge turned to the study of the shadow economy phenomenon, and this gave rise to a wide range of approaches to its definition. However, to develop the measures to eliminate its impact, it is necessary to define shadow economy by means of the actions to measure it. This approach is used when solving the applied, statistical problems, formulating recommendations

for improving legislation and adjusting socio-economic policy, taking into account the impact of undisclosed earnings on the population well-being level (Ryabushkin and Churilova, 2003; Koryagina, 2000). Measuring the shadow economy at the macroeconomic level is covered in a wide range of publications (Barsukova, 2005; Burov, 2011; Voronkova, 2010; Kostin, 2011).

The hidden economy volume is estimated by official statistics on the basis of the decree of the State Statistics Committee of Russia No.7 of 01/31/98 on the approval of the “Basic methodological provisions for the assessment of hidden (informal) economy”. When determining the unaccounted household earnings, Rosstat applies a methodology based on a balance sheet approach and a comparison with the consumption and savings expenditures.

Serious objections to accounting for undisclosed earnings at the micro level are usually because the population is not inclined to share the information about their income, especially if their sources are not entirely legal. In addition, survey information on household income and expenditure is usually provided a month preceding the survey. This significantly limits the possibilities of analysis, however, public opinion polls about longer horizons for receiving funds deteriorate the information quality and reliability.

The work of Pissarides-Weber (Pissarides and Weber, 1989) became a methodological breakthrough in the problem of estimating the undisclosed earnings at the micro level. This work presents a theoretical justification for estimating the share of shadow earnings based on the hypothesis of a higher volatility of unobservable permanent income among the households with shadow incomes (Friedman, 1957).

Replications of Pissarides Weber’s approach across many countries are reflected in numerous publications (Brewer and O’Dea, 2012; Ekici and Besim, 2016; Tedds, 2010). The Pissarides-Weber approach was applied in Russian data in the works of T.A. Ratnikova and Ya.V. Murashov (2016; 2017), who evaluated shadow incomes based on the data from the Russia Longitudinal Monitoring Survey - Higher School of Economics (RLMS-HSE) for 2005-2015. The self-employed were selected as a group of households with shadow incomes predominance in their work but the consumption function was assessed in terms of expenditures on clothing, since according to their calculations, differences in food expenditures between the self-employed and other groups were statistically insignificant.

From our point of view, the choice of the self-employed as a control group leaves out of the scope of the analysis the broad strata of the population who receive undisclosed earning in our country. As argued above, the number of ways to extract undisclosed earning is so great that a priori judgment about the socio-demographic and professional groups structure in Russian society, in which undisclosed earnings are present (or absent), is impossible. One of the ways to distinguish the households with

undisclosed earnings can be to consider those of them in which, for example, the expenses exceed the incomes for a sufficiently long period of time (Nivorozhkina, 2016b).

3. Problem Statement

A comparison of the current disposable resources' volumes and cash expenditures and savings in household surveys indicates as a rule, that they either coincide, or the incomes exceed the expenditures, or turn out to be less. The positive difference between income and expenses is a part of the consumer's net income remaining after necessary expenses, taxes, expenses for meeting basic living needs. Such residual income is spent at the sole discretion of the consumer and is free in this respect. A part of these funds, the so-called revolving fund, will be spent in the next period, the other part may be set aside in the form of savings. If the difference between income and expenses is negative, that is, the household spent more in the current period than it earned, then these funds can be either a part of the working capital in the previous period, or undisclosed earning from non-declared sources, or the savings accumulated during the life cycle, etc. In any case, the total household income in the current month includes these funds, regardless of their origin source.

It is possible to increase the chances of identifying the undisclosed earnings by forming a panel sample and selecting the households that have declared incomes below expenses for several years in a row. One of the possible ways to distinguish the households with undisclosed earnings may be to consider those of them in which, for example, expenses exceeded incomes for three years. A shorter period reduces the turnover cash elimination probability, while a longer period leads to sampling depletion. Further refinement of the households' undisclosed earnings estimate is possible on the Pissarides-Weber model modification basis, where the group in which the undisclosed earnings are mainly concentrated are the households in which the expenditures have consistently exceeded the incomes for a sufficiently long time period.

