DYNAMICS OF SHADOW ECONOMY IN RUSSIA

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Abstract

The article considers methods for the assessment of the shadow economy that are used worldwide. It demonstrates the possibilities of the application of the physical input method, the method of the comparison of income and expenditure, currency demand method for the assessment of the shadow economy. The article presents the results of the assessment of the shadow economy in dynamics when using the indicator of the share of hidden wages. It suggests the dynamic equation of the share of hidden wages that allows the projected values of the indicator to be set for the short term at current trends. Regression equations make it possible to determine the projected values of the share of hidden wages depending on the variation of factor attributes affecting the level of the shadow economy.

Keywords: shadow economy, assessment methods, dynamics, Russia.

Introduction

In one way or another, the shadow economy is present in all countries; therefore, the issues concerning the assessment of its extent are given much prominence in Russian and foreign academic literature. The problem of identifying the shadow economy, selecting the method and evaluating the level of the shadow economy is rather urgent.

The notions of the shadow economy, approaches and methods concerning its assessment vary in accordance with specific tasks and aims of the research. A broader definition is used in order to evaluate the size of the shadow economy at the country level: the shadow economy comprises economic activities – and income earned from them – that circumvent government regulation, taxation, or observation (Del Anno R., 2003). It includes unreported income from the production of legal goods and services, from either monetary or barter transactions and includes all economic activities that would generally be taxable were they reported to the state (tax) authorities. Hence, the shadow economy involves undisclosed production, hidden income and expenditures for final consumption and accumulation not specified in statistics.

Methods of estimating the shadow economy

The shadow economy structurally comprises the formal production of goods, services and the activities of a redistributive nature. Not all shadow economic activities can be measured and evaluated, which is explained by the very nature of the shadow economy; therefore, indirect methods are used to measure its extent. They can be conveniently classified into three groups: methods of open inspections, special economic and legal methods and statistical methods.

Methods of open inspections are applied by specially created regulatory agencies. They detect and deter the violations of tax, customs, currency, banking, antitrust legislations, of trade regulations, sanitary standards, fire safety rules, etc. The results of such inspections can be used for accounting and statistical purposes.

Special methods of economic and legal analysis (accounting, documentary, economic approaches) are used by experienced economists and accountants to detect traces, causes and conditions of economic crimes.

Statistical methods are based on the methodology of the system of national accounts (SNA). They are most appropriate for studying shadow economic activity at the macro level in order to estimate the hidden production of legal goods and services. The shadow economy is identified on the basis of indirect data. The production of unrecorded goods is determined by the balance method, which assumes the comparison of the data from different sources and the recalculation of the missing information. The advantage of statistical methods is the possibility of the quantitative assessment of the concealed part of the production economic activities. These procedures can be used to identify the production sectors of the shadow economy, to assess their scope, to formulate economic and legal policy. The most widespread among statistical methods are the method of specific indicators, the method of soft modeling, structural and expert methods (F. Schneider, 2006).

Methods of specific indicators assume the use of the indicator reflecting the level of economic activities that was obtained directly or indirectly.

Direct methods involve the use of special surveys, polls or tax audits aimed at identifying discrepancies between income and expenditure and characterizing certain aspects of shadow activity by groups of taxpayers. These methods do not allow determining the dynamics of the shadow economy, but they make it possible to obtain information concerning shadow economic activities, the structure and composition of the employed in the shadow economy. Sample surveys were used in the assessment of the shadow economy by A. J. Isachsen, J. Klovland, S.

Strom (1982); A.J. Isachsen, S. Strom (1985); G. V. Mogensen, H. K. Kvist, E. Körmendi, S. Pedersen (1995), and others.

Indirect methods are applied when the straightforward direct fixation of the examined parameters is not possible. They are based on the official statistical information, the data of financial and tax agencies. Indirect methods include the method of the comparison of income and expenditure, resource methods, monetary methods (currency demand approach), the Italian method (labour approach), transaction (operation) method, trade flow method, as well as different modifications of the methods.

The method of the comparison of income and expenditure uses discrepancies of the statistical data on income and expenditure. In the system of national accounts the income amount of GNP should be equal to the expenditure amount of GNP. The difference between expenses and revenues can be used as an indicator of the extent of the shadow economy. This method was applied by A. Franz (1983), K. A. MacAfee (1980), H.-G. Petersen (1982), and others.

