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# ACTUARIAL ASSESSMENT OF PENSION RISKS IN RUSSIA: FROM THEORY TO PRACTICE

*The article examines the origins of pension systems in the world and reveals the causes for the emergence of different models of public pension provision. The authors paid a particular attention to the history of Russian pension system and reviewed the stages and causes of contemporary reform. From the standpoint of contemporary laws, they systematized the forms, types of pension provision and pension insurance in the Russian Federation in terms of their sources of financing and subjects of pension relations. The concept of "actuarial assessment" was defined on the basis of process and systemic approach. The article expands on the theoretical content of such concept as the "pension risk" and provides a classification of pension risks by the area of their emergence. The authors developed a methodological apparatus for actuarial assessment of risks in the pension system with the breakdown by various criteria, such as demographic, economic, financial, and labor risks. The methodological approach proposed for assessing the pension risks is based on the comprehensive assessment of socio-economic indicators and identification of dependencies between socio-demographic and economic processes in the pension system and national economy. The developed toolkit was tested in the actuarial assessment of pension risks on the Russian Federation. The article presents the results of calculations that identified the critical risks in the Russian pension system. It has been demonstrated that, in the short term, the greatest threat to the Russian pension system is posed by stagnation processes in the economy and high share of the shadow economy while, in the long term, such threat may stem from aging of the population and higher life expectancy.*

**Keywords:** pension provision, pension insurance, pension system, insurance pension, funded pension, pension fund, insurance contributions, risk, actuarial assessment, demographic processes, incomes, household expenditure

## Introduction

Over the past decades, the problems of pension reform remain among the most discussed topics in Russia. All these years, there is an active discussion between representatives of the state authorities, scientific community, public figures, and ordinary citizens of the Russian Federation. The ongoing discussion focuses on the issues of transforming the pension system and adapting it to the market economy. Today, the reform processes in the pension system have significantly expanded and are not limited to the area of public finance. In addition to it, the contemporary pension system in the Russian Federation includes insurance companies, credit institutions, private pension funds, and other financial institutions. In this regard, the seamless inclusion of a funded element in the Russian pension system becomes an important issue of reform.

While the participants in the discussion consistently agree on the need for reform, the proposed methods are diverse and range from the implementation of foreign experience to a simple political decision.

The situation with the comprehensive assessment of the state of the pension system is much more complicated. The adequate assessment and long-term forecasting of the balanced nature and financial sustainability of the pension system require a discrete actuarial assessment of basic and derived pension risks. This will allow to reliably establish the cause-effect relationship between negative and positive factors, and regulate and manage the pension system in the Russian Federation.

## History of the Issue

Providing for and supporting the older generation has always been an indispensable process of the social order and, along with the development of civilization, it required support and intervention from the state. Industrial revolutions of the 18th–19th centuries and development of capitalist relations led to the emergence of new principles in the social policy. Two schools of thought have emerged at that time, including the liberal one and a school with expressed features of paternalism. The liberal school was typical for the countries that have been the first to enter the period of industrial revolutions, such

as Great Britain, United States, and France which, by this time, had a more developed system of social assistance for the poor. Austria-Hungary, Germany, and Russia maintained the serfdom relations for a longer time. As a result, they lagged behind in industrial development and traditionally resorted to large-scale state intervention in the economy. The historic speech of the Chancellor of Germany Otto von Bismarck on November 17, 1881, marked the beginning of public social insurance system in the world. It is known that the model of social insurance of the "Iron Chancellor" resulted from the attempts to contain the socialist sentiment in Germany, "The medicine from social flaws should be sought not only in suppressing social and democratic excesses but, at the same time, in the positive development of the welfare of the working class" [1].

In general, the contemporary pension systems in the world were built on the basis of two classical models, including the one of the German Chancellor Otto von Bismarck and the model of the English economist William Beveridge. The Bismarck model (1881) was based on compulsory insurance contributions by employees and employers, it established a retirement age of 70 years old, and the pensions were paid in cash. William Beveridge (1942) proposed to finance the pensions and other social payments with taxes. This included the establishment of a minimum standard (level) of welfare which, if necessary, should be supported by the state, "The State supplies the bread, the people buy the butter" [2]. The amount of payments was determined regardless of whether the recipient participated in the social insurance system or the amount of his contributions [3].

Today, neither of these classical models of pension provision can be found in real world in its authentic form; their development follows the trends of combinatorics, i.e., combination and integration of various approaches. Depending on a number of criteria, we can systematize and identify the most common models of pension systems. For example, depending on the sources of financing, they can be public, private, mixed with the predominance (addition) of state or private pension provision. Depending on the methods of financing, they can be unfunded, funded, or mixed pension systems. Unfunded pension systems are based on insurance or tax principles [4].

As for Russia, the first foundations of its pension system were laid more than 360 years ago. The change of historical periods and socio-economic formations introduced corresponding modifications to the pension system, which reflected the gradual socialization of society. In Russia, the pension provision initially (under the czars Alexey Mikhailovich and Peter the Great) covered only the military personnel, widows and orphans who lost their breadwinner; the pensions were paid from the czar's treasury and were given for life in recognition of services to the Fatherland. Later, the recipients of the state pensions included the officials and workers of strategic and particularly dangerous professions. The empress Catherine the Great was the first to introduce the retirement age of 60 years old and a seniority of 35 years. Under Nicholas I (1828), a funded pension was introduced in addition to the state unfunded pension. The reign of Alexander II (1868) marked the early development of private pension insurance and the opening of "emerital" (merit-based) and insurance pension funds. The emperor Nicholas II established a fairly progressive pension system that covered a large part of Russia's population. This was accompanied by the emergence of a state system for control and supervision. 1908 marked the completion of first actuarial calculations for the period until 2049 and with the profitability of at least 4 % [4–6].

After the October Revolution, the pension system that was built in Russia over several centuries has been eliminated. 1920 marked the laying of first foundations for the new state pension system. During the Soviet period, the state pension system went through several stages and covered all citizens without exception. It included two types of pensions, such as the labor pensions (old-age pensions, long-service pensions) and social pensions (in case of disability, loss of breadwinner). The main criterion was the labor record. For men, the minimum labor record was 25 years; for women, 20 years [4–6].

Since 2002, Russia started to implement a new stage in the reform of its pension system, which is currently at its peak stage of development.