4. Econometric Model

Econometric modeling was carried out according to the algorithm presented in the classic article (Pissarides and Weber, 1989). The authors' modification of the model consists in changing the approach to defining the households' group with undisclosed earnings and in justifying the new instrumental variables. Let us give a short model description.

The households are expected to report income Y_i^s after tax deduction, while the true income is Y_i . A linear relationship is assumed between an actual and reported income:

$$Y_i = k_i Y_i^s, k \geq 1.$$

For the households suspected of obtaining undisclosed earning, a random variable $k_i > 1$, for those not suspected of obtaining undisclosed earning $k_i = 1$.

The C_{ij} product's j -th name consumption function for all households can be written as:

$$\ln C_{ij} = Z_i^T \alpha_j + \beta_j \ln Y_i^s + \gamma_j D_i + \eta_{ij}, \quad (1)$$

where Z_i denotes the explanatory variables characterizing households, D_i is a fictitious variable equal to 1 for the households that are assumed to have undisclosed earning and 0 for those which are assumed not to have undisclosed earning.

The reported income Y_i^s in the equation (1), is endogenous (error correlated) due to the simultaneous influence of the external factors on income and expenses, as well as due to the measurement errors. In this regard, the variable Y_i^s needs instrumentation:

$$\ln Y_i^s = Z_i^T \delta_1 + X_i^T \delta_2 + \zeta_i, \quad (2)$$

where X_i denotes instrumental variables.

Estimating the share of undisclosed earning k_i is then obtained by applying the two-step least-square technique (LST). At the first step, we estimate the LST equation (2) separately for two groups of households $D_i = 0$ and $D_i = 1$ and we get the error variance $\sigma_{\zeta_{ee}}^2$ and $\sigma_{\zeta_{se}}^2$ respectively, as well as the predicted values Y_i^s . In the second step, LST applying for the equation (1) with the values Y_i^s , calculated at the first step, gives the estimates β_j and $\hat{\gamma}_j$. Then, as shown in the work (Pissarides and Weber, 1989), the lower and upper bounds of the income concealment parameter k_i is determined by the expressions:

$$\ln k_{low} = \frac{\hat{\gamma}_j}{\beta_j} - \frac{1}{2} (\sigma_{\zeta_{se}}^2 - \sigma_{\zeta_{ee}}^2) \quad \text{and} \quad \ln k_{up} = \frac{\hat{\gamma}_j}{\beta_j} + \frac{1}{2} (\sigma_{\zeta_{se}}^2 - \sigma_{\zeta_{ee}}^2) \quad (3)$$

The undisclosed earning share is then adjusted for the average income and the households share in the group. $D_i = 1$ according to the approach from the article (Murashov and Ratnikova, 2017):

$$d_{shadow} = \frac{\omega Y_{se} (k - 1)}{\omega Y_{se} + (1 - \omega) Y_{ee}},$$

where k – is a parameter estimate from (3), ω – is the proportion of households for which $D_i = 1$, Y_{se} – is an average income of a group of households $D_i = 1$, Y_{ee} – is an average income of a group of households $D_i = 0$.

5. Initial Data and Analysis Methodology

At the micro level, the data source on the living standards of the population available for the researchers is the Russia Longitudinal Monitoring Survey - Higher School of Economics (RLMS-HSE) for 1994-2018⁴, containing information of a socio-demographic nature and the data on household income and expenditure. A significant panel component allows tracking the same households over a long period of time.

As a standard indicator of living (the households' monthly income), the household disposable resources indicator, which includes, in addition to monetary income, an assessment of natural consumption from various sources, is formed. Expenses and savings included consumption and non-consumption expenses.

To estimate the number of households with undisclosed earnings, a variable-indicator of the undisclosed earnings presence was constructed for three consecutive years of the RLMS-HSE survey, starting from 2000 to 2017, according to the following scenario options: the cash expenditures and savings exceeded the disposable resources of the household by at least 10% (or 20%, 25%, 30%) for three consecutive years.

