How to Raise Pensions by Legalizing Informal Employment

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ABSTRACT

The article presents the study on the problems of imbalances in the Russian pension system, which prevent ensuring the provision of decent pensions for the population at a level that is adequate to their labor contribution. In this study, the authors set a goal of substantiating proposals for building a balanced pension system in Russia. They considered the possibility of increasing the number of workers (contributors to the pension system) by legalizing the informal employment as a reserve for increasing the receipts of insurance contributions to the pension system. In performing of the study was tested the working hypothesis, which is: to ensure a balanced pension system in Russia and raise the pensions, such reserve of increasing the number of contributors as the legalization of informal employment is sufficient. The article set and addressed the optimization problem of legalizing the informal sector of the Russian economy within the existing unfunded pension system in case of raising the pensions to 40% of lost earnings. The authors built a non-linear programming optimization problem based on the balance equation of unfunded pension system. They presented a number of test estimates and conclusions drawn on their basis. First, to ensure a balanced pension system in Russia and raise the pensions, such reserve for increasing the number of contributors as the legalization of informal employment is significant but not sufficient. Secondly, a 40% wage replacement rate can be achieved only in case of virtually complete legalization of population employment in the informal sector. Thirdly, the authors identified the particular characteristics of informal employment legalization in specific economic activities.

INTRODUCTION

The attitude of state towards pensioners and conditions for the decent life of seniors are the basic indicators of social well-being (Iwanicz-Drozdowska et al., 2016; Svagzdiene & Kuklyte, 2016). The twenty-year-long history of reforming the Russian pension system, with its four waves of legislative changes, failed to ensure a decent level of pensions for the population and financial self-sufficiency of the pension system. In 2000–2016, the share of receipts from the federal budget to the Pension Fund of Russia (PFR) increased from 6.2% to 44.0% (Table 1). During the crisis of 2009, the share of pension transfers in the total receipts of PFR reached the highest level and amounted to 60.4%. In part, the higher transfers were associated with growing responsibilities assigned to PFR. Along with compulsory pension insurance, PFR is responsible for paying social benefits, making additional payments to pensions, maternity capital payments, and a number of other payments financed by transfers.

Table 1. The main characteristics of PFR budget

	2000	2002	2003	2005	2009	2012	2014	2015	2016	2017
Total revenue, billion rubles	431.3	699.9	843.1	1,349.6	3,222.6	5,890.4	6,159.1	7,126.6	7,625.2	8,363.4
Taxes, insurance contributions	379.3	642.3	770.5	635.6	1,273.4	3,040.4	3,712.7	3,879.9	4,144.9	n/a
Funds from federal budget	26.8	49.5	51.0	693.1	1,946.7	2,819.5	2,413.0	3,091.7	3,355.3	3,783.3
Total expenditure, billion rubles	341.1	789.6	804.1	1,299.1	3,008.7	5,451.2	6,190.1	7,670.3	7,829.7	8,583.9
Expenditure on financing payments of pensions, benefits to the population including	331.3	661.7	776.4	1265.2	2,872.3	4,897.3	5,798.9	6,322.4	6,677.5	n/a
monthly cash payments	—	—	—	—	263.6	325.4	341.4	358.8	383.4	n/a
compulsory pension insurance	—	—	722.8	1,044.6	2,374.5	4,166.6	4,980.1	5,786.0	6,054.9	n/a
provision of maternity (family) capital	—	—	—	—	42.0	212.3	270.7	328.6	365.3	n/a
Expenditure on financing the costs of maintaining the executive body of PFR	2.8	14.8	19.2	32.5	61.8	92.8	99.4	104.8	107.2	n/a
Surplus (deficit), billion rubles	90.2	-89.8	39.1	50.5	214.0	439.1	-31.1	-543.6	-204.4	-220.5

Source: Rosstat.

Note: 2017—forecast in accordance with Federal Law No. 416-FZ of December 19, 2016.