In Russia all the accounts of the household sector were first measured in 1996; that allowed directly correlating all revenues of households with all expenses. Consequently, the expenses significantly exceeded revenues. However, it should be taken into account that the discrepancy reflects all omissions and errors in the system of national accounts.

The physical input method implies the use of indirect data to calculate the real amount of GDP. The electricity consumption approach is most often applied for that purpose, the best known methods of which are Kaufman-Kaliberda method (D. Kaufmann, A. Kaliberda, 1996) and Lacko method (M. Lackó, 2000). The physical input methods are very simple and appealing, but they have a number of disadvantages: not all shadow economic activities require a considerable amount of electricity (e.g. building sector), and other energy sources can be used as well; the use of electricity becomes more efficient in both formal and shadow sectors of economy; there may be considerable differences or changes in the elasticity of electricity/GDP across countries and over time.

The method of assessment by the employment indicator (the Italian method) is based on a labour cost survey. The average number of hours worked derived from the sample data is compared to the official data. The Italian method provides the best results at a relatively low mobility of population. There are several varieties of the Italian method, providing similar results (F. Schneider, 2006).

The monetary (currency demand) method is based on the fact that when making transactions within the shadow economy, the preference is given to cash. The classical method of

the analysis of the currency demand is based on the supposition that the shadow (hidden) transactions are made in the form of cash, so as to avoid the control from the regulatory agencies. The share of the shadow economy is estimated on the assumption of constant money velocity in the formal and informal sectors of economy (F. Schneider, 2006). The currency demand method was used and developed by P. M. Gutmann (1977), V. Tanzi (1980, 1983), G. Kirchgaessner (1983, 1984), F. Schneider (1986) , and others. The given method has several drawbacks: not all payments in the shadow economy are made in cash; the correlation between the mass of banknotes and bank deposits of population does not remain constant; it is difficult to set up a correspondence between money velocity in both sectors; it is hard to determine a base period with no shadow economy; the effect of foreign currency is not considered.

Transaction (operation) method is based on the assumption that there must be a constant relation over time between the volume of transaction and official GNP. Relating total nominal GNP to total transactions, the GNP of the shadow economy can be calculated by subtracting the official GNP from total nominal GNP (E. L. Feige, 1986). The disadvantages of this method are the following: the assumptions of a base period with no shadow economy, and of a "normal" ratio of transactions to nominal GNP; the need to know the precise figures of the total volume of transactions, which is difficult for cash transactions; the assumption that all variations in the ratio between the total value of transaction and the officially measured GNP result from the shadow economy.

The commodity flow method implies the construction of the balance model and the detection of weak points in the existing data base. The commodity flow, i.e. the behaviour of value in the process from production to use (consumption), is constructed for certain most important goods and product groups. This approach allows making a quantitative assessment of foreign economic mediation, including the extent of "shuttle" business in Russia.

The methods of soft modeling are aimed at calculating the relative size of the shadow economy by distinguishing the combination of factors determining it. This approach was used by D. Giles (1997); D. Giles, L. M. Tedds, W. Gugsa (2002); S. Chatterjee, K. Chaudhury, F. Schneider (2006), and others. In Russia it was applied by S. Nikolaenko, Ya. Lissovolik, R. Mac Farkar (2009); N. Suslov, S. Ageyeva (2009).

The structural method is based on the use of the information concerning the extent of the shadow economy in different production branches.

The expert method relies on the intuition and experience of qualified professionals, who determine the degree of data reliability, interconnections and relations that are difficult for quantitative description.

Assessment of the shadow economy in Russia

The most widespread among the methods for the assessment of shadow economic activities at the macro level are the statistical methods of specific indicators, in particular the physical input method, the method of the comparison of income and expenditure, and the currency demand method that use official statistical information. Let us consider the results of the assessment of the shadow economy in Russia when applying these methods.

The physical input method, which is based on electricity consumption and successfully used in countries with established economies, is inapplicable for Russia. In the Soviet economy the electric intensity of products was unreasonably high, despite a low cost of electricity. In the context of the transition to the market economy concurrently with the growth of the shadow economy the electric intensity of production decreased at a more rapid rate. In addition, since 2000 the growth rates of construction, retail and service sectors that consume relatively less amount of electricity has been faster than the growth rates of industry (Federal State Statistics Service). The graph based on the World Bank data (*Figure 1*) reflects the growth rates of GDP, industrial production and electricity consumption. As follows from the graph, the growth rates of GDP and industrial production have been exceeding the growth rate of electricity consumption practically all years since 1997, except for the years of financial crises.