The equation was estimated according to the final panel data of the year. Accounting for households with expenditures exceeding incomes on the panel data reduced their share significantly, which confirmed the assumption that a significant part of the difference in current income and expenditures is the turnover cash. The logarithm of the available resources and factor variables was used as a dependent variable in the income equations: the presence of central heating, refrigerator, TV, number of rooms.

Instrumental variables in the equation - the presence of a domestic car in the household; foreign cars, garden plot - coincide with those used in the work (Murashov, Ratnikova, 2016; 2017). The new instrumental variable tested in the model was the variable formed by the answer to the question: "Imagine not a very pleasant picture: all members of your family have lost all income sources. How long will your family be able to financially live the same way as you live now, that is, without reducing expenses, only at the expense of money savings, without selling anything from the property?" A constructed answer: several months; less than a month. Undisclosed earnings, by definition, are more volatile, therefore, it can be assumed that the perception of material well-being sustainability in the households with undisclosed earnings compared to those households with stable incomes will be less optimistic.

⁴"The Russia Longitudinal Monitoring Survey - Higher School of Economics (RLMS-HSE)", conducted by the National Research University Higher School of Economics and "Demoscope" LLC with the participation of the Population Center of the University of North Carolina at Chapel Hill and the Institute of Sociology of the Russian Academy of Sciences. (Survey sites RLMS-HSE: <http://www.cpc.unc.edu/projects/rllms> u <http://www.hse.ru/rllms>)".

The answers' distribution to this question in the panel sample indicated the presence of statistically significant differences between the control groups.

Tests for the instruments' overdetermination (strength and exogeneity, Sargan-Hansen test), their strength (separately, Stock and Yogo's test) and exogeneity (separately, Wu-Hausman test) confirmed that the selected instruments were strong and exogenous. In the equation estimating the consumption function, the food expenses logarithm variable was chosen as a dependent variable. Additionally, this equation includes the explanatory variables for the number of children in the household and the credit availability. Previous studies by the authors (Nivorozhkina, 2016a) indicate that the credit burden of households significantly affects the structure of their consumer spending.

6. Simulation Results and Discussion

The simulation results are presented in Table 1. All the obtained model coefficients are statistically significant. According to the modeling results, the estimates of the undisclosed earning component were imputed to the households with undisclosed earnings.

Table 1. Estimates of the food expenditure model and the share of undisclosed earnings¹

Year	The criterion for the expenditures excess over available resources, %	Regression estimates IV		Test ² Hansen-Sargan, χ^2	Test ² Wu-Hausmann on endogeneity, F	Undisclosed earnings share, % ³
		$\hat{\gamma}$	β			
2002	10	0,702*** (0,069)	0,658*** (0,093)	6,2 (0,05)	9,04 (0,00)	33,06
	25	0,705*** (0,079)	0,664*** (0,092)	5,73 (0,06)	9,27 (0,00)	21,96
	30	0,713*** (0,084)	0,659*** (0,091)	7,61 (0,02)	8,15 (0,00)	20,00
2005	10	0,571*** (0,058)	0,527*** (0,062)	35,50 (0,00)	7,24 (0,00)	16,10
	25	0,665*** (0,075)	0,526*** (0,062)	35,28 (0,00)	7,76 (0,00)	11,96
	30	0,693*** (0,080)	0,525*** (0,062)	32,32 (0,00)	7,53 (0,00)	11,50
2008	10	0,447*** (0,058)	0,463*** (0,053)	12,30 (0,01)	5,01 (0,02)	12,7
	25	0,551*** (0,076)	0,458*** (0,053)	11,70 (0,01)	4,34 (0,04)	10,07
	30	0,560*** (0,083)	0,462*** (0,053)	12,40 (0,01)	4,09 (0,04)	8,90
2011	10	0,532*** (0,058)	0,453*** (0,056)	9,40 (0,02)	6,86 (0,00)	13,33
	25	0,538*** (0,083)	0,455*** (0,057)	9,04 (0,03)	6,10 (0,00)	7,03
	30	0,558*** (0,090)	0,458*** (0,057)	9,89 (0,02)	5,50 (0,00)	5,97
2014	10	0,429*** (0,047)	0,369*** (0,044)	10,9 (0,01)	2,04 (0,15)	14,8
	25	0,488*** (0,061)	0,363*** (0,045)	11,2 (0,01)	2,19 (0,14)	10,85