## Theory and Law

Currently, the pension relations in the Russian Federation are regulated by the laws that include the Federal Laws No. 165-FZ of July 16, 1999 (as amended by No. 250-FZ of July 3, 2016) On the Fundamentals of Compulsory Social Insurance, No. 167-FZ of December 15, 2001 (as amended by No. 456 of December 19, 2016) On Compulsory Pension Insurance in the Russian Federation, No. 400-FZ

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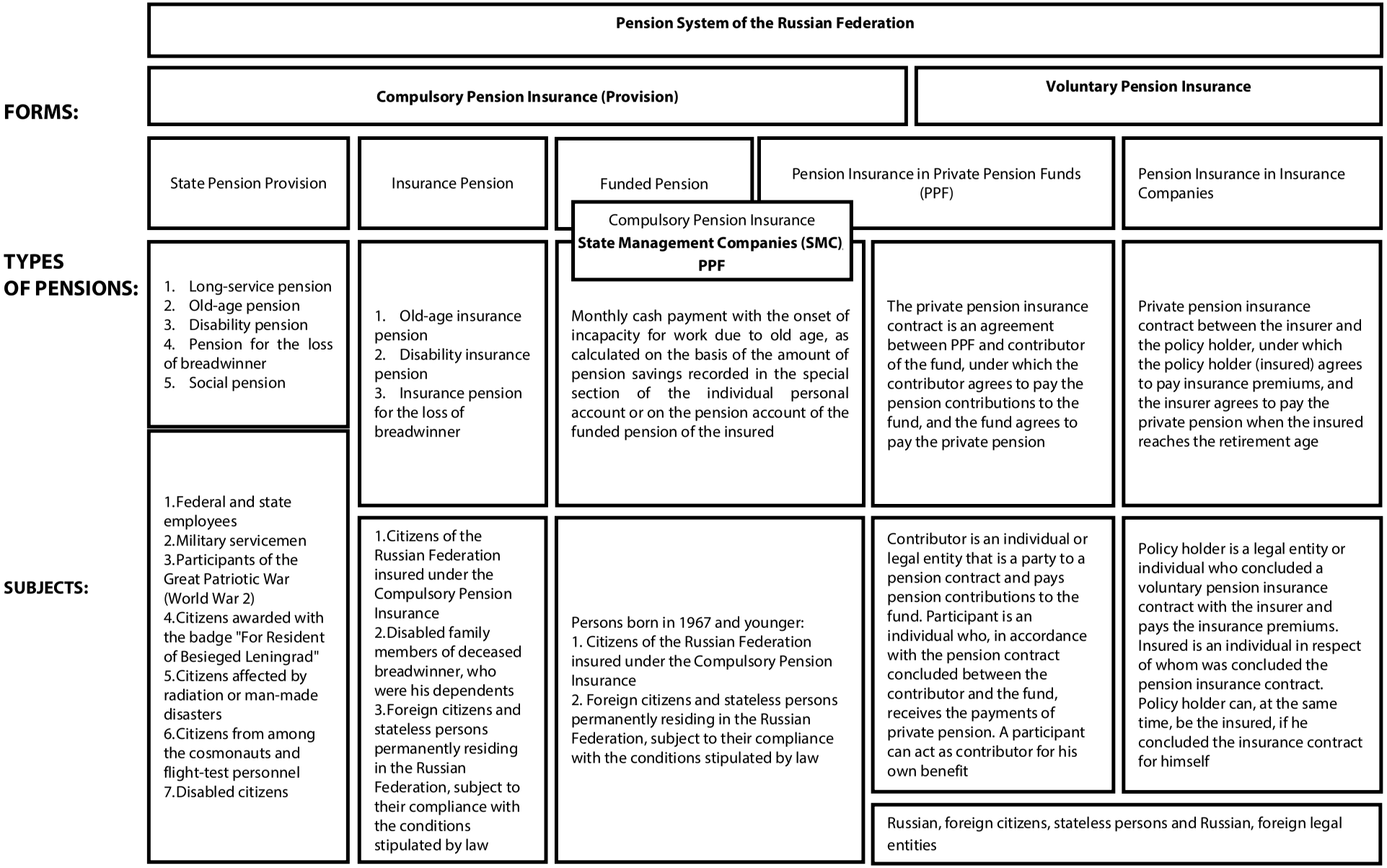


**Fig. 1.** *The pension system of the Russian Federation [prepared in accordance with the Russian laws]*

of December 28, 2013 (as amended by No. 488-FZ of December 19, 2016 ), On Insurance Pensions, No. 166-FZ of December 15, 2001 (as amended by No. 227-FZ of July 3, 2016) On State Pension Provision in the Russian Federation, No. 424-FZ of December 28, 2013 (as amended by No. 143-FZ of May 23, 2016) On Funded Pension, No. 27-FZ of April 1, 1996 (as amended by No. 471 of December 28, 2013) On Individual (Personalized) Accounting in the System of Compulsory Pension Insurance, No. 117-FZ of August 5, 2000 (as amended on April 3, 2017), the Tax Code of the Russian Federation (Part II), Chapter 34 Insurance Contributions, No. 75-FZ of May 7, 1998 (as amended by No. 292-FZ of July 3, 2016) On Private Pension Funds, No. 4015–1 of November 27, 1992 (as amended by No. 363-FZ of July 3, 2016) On Organization of Insurance Business in the Russian Federation, etc.

In accordance with the applicable laws, the contemporary Russian pension system includes compulsory, voluntary pension insurance, state pension provision, insurance and funded pensions (Fig. 1).

Compulsory pension insurance is the system of legal, economic, and organizational measures implemented by the state and aimed at compensating the citizens for earnings (payments to the benefit of the insured) received by them before the establishment of compulsory insurance provision.

Compulsory insurance provision is fulfillment by the insurer (Russian Pension Fund, PFR) of its obligations to the insured in the event of an insured event by paying the insurance pension, funded pension, social benefits for burial of deceased pensioners who were not subject to compulsory social insurance in case of temporary incapacity for work and in connection with maternity as of the day of death.[1]

Voluntary pension insurance is the system of relations for providing the insurance protection at the time of reaching the retirement age with the participation of private pension funds and insurance companies.

By their sources of financing, the pension payments can be divided into state and private payments, where the private pensions can be formed both at the expense of the employer and at the expense of the employee under voluntary pension insurance provided by the insurers and private pension funds (Fig. 2).