In accordance with the *currency demand method,* it is assumed that the growth of the shadow economy leads to an increase in the ratio of cash to deposits. Then the share of cash in all money supply is accepted as a resulting attribute. The ratio of cash and non-cash turnover is expressed by the cash coefficient:

$$K_1 = \frac{M_0}{M_2},$$

where K_1 is the cash coefficient;

M_0 is cash in circulation;

M_2 is the amount of cash in circulation and non-cash funds.

The cash coefficient allows the structure of money supply and the factors affecting cash turnover to be assessed.

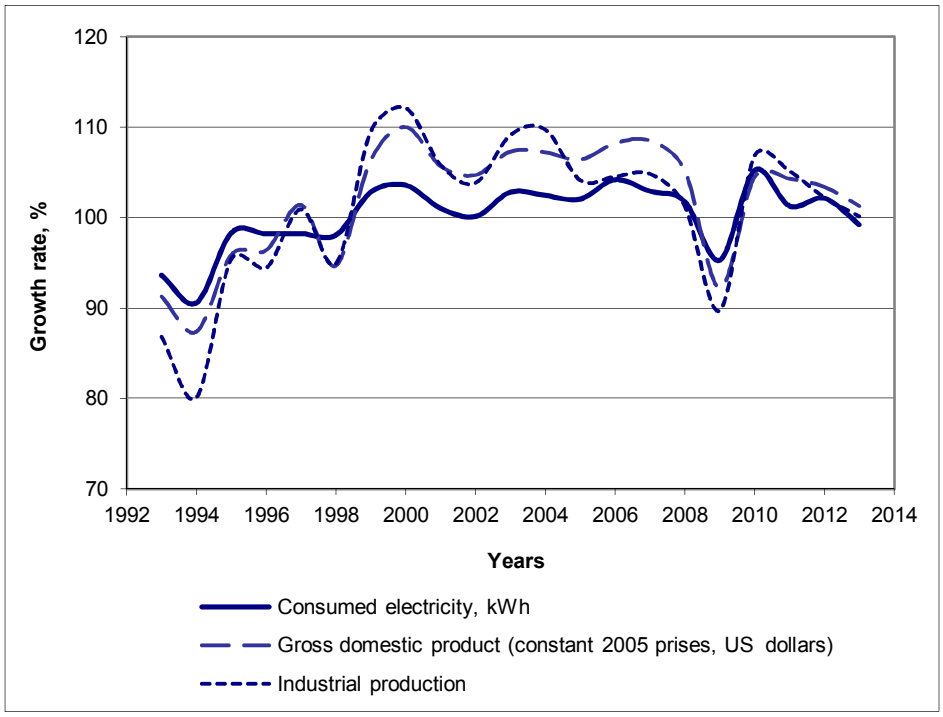

Fig. 1. Growth rate of economic indicators

According to the data of the Federal State Statistics Service, the cash coefficient in Russia has been decreasing almost all the years (*Figure 2*), i.e. the share of cash in circulation has been declining in the total amount of cash in circulation and non-cash funds. There are many reasons for this, including the introduction of plastic cards at enterprises, non-cash payments to employees, and noncash transactions in retail trade.