	30	0,509*** (0,067)	0,359*** (0,045)	10,8 (0,01)	2,08 (0,15)	10,47
2017	10	0,444*** (0,046)	0,441*** (0,045)	9,96 (0,02)	10,98 (0,00)	10,38
	25	0,426*** (0,060)	0,449*** (0,045)	9,88 (0,02)	9,85 (0,00)	5,44
	30	0,413*** (0,065)	0,453*** (0,045)	10,30 (0,02)	7,84 (0,00)	4,50

Note:

1. The coefficients' significance at the levels: *** — 1%, ** — 5%, * — 10%. In parentheses — coefficient standard errors.

2. The parentheses indicate p- meaning.

3. The share is adjusted for the average household income of each group (with and without undisclosed) in the sample, %. For 2008-2017, the instrumental variables: domestic car ownership (1 - yes), foreign car ownership (1 - yes), country house ownership (1 - yes), a household can live without all income sources for several months or more (1 - yes) ... For 2002 and 2005, the composition of the instrumental variables is one less (due to the absence of a corresponding question) - instead of two variables of owning a domestic or foreign car, one was used: car ownership (1 - yes).

Source: Own study.

During the period under review, there was a gradual decrease in the share of undisclosed earning. In the panel of 2000-2002, the share of undisclosed earnings exceeded 33.0%, which can be regarded as a response to the crisis of the 90s, when shuttle trade was active and informal employment flourished. One of the features of this period is the predominance of relatively small wages (the share of undisclosed earnings, starting from the 10% threshold, is predominant). In the periods of 2003-2005, 2006-2008, the undisclosed earnings share decreased by half within all threshold groups. The 2014 crisis triggered a new increase in undisclosed earning with the bulk of undisclosed earning concentrated in households, where their excess was 25-30%. However, this growth was relatively small and, starting from 2015, their decline was indicated.

The presented modeling results made it possible to answer the question: how large are the undisclosed earnings and in which (according to the security level) households are they concentrated? The following table (Table 2) presents the values of average income for the households in which, in accordance with the hypothesis, the undisclosed earnings were present or absent.

The results obtained indicate that the income latent component estimate imputation only in the 2000-2002 period increased the average disposable resources of households to a level exceeding the incomes in the group without such incomes. For the entire subsequent period, despite the imputation of the latent income component, the average disposable resources in these households were lower. The share of the undisclosed earning component reached 39.0% in these households in the early 2000s, then fell sharply, showing a noticeable increase only in 2014. The share of households receiving such income was also the highest in the early 2000s - 15.5%, and then gradually decreased, reaching 5.9% in 2017. The increase in the share of households with undisclosed earning in 2014 was less than one percent.

Table 2. *The disposable resources of households, taking into account the undisclosed earnings' absence or presence (threshold value - the excess of expenditures over incomes not less than 10%) per capita*

Year	Disposable resources * (average, rub.) per capita			The undisclosed earnings component share (%)	% households with undisclosed earnings
	Without undisclosed earnings	With undisclosed earnings	With undisclosed +imputed earnings		
2002	2941,63	2100,23	3444,33	39,0	15,5
2005	5684,73	3972,59	4728,39	16,0	9,9
2008	11111,19	7694,69	9427,01	18,4	8,4
2011	15166,83	11461,03	14196,99	19,3	6,0
2014	19621,67	12541,87	15995,97	21,6	6,7
2017	23236,82	17204,38	20683,46	16,8	5,9

Source: *Own study.*

Table 3. *The disposable resources of households, taking into account the undisclosed earnings' absence or presence (threshold value - the excess of expenditures over incomes not less than 30%) per capita*