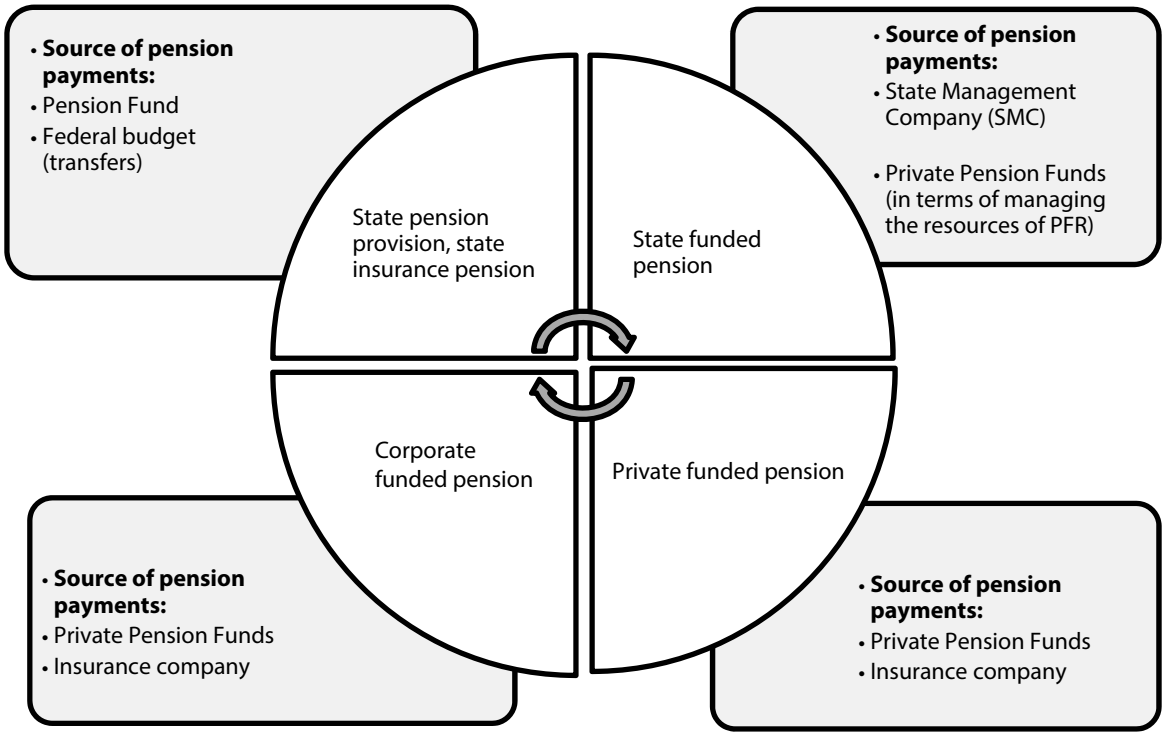


**Fig. 2.** *The sources of financing of the pension system in the Russian Federation*

Therefore, the contemporary pension system of the Russian Federation is a complex and multicomponent substance. From the point of view of the systemic approach, we see it as an open,

[1] On the Fundamentals of Compulsory Social Insurance, No. 167-FZ of December 15, 2001 (as amended by No. 456 of December 19, 2016).

multi-parameter, dynamically changing economic system that has no clear boundaries and is actively interacting with its external environment.

From the standpoint of the process approach, the pension system can be described as a set of interconnected but, at the same time, relatively autonomous socio-economic processes, including demographic, financial, labor, political, and other processes.

When describing the pension system, the concept of "pension risks" takes a central place in the category apparatus. However, this concept is not defined in the Russian laws. There is only the interpretation of "social insurance risk", which is seen as an assumed event, the occurrence of which results in compulsory social insurance,[2] a part of which is pension insurance. In our opinion, this definition does not reflect the complexity of socio-economic processes in the pension system of the Russian Federation. The analysis of publications in this field revealed that most researchers associate the pension risk "with the onset of incapacity for work due to old age or disability" [4, 7–10].

The risk is the quintessence of the pension system. Pension risks are numerous and heterogeneous, they are of complex nature and emerge at the junction of various spheres of life activity, and they have no clearly defined boundaries.

Pension risks simultaneously refer to social, demographic, economic, and financial risks. The identification of pension risks allows us to divide them, primarily, into exogenous and endogenous risks. Exogenous risks include macroeconomic risks, while the endogenous risks include the direct risks of the pension system. In our view, the pension risks represent a fairly specific group of risks that can lead both to the unfavorable and favorable outcome (survival to the retirement age, higher life expectancy, etc.) for various subjects (population, pension fund). Pension risks are also associated with the assessment of income and living standards among pensioners and economically active population (Fig. 3).

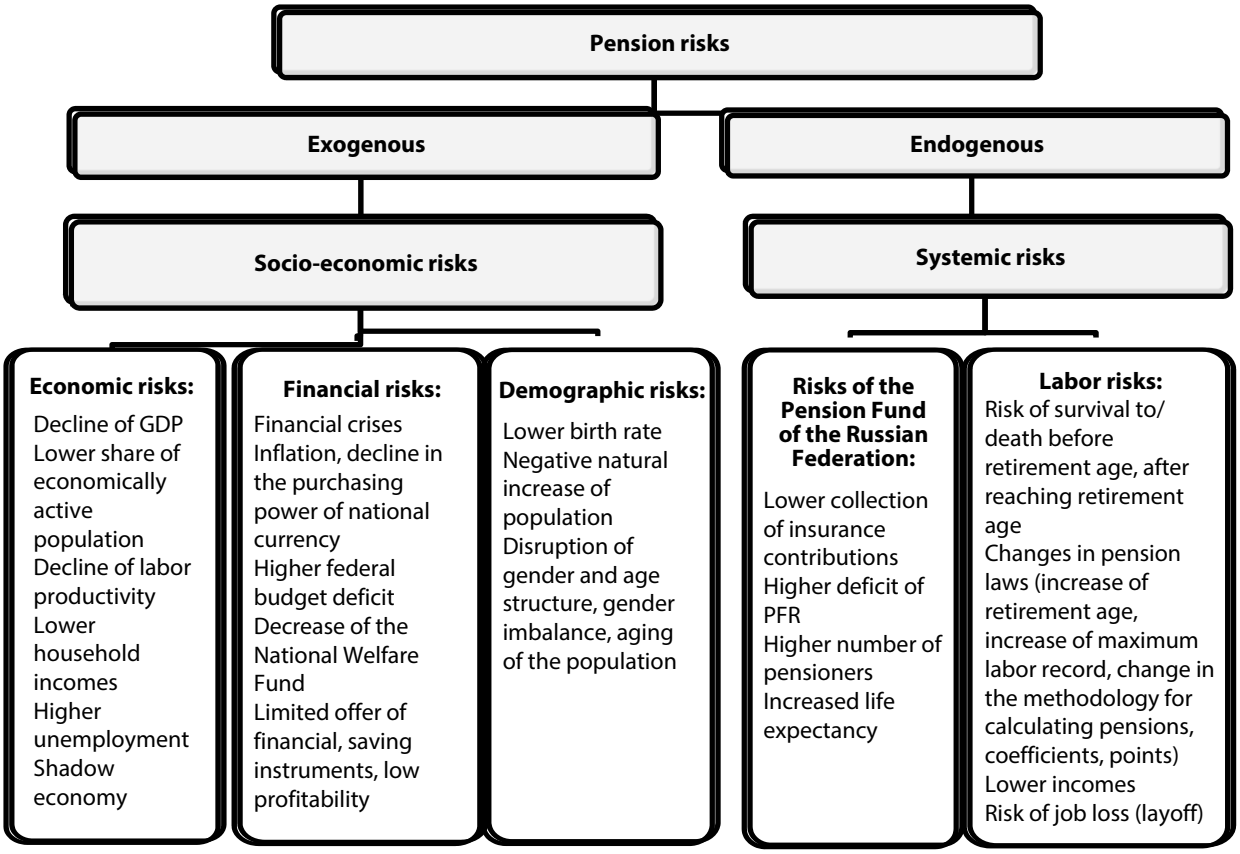


**Fig. 3.** *The classification of pension risks*

The ever changing socio-economic, demographic processes naturally give rise to the problem of objective assessment of pension risks to ensure a timely response, forecasting and adoption of rational decisions. It seems more relevant that, today, the reform of the pension system in the Russian

[2] On the Fundamentals of Compulsory Social Insurance, No. 167-FZ of December 15, 2001 (as amended by No. 456 of December 19, 2016).

Federation should rely on economic and mathematical methods of management based on risk theory and actuarial assessment, rather than on political methods.

## Methods

Given that for the purposes of this article the "actuarial assessment" represents the key concept, we will examine it in more detail and define its substance, basic principles, methodology in relation to pension risks and pension insurance.