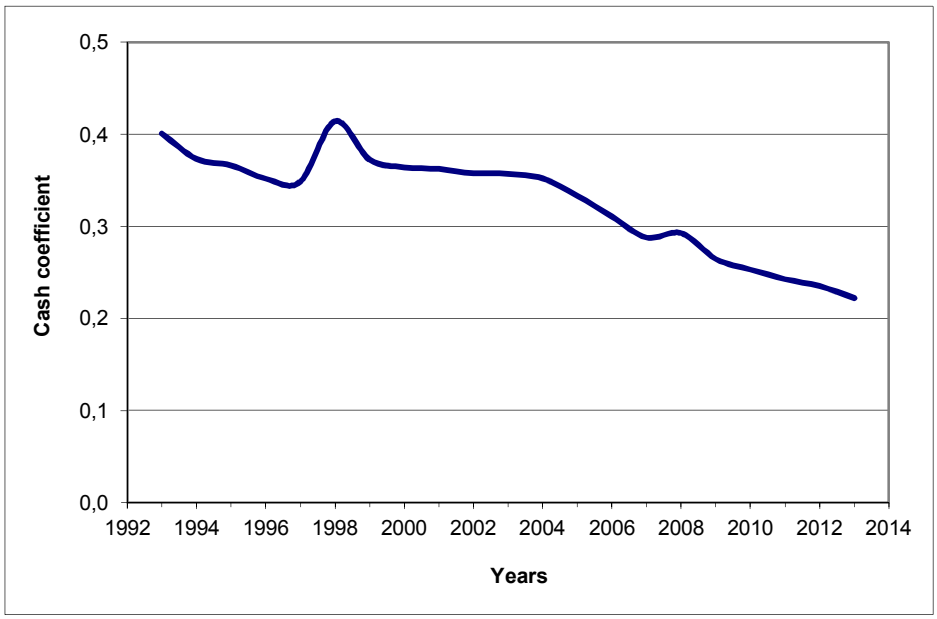

Fig. 2. Dynamics of the cash coefficient

The exceptions were the years of financial crises, when the cash coefficient increased (by 18.8% in 1998 and by 1.7% in 2008). The multidirectional dynamics of cash increase due to the growth of the shadow economy and of cash decrease resulting from other reasons makes the qualitative determination of the share of the shadow economy rather time-consuming when using the currency demand method.

The method of comparison of income and expenditure is applied by statistical agencies to detect hidden remuneration. Hidden (unreported) wages and salaries comprise payments in non-taxable forms: unrecorded payrolls; by means of monetary aid, loans, insurance scheme payments, bank deposits; remuneration in kind through purchasing real estate, durables, etc. for the employees. The main reason for hidden wages is the intention of the employers to avoid payments of consolidated social tax and other taxes. This allows them to raise wages of the employees and to reduce the costs of production, making it more competitive.

In accordance with SNA methodology, hidden wages of hired workers are determined by applying the balance method as the difference between total households' expenditures, including increase in their financial assets, and formally registered incomes.

Population incomes comprise all tangible assets received by households as a result of economic activities or as transfers in cash and in kind (in-house production and in-kind transfers).

Household expenditure include all expenses on acquisition of consumer goods and services, as well as the cost of goods and services that were consumed in kind (agricultural production grown at personal subsidiary plots, imputed service charges for living in own houses) and received as earnings and humanitarian supplies.

According to the statistical data, the share of hidden wages over the years in the period under review increased from 17.0% in 1993 to 28.8% in 2006 (*Figure 3*). In subsequent years the share of hidden wages fell within the range of 26.6% to 28.8% from the earnings of employees. Consequently, in the last decade the population has been receiving more than a quarter of income bypassing taxation, and the given share continues to increase.

A significant advantage of the given method is the availability of official statistical data obtained within one technique that allows evaluating the dynamics of the indicator.

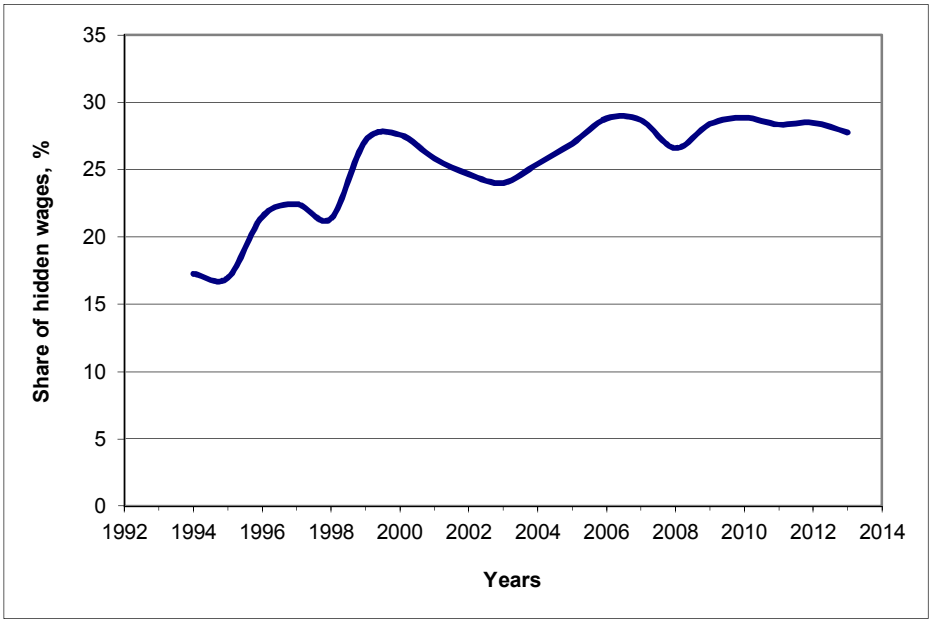

Fig. 3. Share of hidden wages

Modelling the dynamics of the share of hidden wages

The modeling of the dynamics of the share of hidden wages for the long term can be conducted in two ways:

- extrapolation of the existing tendencies using a dynamic equation (short-term forecast);
- on the basis of a regression equation with the inclusion of the time factor (mid-term forecast).