Yaer	Disposable resources * (average, rub.) per capita			The undisclosed earnings components, % of the available resources	% households with undisclosed earnings
	Without undisclosed earnings	With undisclosed earnings	With undisclosed+imputed earnings		
2002	2897,22	1926,29	2745,49	29,7	8,9
2005	5623,64	3479,34	4344,30	19,9	5,0
2008	10991,57	6631,64	7949,93	16,6	3,8
2011	15092,17	8982,37	10080,61	10,9	2,4
2014	19385,81	11563,85	14326,75	19,3	3,1
2017	23066,80	16564,99	18247,70	9,2	2,8

Source: *Own study.*

For the households in which the threshold value of the expenditures excess over income is at least 30% per capita, the disposable resources turned out to be even lower and the contribution of the latent income component also decreased. However, the 2014 crisis gave a very significant increase.

How can the obtained results be interpreted? In the sample population of RLMS-HSE households there are neither the big business representatives or the criminals. The shadow incomes' estimation of these groups is beyond the scope of this study. The results obtained for the households represented in the sample revealed that the undisclosed earnings of their significant part are a tool for maintaining the current welfare at an average level. The argument in favor of this conclusion is that the estimate of the latent income component for the households in which their share exceeded 30% showed that their average disposable resources were lower than for the households, which undisclosed earnings started from 10%.

Do undisclosed earnings affect household inequality and poverty? The following table (Table 3) presents the Gini inequality index values for all households and the contribution of the undisclosed earning component to total inequality. Of course, our estimates of inequality (although they are close to those published by Rosstat), differ significantly in the calculation methodology. These results characterize the inequality level among the households representing the middle of the income distribution, since they exclude both the poorest and the very wealthy households.

Table 4. *The inequality level and relative poverty of households (threshold value - the expenditures excess over incomes not less than 10%)*

Year	Gini coefficient	Contribution of undisclosed earnings components to overall inequality, %	Relative poverty	
			without undisclosed earnings	with undisclosed earnings
2002	0,445	8,5	24,3	32,8
2005	0,425	1,2	25,3	26,1
2008	0,419	1,3	22,1	24,2
2011	0,391	1,3	21,4	26,0
2014	0,372	1,2	20,6	28,8
2017	0,374	1,1	22,3	30,3

Source: *Own study.*

The contribution of the undisclosed earning component to the Gini inequality index is insignificant, which is, to a certain extent, a result of the fact that the share of such households in the sample is relatively small. It is clear from the calculations presented in Table 2 and Table 3 that the undisclosed earning component contribution should not increase, but rather slightly reduce overall inequality. This conclusion is also confirmed by the fact that for the group of households with a 30% threshold for the expenditures excess over income, the contribution of the latent income component to total inequality, starting from 2003, did not reach 1 percent.

The last two columns of Table 4 are the level of relative poverty, calculated as the proportion of households which disposable resources per capita, taking into account the undisclosed earning component, are below half the median. The table shows that the level of poverty in households with undisclosed earnings is noticeably higher, and during periods of exacerbation of crises, the level of poverty grew precisely in households with undisclosed earnings. In the group of households with a 30% threshold for the excess of spending over income, the level of relative poverty was higher by an average of five percent.

7. Summary

How accurate are the results? The fact that the households included in the model receive undisclosed earnings on a regular basis, as three years have been chosen as the period for fixing these incomes should be taken into account. However, informal earnings with non-fixed income are often sporadic, not regular, and these households

formally remain in the group that has no undisclosed earning. In addition, as already noted, the sample does not include both extremely poor and very rich households. Another important aspect: participation in the survey is voluntary. Therefore, even if the conditions of the sample representativeness are met, the households which income is predominantly shadow will not be represented in the data. Thus, the presented results may be slightly underestimated. Nevertheless, further structure identification of the selected group of households is of undoubted interest and value for adjusting social policy in relation to socially vulnerable segments of the population, withdrawing a part of the population's income from the shadows, forming an understanding for their mandatory declaration need.