In a broad sense, the actuarial assessment means the estimation of risks by using mathematical and statistical methods (actuarial calculations). In the Russian Federation, the actuarial activities and profession of actuary have resumed on the legal basis from January 1, 2015. In accordance with the Federal Law No. 293-FZ of November 2, 2013, the "actuarial activities are the activities for the analysis and quantitative, financial assessment of risks and/or risk-related financial obligations, as well as the development and assessment of the effectiveness of methods used for financial risk management; the actuarial assessment is the type of actuarial activities for the analysis and quantitative, financial assessment of risks and/or risk-related financial obligations, which results in the actuarial opinion". In accordance with Article 3 of this law, the actuarial assessment is compulsory for the authorized body in elaborating the insurance tariffs for compulsory insurance, private pension funds, insurance companies, except for insurance medical organizations involved exclusively in compulsory medical insurance and mutual insurance companies.[3] These subjects were traditionally performing the actuarial calculations and have accumulated some experience of actuarial assessment.

Since the Russian Pension Fund is not among the compulsory subjects of actuarial assessment, there are no uniform methodological approaches and federal standards of assessment with regard to the state pension insurance system. That is why today the risks of the pension system are being assessed by individual institutions and individual experts, of whom we should first of all mention V. Baskakov, A. Budko, A. Lelchuk, D. Pomazkin, A. Solovyov [1113].

The analysis of methods used for assessing the pension risks has shown that there is a sufficient methodological base for actuarial assessment. The existing methodologies differ by sets of indicators and preference for individual risks and threats to the Russian pension system. In our opinion, a drawback of methodological base used for actuarial assessment is the lack of methodological uniformity in political, economic, and social approaches to the assessment of the pension system. This can be explained by the fact that actuarial assessment of pension risks is a complex process of interdisciplinary nature, which requires a comprehensive systemic approach to the assessment.

The algorithm of full actuarial assessment of pension risks can be divided into stages (Fig. 4).

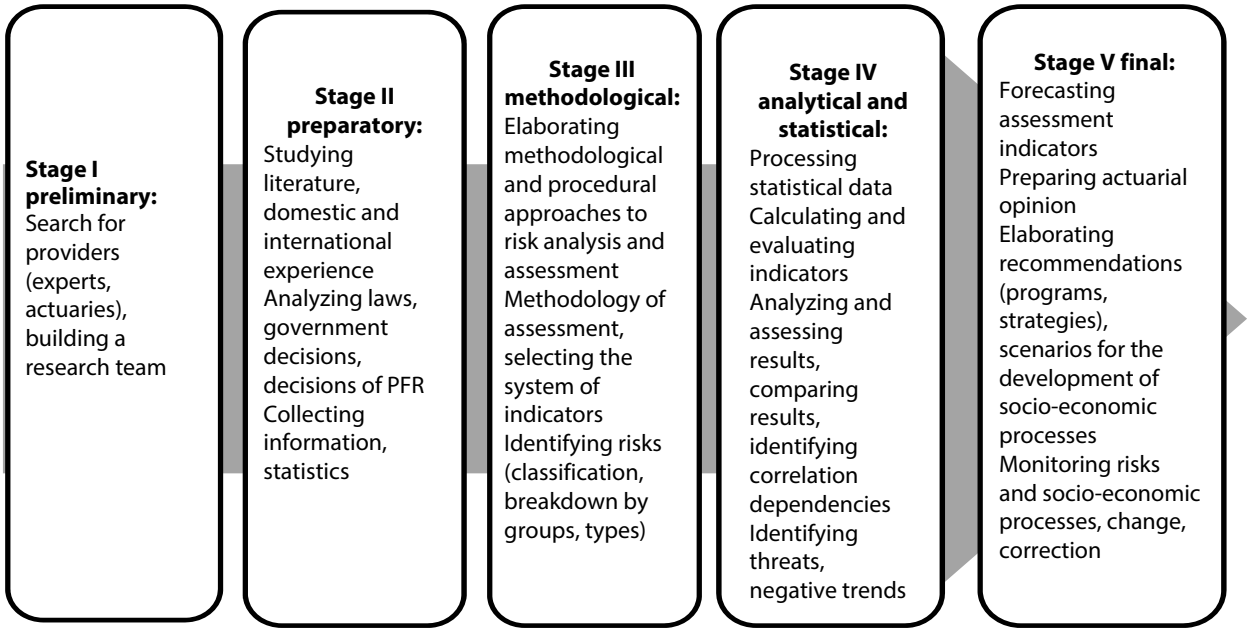


**Fig. 4.** *The algorithm of actuarial assessment of pension risks*

[3] On Actuarial Activities in the Russian Federation, No. 293-FZ of November 2, 2013 (as amended by No. 194-FZ of June 23, 2016).

Table 1

**The indicators for assessing the risks of the pension system**

| No. | Indicator, unit of measurement | Calculation |
|---|---|---|
| | *Demographic risks* | |
| 1. | Population, million people:<br>— Population change | <br>ΔGrowth/Reduction rate; dynamics by years |
| 2. | Indicators of the natural movement of population:<br>— Born, thousand people<br>— Deceased, thousand people<br>— Birth rate per 1000 people<br>— Mortality per 1000 people<br>— Natural increase (decrease) | <br>(+) Increase / (–) Decrease<br>(+) Increase / (–) Decrease<br>$K_{b/d}$ = (*Number of Born / Deceased*) / 1000<br>*E = Number of Born – Number of Deceased;* $E = K_{born} - K_{deceased}$<br>ΔGrowth/Reduction rate; dynamics by years |
| 3. | Average life expectancy, years | ΔGrowth/Reduction rate; dynamics by years |
| 4. | Risk of survival to retirement age, % | $E_x = \frac{l_{x+n}}{l_x} \times 100$<br>$l_x$ = Number of people at the age of entering the labor force;<br>$l_{x+n}$ = Number of people at retirement age (women $l_{55}$, men $l_{60}$);<br>$n$ = Labor record. |
| 5. | Risk of death (before the retirement age), % | $A_x = \frac{\sum d_x + d_{x+1} + \ldots + d_{x+n-1}}{l_x} \times 100$<br>$l_x$ = Number of people at the age of entering the labor force;<br>$d_x$ = Number of people dying during the transition from age $x$ to age $x + 1$;<br>$d_{x+n-1}$ = Number of people dying at the retirement age (women $l_{55}$, men $l_{60}$). |
| 6. | Average life expectancy after retirement, years | $E_w^x = \frac{\sum l_x + l_{x+1} + \ldots l_w}{l_x}$<br>For explanation of symbols, please see above |
| 7. | Number (share) of pensioners, people:<br>— Recipients of old-age pensions<br>— Recipients of disability pensions<br>— Pensions for the loss of breadwinner<br>— state employees, etc. | ΔGrowth/Reduction rate; dynamics by years |
| 8. | Share of working pensioners, % | $Share = \frac{Working\ pensioners}{Total\ pensioners} \times 100$ |
| | *Socio-economic risks* | |
| 9. | GDP, trillion rubles. | ΔGrowth/Reduction rate; dynamics by years |
| 10. | Industrial production index, % | ΔGrowth/Reduction rate; dynamics by years |
| 11. | Inflation rate, % | ΔGrowth/Reduction rate; dynamics by years |
| 12. | Household incomes, trillion rubles | ΔGrowth/Reduction rate; dynamics by years |
| 13. | Average wages, rubles | ΔGrowth/Reduction rate; dynamics by years |
| 14. | Average pension (old-age), rubles | ΔGrowth/Reduction rate; dynamics by years |
| 15. | Subsistence level, rubles | ΔGrowth/Reduction rate; dynamics by years |
| 16. | Number (share) of economically active population, people | ΔGrowth/Reduction rate; dynamics by years |
| 17. | Number (share) of employed in the economy, people | ΔGrowth/Reduction rate; dynamics by years |
| 18. | Number (share) of pensioners, people | ΔGrowth/Reduction rate; dynamics by years |
| 19. | Number (share) of self-employed, people | ΔGrowth/Reduction rate; dynamics by years |