Since 2014, the growing deficit of PFR is no longer covered by transfers from the federal budget. In 2016, the budget expenditure of PFR exceeded its revenue by 204.4 billion rubles. Most of these funds (81.7%) are related to the transfer of pension savings by the citizens from PFR to private pension funds (PPFs) and only technically represents the deficit (PFR, 2016). However, in 2002, prior to the introduction of compulsory funded component, the amount of received social contributions fully covered the expenditure on payment of pensions (Table 1). Therefore, in essence, the transfers from the federal budget become a compensation for the shortfall in revenues of PFR and are directed to balance its budget. Since 2014, a moratorium was introduced on the formation of pension savings; i.e. all insurance contributions are directed to the formation and

financing of insurance pensions in the unfunded component of the pension system. This "freezing" was caused by the low efficiency of the funded component and actual decrease in the pension rights of citizens as a result of this mechanism (Topilin, 2015). Individuals with occasional or temporary earnings are automatically excluded from the system since the funded pension system applies only to the workers with permanent income (Dmitrieva et al., 2010; Brovchak, 2008). The reformed pension system also faced another serious challenge of improving the profitability of pension savings and protecting them. In 2015, the annual average return of PPFs was 10.54% while the inflation rate was 12.94% (Pension and Actuarial Consultations, 2016). According to other estimates, the average annual return of PPFs is 4.7% or 5.4%, depending on calculation method (Gorlin, 2015). The study (Grishchenko, 2016) of pension systems in the post-Soviet states showed that, currently, the unfunded system is more acceptable and beneficial for pensioners. But, in the future, with the aggravating demographic situation (population aging, declining birth rate), the funded system will become more efficient.

The modernization of Russian pension system is far from being over and, first of all, this concerns the issue of raising the amount of pensions (Roik, 2015). The imbalances of the Russian pension system prevent ensuring the provision of decent pensions for the population at a level that is adequate to their labor contribution (Bogdan, 2016). The key indicator describing the effectiveness of the pension system is the wage replacement rate. Recent changes in pension legislation do not contribute to increasing this rate. In 2002–2008, it gradually decreased from 33.5% to 26.4% (Table 2). Only in 2009, with more subsidies from the federal budget, it reached the level of 2002. In 2016, its value exceeded the minimum level recommended by the International Labor Organization (ILO), and it happened only because of the one-time cash payment.

Table 2. The wage replacement rate in Russia

	2002	2007	2008	2009	2013	2014	2015	2016
Average granted monthly pensions at the end of the year, rubles	1,462.3	3,682.3	4,546.3	6,177.4	10,029.7	10,889.0	12,081.0	12,391.0 17,425,6*
Average monthly nominal wage paid, rubles	4,360.3	13,527.4	17,226.3	18,637.5	29,792.0	32,495.0	34,030.0	36,709.0
Wage replacement rate, %	33.5	27.2	26.4	33.1	33.7	33.5	35.5	33.8 47.5*

Source: Rosstat.

Note:
* As of January 1, 2017, including the one-time payment granted in accordance with the Federal Law No. 385-FZ of November 22, 2016 in the amount of 5,000 rubles.
The replacement rate is the ratio of the average pension and average wage.

An additional threat to financial security of state pension obligations is the demographic aging of the population, which increases the burden on the working population (Kuklin et al., 2014). The share of individuals at the retirement age increased from 20.4% in 2000 to 24.6% in 2016 and, according to Rosstat forecasts (Federal State Statistics Service …, 2017), by 2036, it will be 28.8–30.1%. This rapid growth of elderly population puts more pressure on the pension system, which is based on the principle of solidarity between generations (Chistova, 2016). While, in 1990, there were 2.3 working individuals per pensioner, in 2016, this ratio stood at 1 to 1.7. The mechanisms proposed to ensure a balanced pension system (limiting indexation of pensions, raising the retire-

ment age, establishing limits on payment of pensions to working pensioners, etc.) only increase the pressure on the working population. Higher expenditure on provision of pensions caused by demographic trends represents one of the main factors of budget imbalances (Goryunov et al., 2015). This fact indicates growing threats to social security of the region and the need to strengthen the social support (Kuklin et al., 2016).