Earlier (Nivorozhkina, 2019), we argued that undisclosed household earnings form a latent mechanism for leveling the standard of living and are a "safety cushion" during the economic crises' periods, a factor that eliminates social tension in society. And, if we turn to the tables and graphs presented, then there is a rise in the level of shadow incomes during the crisis years. However, if we return to the current situation, the sources of undisclosed earning, which are listed above, are sharply reduced. Thus, in 2017, the poverty level recalculation without taking into account the undisclosed earning component increased the level of relative poverty in the households that had unaccounted earnings for another 5%.

The presented trend, which characterizes the prevalence and volume of undisclosed earnings among the Russian households, suggests that the shadow income concentration, the enormous scale of which has been written a lot about, occurs outside the household sector's boundaries. As for the situation with the households deriving incomes hidden from the accounting records, we can refer to the experience of the 90s, when during the period of a landslide decline in the living standard of the Russian population, it was the income from informal employment that became the main source of livelihood for a significant part of the population. The population's ability to self-organize, resistance to external shocks indicate that the removal of a number of prohibitive measures, strict tax regimes on informal activity of the population, and ignoring the model of paternalism will ease the burden of the state's social obligations during the economic recovery after the crisis caused by the fall in energy prices, coronavirus.

References:

- Barsukova S. 2005. The structure and institutions of the informal economy. *Sociological journal*, 3, 118-134.
- Brewer, M., O'Dea, C. 2012. Measuring living standards with income and consumption: evidence from the UK. IFS Working Paper W12/12.
- Burov, V.Yu. 2011. Shadow activity of small businesses. Germany, LAP Lambert Academic Publishing GmbH & Co, 225.

- Ekici, T., Besim, M. 2016. A Measure of the Shadow Economy in a Small Economy: Evidence from Household-Level Expenditure Patterns. *Review of Income and Wealth*, 1(62), 145-160, <http://dx.doi.org/10.1111/roiw.12138>.
- Friedman, M. 1957. The relation between the permanent income and relative income hypotheses. Princeton, Princeton University Press.
- Gimpelson V., Zudina A. 2011. Informals in the Russian economy: how many are there and who are they? *Economic Issues*, 10, 53-76.
- Kormishkina, L.A., Lizina, O.M. 2009. Shadow economy: textbook. manual for universities. Saransk, Publishing house of Mordovsky University.
- Koryagina, T. 2000. The growth of the shadow economy is a challenge for theorists and for state statistics. *Economics and Mathematical Methods*, 4(36).
- Kostin, A.V. 2011. Experience in measuring the shadow economy in Western literature. *Vestnik NSU, Series: Socio-economic sciences*, 4(11), 33-43.
- Murashov, Ya.V., Ratnikova T.A. 2017. Dynamics of unrecorded incomes of Russian households. *Applied Econometrics*, 2, 30-54.
- Murashov, Ya.V., Ratnikova, T.A. 2016 Unaccounted incomes of Russian households. *Economic Issues*, 5, 1-28.
- Nivorozhkina, L.I. 2016a. Impact of lending on household consumption: an economic and statistical study. *Statistical issues*, 1, 47-53.
- Nivorozhkina, L.I. 2016b. Undisclosed earnings of households: experience of empirical analysis. *Terra Economicus*, 4(14), 42-53.
- Nivorozhkina, L.I. 2019. Undisclosed earnings of the population as a threat to the financial institutions of the state. *Problems of accounting, analysis, audit and statistics in market conditions: scientific notes*, 22, 201-207.
- Pissarides, C., Weber, G. 1989. An Expenditure-Based Estimate of Britain's Black Economy. *Journal of Public Economics*, 39, 17-32.
- Ryabushkin, B.T., Churilova, E.Yu. 2003. Methods for assessing the shadow and informal sectors of the economy. Moscow, Finance and Statistics, 143.
- Tedds, L.M. 2010. Estimating the income reporting function for the self-employed. *Empirical Economics*, 3(38), 669-687.
- Voronkova, O.V. 2010. Foreign experience in the study of shadow income. *Terra Economicus*, 4(8), 82-89.