| | | |
|---|---|---|
| 20. | Share of shadow economy in GDP, %<br>— "Hidden" labor remuneration, rubles | $Share = \frac{Shadow\ economy}{GDP} \times 100$<br>$Share\ of\ hidden\ wages = \frac{Hidden\ wages}{Payroll\ fund} \times 100$ |
| *Financial risks* | | |
| 21. | PFR revenues, million rubles | ΔGrowth/Reduction rate; dynamics by years |
| 22. | PFR expenditures, million rubles | ΔGrowth/Reduction rate; dynamics by years |
| 23. | Deficit/surplus of PFR, million rubles<br>Share of deficit/surplus of PFR, % | ΔGrowth/Reduction rate; dynamics by years<br>$Share = \frac{Revenues - Expenditures}{Revenues} \times 100$ |
| 24. | Transfers from federal budget, million rubles:<br>— Share of transfers from federal budget in PFR expenditures,% | $Share = \frac{Transfers\ from\ federal\ budget}{Budget\ of\ PFR} \times 100$ |
| 25. | Deficit (share) of the federal budget, million rubles | ΔGrowth/Reduction rate; dynamics by years |
| 26. | Russian National Wealth Fund, million rubles | ΔGrowth/Reduction rate; . dynamics by years |
| 27. | Share of deficit of PFR and Russian National Wealth Fund, % | $Share = \frac{Deficit\ of\ PFR}{NWF} \times 100$ |
| 28. | Average profitability of State Management Companies, % | ΔGrowth/Reduction rate; dynamics by years |
| 29. | Average profitability of PPF, % | ΔGrowth/Reduction rate; dynamics by years |
| 30. | Average profitability of voluntary pension insurance in insurance companies, % | ΔGrowth/Reduction rate; dynamics by years |
| *Labor risks* | | |
| 31. | Compulsory insurance labor record for obtaining insurance pension | Established by law:<br>No less than 15 years* |
| 32. | Pension insurance record | Period of payment of insurance contributions to PFR |
| 33. | Individual pension coefficient | Maximum pension coefficient and the calculation of individual coefficient are established by law |
| 34. | Amount of insurance contributions to PFR | Insurance tariffs (basic tariff, without benefits) 22.0 %.<br>Maximum amount of the employee's wage is 796 thousand rubles; a tariff of 10 % is applied to the sum in excess of that amount.<br>Increase of the insurance tariff from 2019** |
| 35. | Retirement age | Established by law:<br>Women: 55 years old; men: 60 years old |

* On Insurance Pensions No. 166-FZ of December 15, 2001 (as amended by No. 227-FZ of July 3, 2016).

** The Tax Code of the Russian Federation (Part Two) No. 117-FZ of August 5, 2000 (as amended by No. 58-FZ of April 3, 2017).

The methodological approach to the actuarial assessment of pension risks proposed by the authors is based on the analysis and evaluation of the correlation between social, demographic, economic, and financial risks of the pension system:

1. Selection of indicators to assess the risks of the pension system (Table 1).

2. Evaluation of the correlation between social, demographic, economic, and financial risks of the pension system, identification of relevant risks, main threats to the Russian pension system.

In theory and practice, the assessment of risks involves the use of several methodological approaches:

— Statistical method of assessment;
— Method of expert evaluation;
— Use of analogs;
— Combined method.

The preferred and most accurate approach is the statistical method where the approaches of probability theory and mathematical statistics are used to assess the risk through the indicators of variance, standard deviation, coefficient of variation, and correlation. The advantage of this method of risk assessment is the simplicity of mathematical calculations, while the downside is the need for a large amount of statistical data (the larger the array, the more reliable is the risk assessment).

## Obtained results

In this article, we will test the assessment of pension risks which, in the opinion of authors and many experts [12–17], are the most significant both for the global and Russian pension systems.

First of all, this includes the increase in the number and share of pensioners. Currently, 42.9 million people are registered with the PFR in the Russian Federation, 83.2 % of whom receive the old-age pension (Fig. 5).[4]

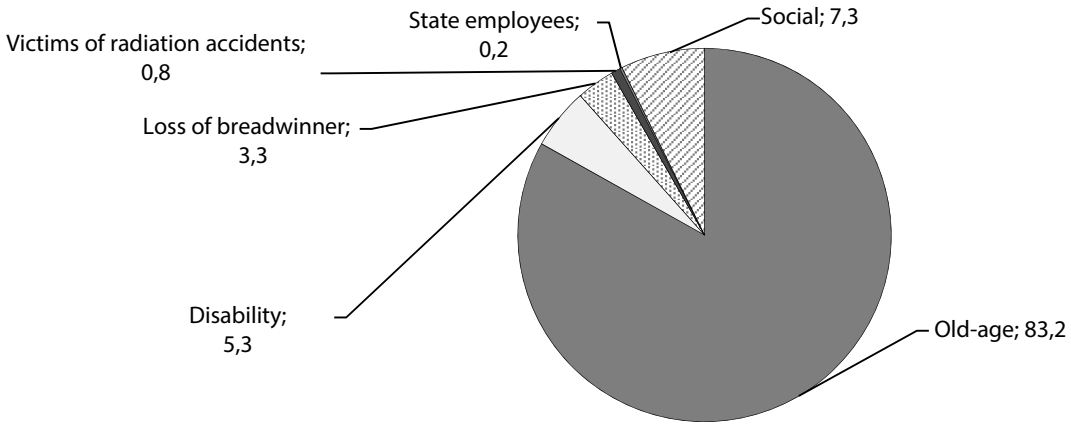


**Fig. 5.** *Structure of pensions in the Russian Federation, 2016 (SourceÖ The Pension Fund of the Russian Federation [Electronic resource]. URL. http://www.pfrf.ru/ (Access date: May 31, 2017))*

The risk of a higher number of pensioners can be described by a number of demographic processes, such as the aging of the population, negative dynamics of fertility, higher life expectancy. 2016 broke the absolute record for the entire history of Russia, as the average life expectancy reached 72.1 years (women: 77.3 years, men: 67 years), and increased by 1.5 times since 1960.[5]