In this study, we set a goal of substantiating the proposals for building a balanced pension system in Russia by using a parametric approach while preserving a solidarity-based unfunded pension system. We considered the possibility of increasing the number of workers (contributors to the pension system) by legalizing the informal employment in order to generate more insurance contributions. The study set and addressed the optimization task of legalizing the informal sector of the Russian economy within the existing unfunded pension system along with raising the pension level.

1. RESEARCH METHODOLOGY

The balance equation of the unfunded pension system has two sides:

$$S \cdot W \cdot E = P \cdot R, \qquad (1)$$

Where S is rate of contributions for pension provision, %;
W is the average nominal wage, rubles;
E is the number of insured workers, thousand people;
P is the average nominal pension, rubles;
R is the number of pensioners, thousand people (Ministry of Labor ..., 2012).

The left side of equation is the revenue of the pension system, and the right side is its expenditure. According to calculations based on the equation (1), currently, the amount of levied insurance contributions (left side of the equation) even exceeds the amount needed to pay the pensions (right side). Therefore, the understated level of pensions is not associated with the deficit of the pension system, but with the insufficient funding from the federal budget for purposes of valorization, financing of additional payments to pensions, compensation of "non-insurance" periods (military service, childcare, etc.), and the shortfall of revenue as a result of preferential tariffs.

Since the pension is not only an instrument for protection against poverty, but also acts as insurance against lost earnings, we consider the increase of the wage replacement rate of to 40% as a target for solving the optimization problem. As the controlled parameter of equation, we selected the number of workers (contributors), because any changes in the insurance premium rates and the amount of accepted obligations are deemed to be socially unacceptable. We view the legalization of informal employment and taking the wages out of the "shadow" economy as an important reserve for increasing the amount of insurance contributions. According to Rosstat's methodology, the informal employment means the employment at the enterprises that:

— produce goods and services for sale on the market;
— do not have the legitimate status of a legal entity (Federal State Statistics Service..., 2016).

Moreover, based on this definition, we can assume that, for some economic activities, the informal employment is virtually non-existent, while for others, it is widespread. Since it is extremely difficult to completely legalize the informal sector of the economy[1], we propose to solve the optimization problem of legalizing this sector in the context of specific economic activities. The following was used as methodological provisions for solving the optimization problem:

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[1] As demonstrated by unsuccessful experience of Belarus, the imposition of officially unemployed citizens by special tax can trigger social discontent.

– The economic activities, where the informal employment is widespread and where are the conditions for its emergence (opportunities for tax evasion, weak state control, low need for large capital investments and workers with special professional skills and high qualifications), have the highest potential for legalizing the informal employment.
– The level of wages of "legalized" workers (those who entered the market from the informal sector) is factored in at the level of nominal wage paid in the corresponding economic activity. This assumption is made because, for objective reasons, there is no information and unambiguous expert assessment (Oshchepkov, 2013; Gimpelson and Kapelyushnikov, 2013; Sinyavskaya, 2005; Bernabe, 2002) on the wages of those employed in the informal sector of the economy.
– For the efficiency of legalizing the informal employment in order to increase the insurance contributions to the pension system, two limitations have been introduced in the optimization model. First, the increase in the number of "legalized" workers leads to more efforts (costs) for further legalization in that economic activity and, accordingly, reduces its effectiveness. Secondly, the greater is the ratio of the average wage in specific economic activity to the average wage paid in general, the more effective is their legalization.