The dynamic equation is constructed from time series data concerning the share of hidden wages. It is taken into account that of interest is not the modeling of the complex dynamics of the index, but the main tendency of the indicator to change in time, particularly in the last time segment. The dynamics of the indicator can be well described by the logarithmic equation:

$$y = 16{,}6 + 4{,}133\ lnt \qquad (R = 0{,}95)$$

where t are the years of the period under review ($t = 1$ in 1994)

The equation is of rather high quality, which is proved by the correlation index. Standard errors of the equation parameters and the equation in general are within permissible values. Fisher and Student criteria confirm the reliability of the equation and its parameters.

All empirical values lie within a confidence interval. The discrepancy between empirical and theoretical values of the last time segment does not exceed 1.8%. Hence, at current trends the value of the share of hidden wages is expected within the range of 29% in the next two years.

However, in contrast to regression equations, the extension of retrospective dynamics does not allow considering the impact of various factors on the dynamics of the examined parameter.

The modeling of the interrelation between the share of hidden wages and various socio-economic factors makes it possible to predict the value of the given indicator for a longer term extending the dynamic range of factor attributes. The modeling of interrelation implies the construction of double and multiple regression equations of the share of hidden wages when using different factor attributes.

As a result of the correlation analysis, it was possible to establish an interrelation between the share of hidden wages and the following factors: total share of taxes in GDP; the share of net taxes on production and import in GDP; average tax rate; interest rate on deposits; the share of the personnel of public administration, military security, and social insurance institutions; the share of the employees in public and local authorities; GDP per capita at constant prices; household final consumption per capita at constant prices; average annual income per capita at constant prices; the share of wages in gross national income; consumer price index; overall unemployment rate; number of displaced families and refugees.

Double regression equations represent the dependence of the share of hidden wages from each of the factors distinguished in the correlation analysis. All indicators change in dynamics, therefore, the time factor is eliminated, and the influence of the explicitly analyzed factor is revealed. For some factor attributes the time factor was insignificant. Double regression equations of the share of hidden wages are as follows:

$$y = 25{,}537 + 0{,}384\ t - 3{,}059\ x_1 \qquad (R = 0{,}91);$$

$$y = 22{,}787 + 1{,}211\ t - 3{,}815\ x_2 \qquad (R = 0{,}90);$$

$$y = 8{,}191\ x_3^{0{,}722} \qquad (R = 0{,}89);$$

$$y = 26{,}544 + 1{,}273\ t - 6{,}325\ x_4 \qquad (R = 0{,}89);$$

$$y = 26{,}610 + 1{,}193\ t - 1{,}217\ x_5 \qquad (R = 0{,}88);$$

$$y = 12{,}622 + 0{,}753\ t - 0{,}601\ x_6 \qquad (R = 0{,}88);$$

$$y = 5{,}739\ x_7^{0{,}600} \qquad (R = 0{,}87);$$

$$y = 32{,}396 + 0{,}572\ t - 0{,}267\ x_8 \qquad (R = 0{,}86);$$

$$y = 2{,}206\ x_9^{0{,}863} \qquad (R = 0{,}85),$$

where t are the years of the analyzed period ($t = 1$ in 1994);

x_1 is the consumer price index, times;

x_2 is household final consumption per capita at constant 2005 prices, thousands US dollars;

x_3 is the share of the employees of the public administration, military security, and social insurance institutions, %;

x_4 is the average annual per capita income at constant 2000 prices, thousands US dollars;

x_5 is GDP per capita at 2005 PPP, thousands of US dollars;

x_6 is the overall unemployment, % of total labour force;

x_7 is the total share of taxes in GDP, %;

x_8 is the share of wages in gross national income, %;

x_9 is the share of net taxes on production and import in GDP, %.

All regression equations are of rather high quality, which is proved by the correlation indices. Moreover, standard errors of all equations and their parameters are within permissible values. Fisher and Student criteria confirm on the whole the reliability of the equations and their parameters.