Table 2

**Ratio of working-age population and pensioners, thousand people, %**

| Indicator | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| Labor force | 75,477.9 | 75,779.0 | 75,676.1 | 75,528.9 | 75,428.4 | 76,587.5 | 76,636.1 |
| % to previous year | — | 100.4 | 99.9 | 99.8 | 99.9 | 101.5 | 100.1 |
| Number of employed in the economy | 69,933.7 | 70,856.6 | 71,545.4 | 71,391.5 | 71,539.0 | 72,323.6 | 72,392.6 |
| Number of unemployed | 5,544.2 | 4,922.4 | 4,130.7 | 4,137.4 | 3,889.4 | 4,263.9 | 4,243.5 |
| Number of pensioners | 41,144 | 41,819 | 42,367 | 42,837 | 43,327 | 43,797 | 45,182 |
| % to previous year | 101.6 | 101.1 | 101.0 | 101.1 | 101.1 | 101.4 | 103.2 |
| Ratio of pensioners to labor force, % | 54.5 | 55.2 | 56.0 | 56.7 | 57.4 | 57.2 | 58.9 |
| Ratio of pensioners to employed in the economy, % | 58.8 | 59.0 | 59.2 | 60.0 | 60.6 | 60.6 | 62.4 |

[*] Prepared in accordance with the data of the Federal State Statistics Service. Retrieved from: http://www.gks.ru (date of access: May 3, 2017).

[4] Pensionnyy fond Rossiyskoy Federatsii [The Pension Fund of the Russian Federation]. Retrieved from: http://www.pfrf.ru/ (date of access: May 31, 2017). (In Russ.)

[5] Fderalnaya sluzhba gosudarstvennoy statistiki [Federal State Statistics Service]. Retrieved from: http://www.gks.ru (date of access: May 3, 2017).

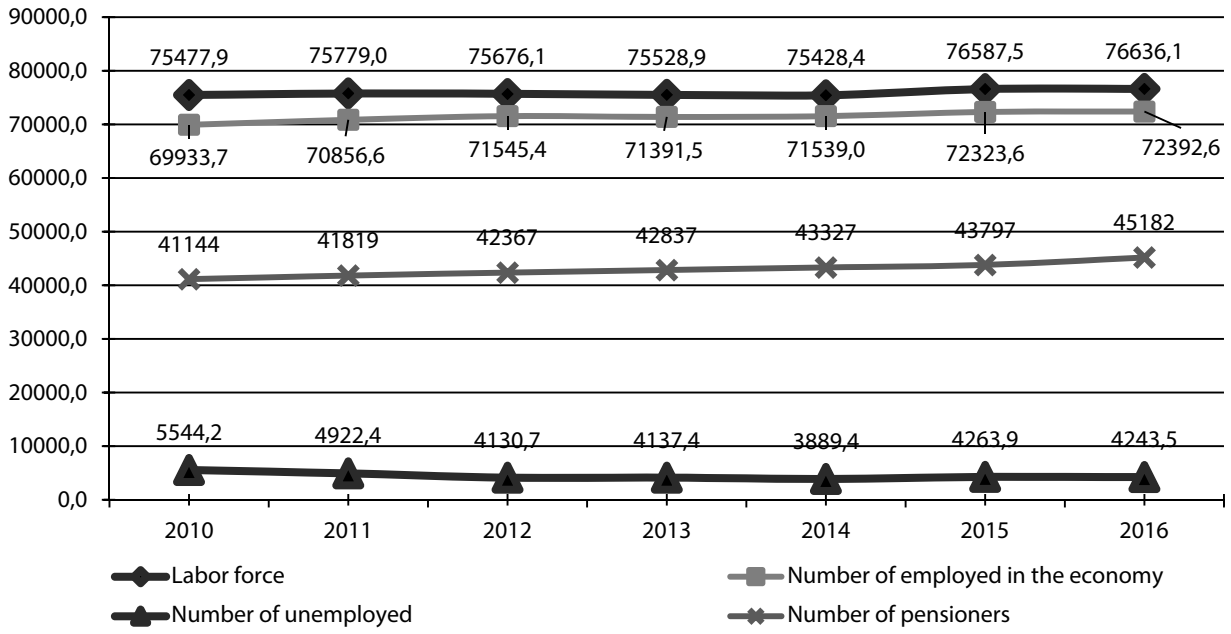


**Fig. 6.** *Population structure of the Russian Federation, thousand people (Source: Federal State Statistics Service [Electronic resource]. URL: http://www.gks.ru (Access date: May 3, 2017))*

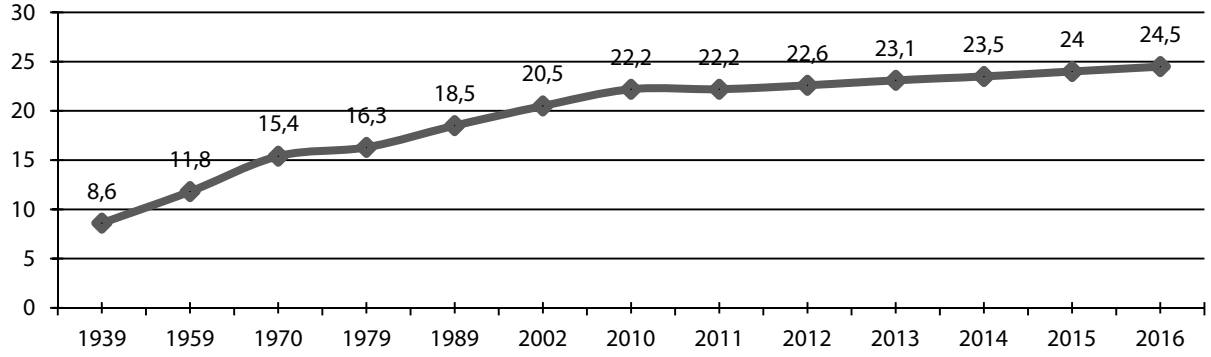


**Fig. 7.** *Share of population over working age, %*
*Men aged 60 years and older, women aged 55 years and older (Source: Federal State Statistics Service [Electronic resource]. URL: http://www.gks.ru (Access date: May 3, 2017))*

However, a substantial threat to the stability of the pension system is not the growth in the number of pensioners per se, but the faster growth of the number and share of pensioners compared to economically active population (Table 2, Fig. 6–7).

The initial analysis (Table 2, Fig. 6–7) showed that, so far, the positive dynamics in the number and share of pensioners in Russia is not critical, the growth rate of the number of pensioners slightly exceeds the change in the number of labor force and population employed in the economy; in 2016, these figures were 1.1 % and 3.1 %, respectively.

The problems of aging, first of all, affect the financial indicators and financial sustainability of the pension system. It is obvious that increasing life expectancy and aging of the population will lead to reduction of pensions and lower replacement rate (Fig. 8, Table 3).

After joining OECD in 2012, Russia must, among other things, with the requirements of the International Labor Organization (ILO) for the replacement rate. Under the Convention 102, the

Table 3

**Replacement rate in the Russian Federation, %**

| Indicator | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| Ratio of pension to subsistence level, % | 165.4 | 163 | 176.5 | 165.4 | 163 | 150.5 | 137.2 |
| Replacement rate (pension/average wage), % | 35.7 | 35.1 | 33.9 | 33.3 | 33.2 | 35.3 | 34.2 |

* Prepared in accordance with the data of the Federal State Statistics Service [Electronic resource]. URL: http://www.gks.ru (Access date: May 3, 2017).