2. NON-LINEAR MODEL FOR SOLVING THE OPTIMIZATION PROBLEM

Based on the balance equation of unfunded pension system (1), we built a nonlinear programming optimization problem:

$$F = \sum_{i=1}^{n} \rho_i \cdot f\left(\frac{x_i}{x_i^0}\right) \to \max_{\mathbf{x}}, \tag{2}$$

$$0 \le x_i \le x_i^0, \quad i = 1, 2, \dots, n, \tag{3}$$

$$\sum_{i=1}^{n} x_i v_i = V, \tag{4}$$

The following notations were adopted in the problem (2)–(4):

$\rho_i = a_i \cdot b_i, \quad i = 1, 2, \dots, n$,

$a_i = \dfrac{x_i^0}{\sum\limits_{k=1}^{n} x_k^0}$ is the share of workers in the informal sector in the i-th economic activity relative to the entire informal sector;

$b_i = \dfrac{v_i}{\bar{v}}$ is the ratio of the average wage 'vi' in the i-th economic activity to the average wage paid $\bar{v}$ in general;

x_i^0 is the total number of workers in the informal sector in the i-th economic activity;

x_i is the value of the variable of the total number of workers in the informal sector in the i-th economic activity that ensures the optimal value of the objective function;

V is the required annual receipt of deductions from wages to the pension system resulting from the legalization of workers by various economic activities;

$f\left(\dfrac{x_i}{x_i^0}\right)$ is a monotone, continuous, increasing, and nonnegative function in the interval (0; 1).

The required minimum amount of additional legalized annual wages for a given wage replacement rate K is determined by the following formula:

$$V = 12 \cdot N_p \cdot (K \cdot \bar{v} - \bar{p}),$$ (5)

where N_p is the average annual number of pensioners;

$\bar{v}$ is the average wage paid;

$\bar{p}$ is the average pension.

When building the efficiency criterion in the form of objective function (2), we made the following assumptions.

$$a_i = \frac{x_i^0}{\sum\limits_{k=1}^{n} x_k^0}$$

- The larger is the share $\quad$ of workers in the informal sector in the i-th economic activity relative to the entire informal sector, the more important is the legalization of the i-th economic activity.
- The higher is the ratio of the average wage "v_i" in the i-th economic activity to the average wage

$$b_i = \frac{v_i}{\bar{v}}$$

paid $\bar{v}$ in general $\quad$, the more important is the legalization of the i-th economic activity.

- Function $f\left(\dfrac{x_i}{x_i^0}\right)$ is a monotone, continuous, increasing, nonnegative and bounded function on the interval [0; 1], because $0 \leq x_i \leq x_i^0$. It describes the value of legalizing the share of $\dfrac{x_i}{x_i^0}$ workers of the informal sector in the i-th economic activity. It is obvious that the legalization of workers in the informal sector requires the efforts. Moreover, with the increase in the number of legalized workers, the efforts (costs) for further legalization are increasing. This means that this function must be concave (convex upward), i.e. $\forall t \in (0;1) \; f''(t) < 0$. For convenience, we assume that $f(0) = 0$, $f(1) = 1$. We also introduce the limitations on the derivative of function f(t): the derivative on the right at the point $t = 0$ tends to infinity, and the derivative on the left at the point $t = 1$ tends to zero. These assumptions allow us to consider the rate of change in the value of legalization as monotonically decreasing from $+\infty$ to 0, which is an adequate assumption.

These conditions are satisfied by the equation of a circle of radius 1 with the center at (1; 0):

$$f(t) = \sqrt{1 - (t-1)^2} = \sqrt{2t - t^2}, \; t \in [0;1].$$

Therefore, we obtained the following

$$f\left(\frac{x_i}{x_i^0}\right) = \sqrt{1 - \left(\frac{x_i}{x_i^0}\right)^2} = \sqrt{2\left(\frac{x_i}{x_i^0}\right) - \left(\frac{x_i}{x_i^0}\right)^2}, \; 0 \leq x_i \leq x_i^0.$$ (6)

It should be noted that these prerequisites are one of the variants for the optimization problem and can be adjusted.

3. STUDY DATA

It is difficult to provide an accurate and reliable estimate of the number of those employed in the informal sector given the nature of such labor relations. The labor force surveys[2] conducted by the Federal State Statistics Service (Rosstat) are the main source of information on employment in this sector. That information was used in calculations for this study. The initial data for the study was also provided by statistical estimate of the number of those employed in the economy, which was calculated by Rosstat in accordance with the updated methodology for calculating the balance of labor resources[3].