Other factor attributes affect the size of the share of hidden wages insignificantly. The shares of direct and indirect taxes have a slight impact on the resultative indicator. The effect of the average tax rate (the given factor was insignificant by Student criteria when taking into account the time factor) and the impact of the financial crisis have not been determined.

Regression equations demonstrate that the share of hidden wages rises along with an increase in the overall share of taxes, the share of net taxes on production and import, the share of the employees of the public administration, unemployment rate and a decrease in GDP per capita at constant prices, final consumption and average annual income per capita at constant prices, the share of labour remuneration in gross national income.

Increased tax burden provokes businessmen to make partial payments of salaries and wages bypassing taxation. The burden of state regulation, which is expressed as a growth in the number of the employees of the public administration, also contributes to an increase in hidden wages. The growth of population income (household final consumption per capita at constant prices, average annual income per capita at constant prices, GDP per capita at PPP, share of labour remuneration in GNI) leads to a decrease in secondary employment and employment in the informal sector, where the probability of hidden wages is higher. Since the consumer price index is an indicator of economic development, the reduction in the consumer price index points to economic stabilization and economic growth. Economic growth and rising income of

population also promote an increase in the volume of housing construction. Trade and small business are recovering. More employment opportunities emerge in these spheres. It is easier to hide income in the sectors of housing construction, trade and small business.

The distinguished factor attributes underlie the construction of multiple regression equations. Additionally, the time factor is eliminated. Considering the existence of duplicate factors, all factor attributes are divided into three groups: 1) factors reflecting tax burden; 2) factors reflecting the burden of state regulation; 3) socio-economic indicators. No more than one factor from each group is included in the equations. As a result, the following regression equations were obtained:

$$y = -0{,}408\,t + 0{,}896\,x_1 + 3{,}896\,x_3 \qquad (R = 0{,}99);$$

$$y = 17{,}657 + 0{,}690\,t + 1{,}238\,x_1 - 1{,}300\,x_4 \qquad (R = 0{,}90);$$

$$y = 18{,}157 + 0{,}793\,t + 1{,}156\,x_1 - 6{,}664\,x_6 \qquad (R = 0{,}89);$$

$$y = 19{,}649 + 0{,}859\,x_1 - 3{,}591\,x_7 \qquad (R = 0{,}89);$$

$$y = 1{,}652\,x_1 + 0{,}640\,x_8 \qquad (R = 0{,}99);$$

$$y = 1{,}699\,x_1 - 2{,}192\,x_7 + 0{,}885\,x_8 \qquad (R = 0{,}99);$$

$$y = 4{,}667\,x_3 + 0{,}339\,x_8 \qquad (R = 0{,}99),$$

where t are the years of the analyzed period ($t = 1$ in 1994);

x_1 is the total share of taxes in GDP, %;

x_2 is the share of net taxes on production and import in GDP, %;

x_3 is the share of the employees of the public administration, military security, and social insurance institutions, %;

x_4 is GDP per capita at 2005 PPP, thousands of US dollars;

x_5 is household final consumption per capita at constant 2005 prices, thousands of US dollars;

x_6 is the average annual per capita income at constant 2000 prices in thousands of US dollars;

x_7 is the consumer price index, times;

x_8 is the overall unemployment, % of total labour force.

The regression equations show that the share of hidden wages rises, in case of an increase in the total share of taxes in GDP, in the share of net taxes on production and import, in the share of the employees of the public administration and in the unemployment rate, and a decrease in

GDP per capita at 2005 purchasing power parity, in average annual income per capita at constant 2005 prices and in the consumer price index.

Multiple regression equations confirm the conclusions drawn from regression equations, and allow for a mid-term forecasting of the share of hidden wages. It is possible to expect an insignificant growth in the share of hidden wages, which will fall within the range of 30% in the next three years.

Conclusion

To sum up, it may be stated that the variety of the applied methods indicates the absence of a generalized most accurate approach for the quantitative estimation of the parameters of shadow economic activities, suitable for different countries and time periods. Each method has its advantages and disadvantages, its own field of application.

The dynamics of the shadow economy in Russia is most adequately reflected by the share of hidden wages. The dynamic equation and the system of double and multiple regression equations allow forecasting the dynamics of the given indicator for the short and medium terms. An insignificant growth in the share of hidden wages is predicted in the next three years, but still it will fall within the range of 30%.

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