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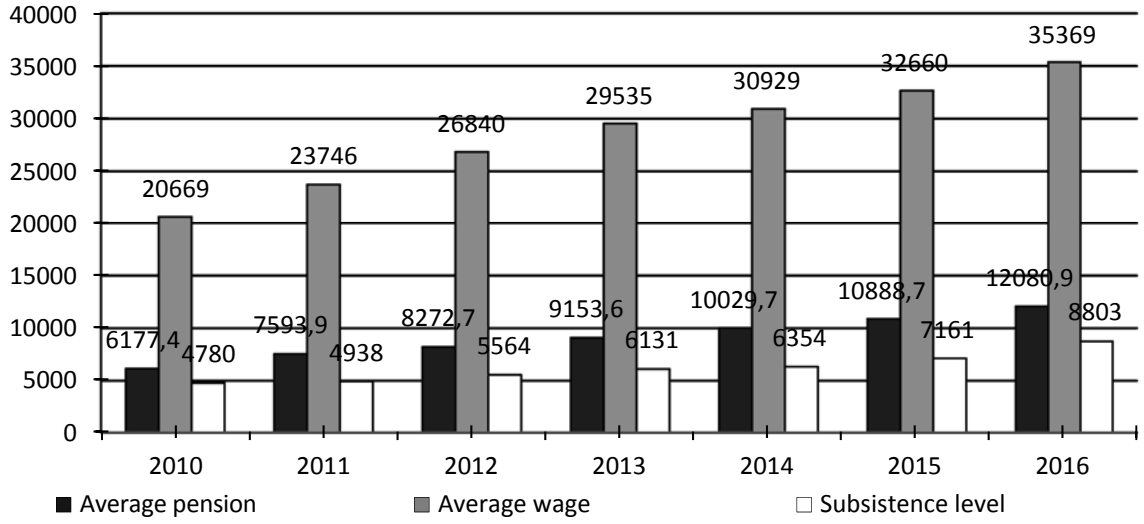


**Fig. 8.** *The dynamics of average wages, pensions, and subsistence level in the Russian Federation, rubles (Source: Federal State Statistics Service [Electronic resource]. URL: http://www.gks.ru (Access date: May 3, 2017))*

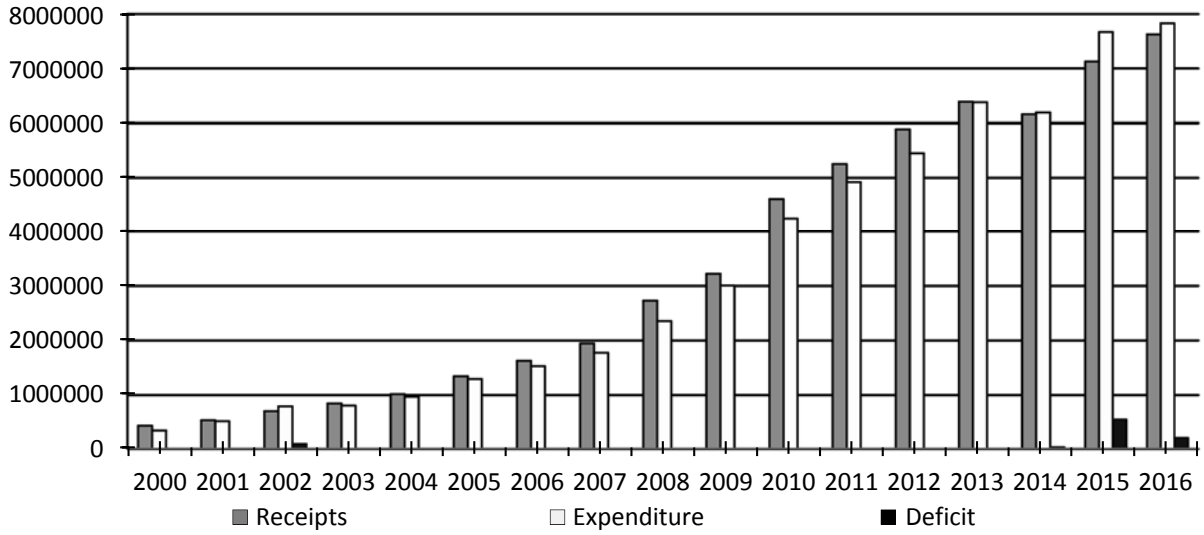


**Fig. 9.** *Revenues, expenditures, deficit/surplus of the Russian Pension Fund, million rubles (Source: Federal State Statistics Service [Electronic resource]. URL: http://www.gks.ru (Access date: May 31, 2017))*

replacement rate should be at least 40 % of the average wage level. In Russia, in 2016, it was 34.2 % (Table 3) (although in some Russian regions and sectors with low wages, it exceeds 50 % and, in some cases, even reaches 80 %).

The most "simple" way to solve the problems of population aging is to increase the financing of the pension system. Let's assess the financial risks and financial capacity of the Russian Pension Fund (Fig. 9).

The analysis of revenues and expenditures of PFR showed that, in the reviewed period, since 2000, PFR had deficit only in 2002 and in the past three years (2014–2016); and, by the end of 2016, the deficit decreased by 37.6 % and stands at only 2.6 % of PFR expenditures. An important issue for assessing the financial sustainability of the pension system is the ratio of sources of receipts to the pension fund. The receipts of PFR are generated by insurance contributions and transfers from the Federal Budget (Fig. 10).

During the reviewed period of 2000–2016, the ratio of these sources has changed. From 2006 to 2010, the share of receipts from the federal budget exceeded the share of insurance contributions (at that time, the Uniform Social Tax, UST); from 2012, the share of transfers is declining; and, in 2016, it was 44 % of all receipts of PFR. We should bear in mind that the share of old-age pensions is 82.3 % (Fig. 5), the payments of maternity capital, social pensions to state employees and others are financed from the federal budget; therefore, the share of federal funds allocated to support the Russian

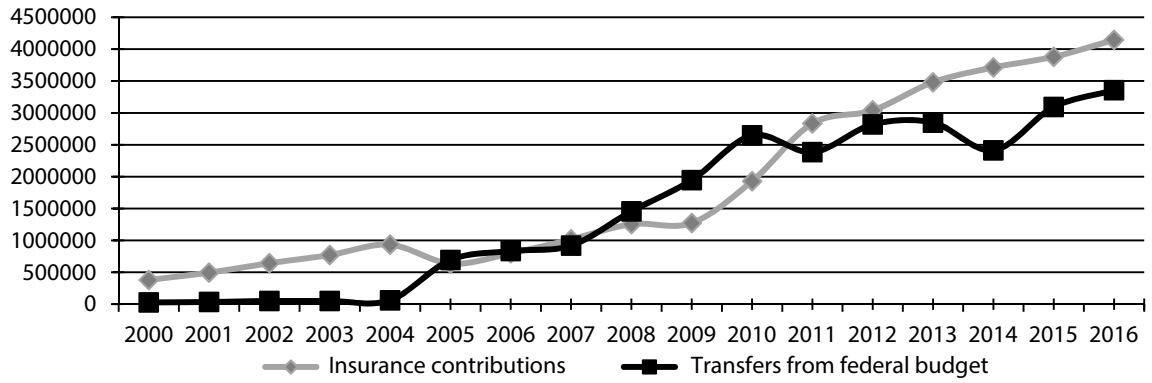


**Fig. 10.** *The ratio of PFR receipts: insurance contributions, transfers from the federal budget, million rubles (Source: Federal State Statistics Service [Electronic resource]. URL: http://www.gks.ru (Access date: May 31, 2017))*

pension system in 2016 was about 1,902,561 million rubles, which corresponds to 24.3 % of all PFR expenditures.[6]