According to these data, in 2016, the number of those employed in the informal sector across Russia amounted to 15.4 million people, or 21.3% of the total number of population employed in the economy (Table 3).

Table 3. The informal employment by economic activities in Russia, 2016

	Number of employed in the informal sector aged 15–72 years old, thousand people	Average number of workers across all organizations, thousand people	Scale of informal sector, people / people employed officially	Average monthly nominal wage paid, rubles
Total	15,370	72,065	0.21	36,745.7
Agriculture, hunting, and forestry	3,588	5,374	0.67	21,445.4
Fishery and fish farming	48	129	0.37	54,449.4
Extraction of minerals	25	1,119	0.02	69,687.9
Manufacturing industries	1,427	10,247	0.14	34,748.1
Production and distribution of electricity, gas, and water	38	1,991	0.02	39,607.0
Construction	1,652	6,231	0.27	32,188.1
Wholesale and retail trade; repair of motor vehicles, motorcycles, personal items	4,781	13,633	0.35	29,554,8
Hotels and restaurants	510	1,652	0.31	22,102.4
Transport and communications	1,436	5,978	0.24	41,762.4
Financial activities	36	1,437	0.03	78,310.5
Real estate operations, lease, and services	628	7,157	0.09	44,040.1
Education	150	5,552	0.03	28,093.6
Health care and social services	171	4,606	0.04	29,845.3
Other utilities, social, and personal services	879	3,164	0.28	32,294.1

Source: Rosstat.

Note: The scale of the informal sector is the ratio of the number of those employed in the informal sector to the number of those employed in the economy.

As we can see from Table 3, the employment in the informal sector is concentrated primarily in the services and agriculture.

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[2] Until 2016, population surveys on employment issues
[3] Decree of the Government of the Russian Federation No. 973 of September 14, 2015 "On the improvement of statistical records in connection with the inclusion in the official statistical information of the average monthly wage paid to workers in organizations, individual entrepreneurs, and individuals (average monthly income from labor activity)."

4. RESULTS OF THE STUDY

According to the equation (5) based on the data for 2016, raising pensions to 40% of lost earnings by legalizing employment in the informal sector would require the additional total annual nominal wage paid in the amount of 1,189.317 billion rubles. The optimization problem described above was built by taking into account this amount.The results of calculations in the form of solutions to this problem are presented in Table 4.

Table 4. The results of solution of the optimization problem to legalize the informal sector in order to ensure the wage replacement rate of 40%

	Optimal number of population employed in the informal sector and required to be legalized, thousand people	Estimated share of the population employed in the informal sector and required to be legalized, % of the population employed in the informal sector
Total	*14,742.2*	*95.9*
Agriculture, hunting, and forestry	3,255.1	90.7
Fishery and fish farming	47.6	100.0
Extraction of minerals	25.5	100.0
Manufacturing industries	1,427.4	100.0
Production and distribution of electricity, gas, and water	37.7	100.0
Construction	1,652.1	100.0
Wholesale and retail trade; repair of motor vehicles, motorcycles, personal items	4,485.9	93.8
Hotels and restaurants	510.0	100.0
Transport and communications	1436.1	100.0
Financial activities	36.3	100.0
Real estate operations, lease, and services	628.1	100.0
Education	149.7	100.0
Health care and social services	171.4	100.0
Other utilities, social, and personal services	879.3	100.0

Source: Authoring

The solution of the optimization problem allowed to calculate the total number of workers in the informal sector in the i-th economic activity that ensures the optimal value of the objective function. As shown in Table 4, a 40% wage replacement rate can be achieved only in case of virtually complete (95.9%) legalization of population employment in the informal sector. Since the informal employment is highly prevalent in such economic activities as "Agriculture, hunting, and forestry" and "Wholesale and retail trade; repair of motor vehicles, motorcycles, personal items," the effectiveness of legalization in these activities is 90.7% and 93.8%, respectively.

Based on the obtained results, we can conclude that, at this point of time, the objective set in the Strategy for the Long-Term Development of the Pension System of the Russian Federation until 2030[4] is difficult to reach under the current parameters of the pension system and it requires additional resources in order to achieve it. However, the calculations have shown that there is a certain reserve for increasing the receipts of insurance contributions just by legalizing the informal employment (while preserving other parameters of the pension system). The study allowed to solve

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[4] One of the objectives for development of the pension system is to ensure the replacement of up to 40 percent of lost earnings by the old-age retirement pension in case of standard pension insurance period and average wage (Order of the Government of the Russian Federation No. 2524-r of December 25, 2012 "On the Strategy for the Long-Term Development of the Pension System of the Russian Federation").

the optimization problem of legalizing the informal sector in order to raise the pensions to 35% of lost earnings. The results of the solution are presented in Table 5.

Table 5. The results of solution of the optimization problem to legalize the informal sector in order to ensure the wage replacement rate of 35%

	Optimal number of population employed in the informal sector and required to be legalized, thousand people	Estimated share of the population employed in the informal sector and required to be legalized, % of the population employed in the informal sector
Total	2,696.3	17.5
Agriculture, hunting, and forestry	215.5	6.0
Fishery and fish farming	44.8	94.1
Extraction of minerals	25.5	100.0
Manufacturing industries	302.2	21.2
Production and distribution of electricity, gas, and water	37.7	100.0
Construction	294.7	17.8
Wholesale and retail trade; repair of motor vehicles, motorcycles, personal items	264.3	5.5
Hotels and restaurants	214.7	42.1
Transport and communications	353.8	24.6
Financial activities	20.9	57.5
Real estate operations, lease, and services	320.3	51.0
Education	149.7	100.0
Health care and social services	171.4	100.0
Other utilities, social, and personal services	280.9	31.9

Source: Authoring

As demonstrated by the obtained results, full legalization of informal employment is the optimal solution for economic activities that are under active state control, namely, "Extraction of minerals," "Production and distribution of electricity, gas, and water," "Education," and "Health care and social services."

As part of test estimates, other scenarios for increasing the replacement rate were explored with a step of 1% (Table 6).

Table 6. The results of solution of the optimization problem to legalize the informal sector in order to ensure the increase of the wage replacement rate

	Optimal number of population employed in the informal sector and required to be legalized, thousand people	Estimated share of the population employed in the informal sector and required to be legalized, % of the population employed in the informal sector
Increase of the wage replacement rate:		
up to 34%	637.02	4.1
up to 35%	2,696.3	17.5
up to 36%	4,777.9	31.1
up to 37%	6,984.8	45.4

up to 38%	9,284.0	60.4
up to 39%	11,998.1	78.1
up to 40%	14,742.2	95.9
up to 40.022%	15,370.0	100.0

Source: Authoring

Therefore, in case of full legalization of employment in the informal sector, the additional volume receipts of insurance contributions to the pension system will be 1,231.2 billion rubles (while preserving other parameters of the pension system), which will allow to raise the average nominal pension to 14,780 rubles or by 19.3%.

CONCLUSIONS

The study showed that, to ensure a balanced pension system in Russia and raise the pensions, such reserve of increasing the number of contributors as the legalization of informal employment is significant but not sufficient. A 40% wage replacement rate can be achieved only in case of virtually complete legalization of population employment in the informal sector. Full legalization is the most optimal solution for economic activities that are under active state control and do not have many opportunities for tax evasion. By contrast, the legalization of informal employment is ineffective in economic activities with high prevalence of informal employment, relatively low wages, and a low need for workers with special professional skills.

If the legalization of informal employment is viewed as the only mechanism ensuring a balanced pension system in Russia, the objective set in the Strategy for the Long-Term Development of the Pension System of the Russian Federation until 2030 would be difficult to reach under the current parameters of the pension system, and it would require additional resources in order to achieve it. From this point of view, the non-linear programming optimization problem set in this study can be complemented by various objective functions, parameters, and limitations.

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