When assessing the risks to the financial sustainability of the Russian pension system, we need to mention the National Welfare Fund (NWF), which is "part of the federal budget funds. The Fund is meant to become a part of the stable arrangement for the long-term pension provision to the citizens of the Russian Federation. The goals of the National Welfare Fund are to ensure co-financing of voluntary pension savings of citizens of the Russian Federation and ensure a balance (covering the deficit) of the budget of the Pension Fund of the Russian Federation."[7] The formation of the Fund began in 2008 as following the division of the Stabilization Fund into the Reserve Fund and the National Welfare Fund (Table 4).

Table 4

**Amount of National Welfare Fund (NWF), billion rubles**

| Date | Amount of funds, billion rubles | % of GDP | Deficit of PFR, billion rubles |
|---|---|---|---|
| 01.01.2017 | 4359.16 | 5.0 | 204.425 |
| 01.01.2016 | 5227.18 | 6.1 | 543.636 |
| 01.01.2015 | 4388.09 | 5.3 | 31.063 |
| 01.01.2014 | 2900.64 | 4.1 | — |
| 01.01.2013 | 2690.63 | 4.0 | — |
| 01.01.2012 | 2794.43 | 4.7 | — |

The Ministry of Finance of the Russian Federation. Retrieved from: http://minfin.ru/.

NWF is a "pillow of financial security", the insurance fund of the Russian pension system; as can be seen in the Table. 5, its amount exceeds by many times the deficit of the Russian Pension Fund. The funds of the National Welfare Fund are managed by the Russian Ministry of Finance, and some management powers can be exercised by the Bank of Russia. The resources of the NWF is placed on deposits with the Bank of Russia, the State Corporation "Bank for Development and Foreign Economic Affairs (Vnesheconombank)", in debt obligations of foreign banks and states, and other assets. "The goals of managing the resources of the National Welfare Fund are to ensure the safety of the Fund's resources and the stable level of long-term income from their placement"[8] for future payments of pension savings to citizens.

Today, the "reform of the institution of the funded component of the pension system" is designated as one of the main areas of the state policy in the Russian Federation.[9] The results of analysis and assessment of risks for the funded component allowed us to conclude that the development of funded component in the system of compulsory state pension insurance in Russia is in its infancy. For example, according to the PFR, in 2016, only 1.3 million people. (3 % of pensioners) receive the payments from

[6] Calculations based on: Federal State Statistics Service. Retrieved from: http://www.gks.ru (date of access: May 31, 2017).

[7] The Ministry of Finance of the Russian Federation (http://minfin.ru/).

[8] The Ministry of Finance of the Russian Federation. Retrieved from: http://minfin.ru/.

[9] On the approval of the Strategy for the long-term development of the pension system of the Russian Federation. Approved by the Order of the Government of the Russian Federation No. 2524-P of December 25, 2012.

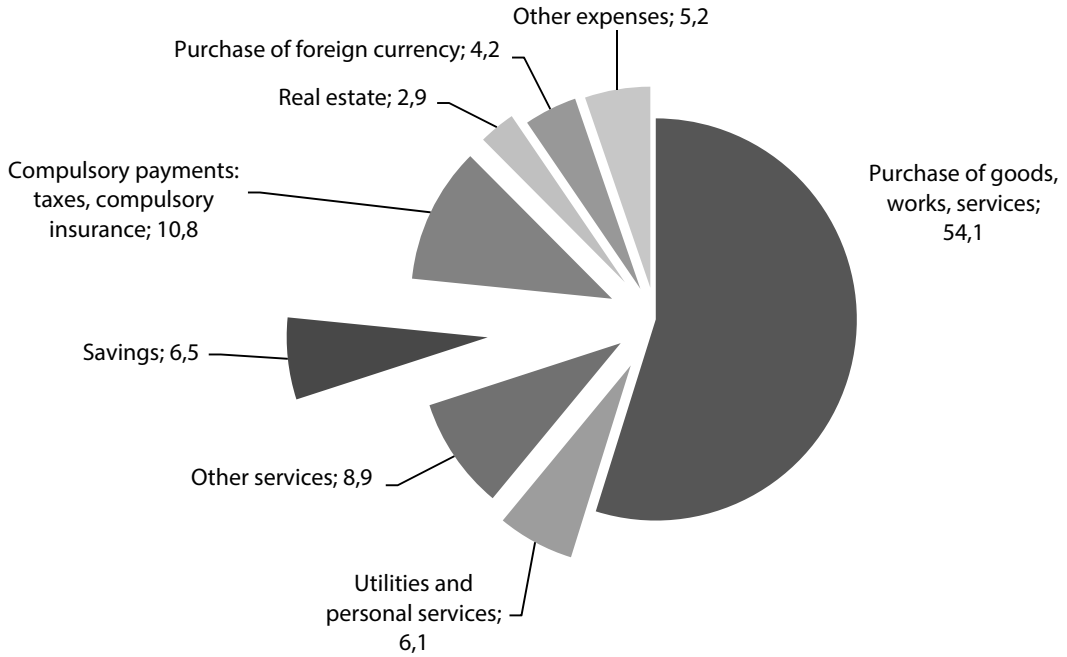


**Fig. 11.** *The structure of household expenditure in the Russian Federation in 2015, % (Source: Federal State Statistics Service [Electronic resource]. URL: http://www.gks.ru (Access date: May 31, 2017))*

pension savings. The average amount of funded pension is 802 rubles, and the average investment return on pension savings is 14.2 %.[10] This insignificant result has its objective and subjective causes. The objective causes are determined by the fact that the funded component was introduced only in 2002; subjective causes include the limited choice of funded instruments, low incomes, and low financial culture. In household expenditure, the share of all savings is 6.5 %, of which the overwhelming part (4.9 %) are bank deposits (Fig. 11).

In addition, a threat to the development of funded pension system is posed by the risks of stratification and impoverishment of the population. According to Federal State Statistics Service, in 2016, the average salary in Russia was 36,703 rubles. At the same time, more than half (55 %) of working citizens of the Russian Federation earn less than 25,000 rubles a month, and 30 % of the working-age population have a salary below 15,000 rubles. According to official statistics, in 2016, 19.3 million Russians, or one out of seven, lived below the poverty line. Their incomes did not exceed the subsistence level which, in 2016, was 10,678 rubles for working-age individuals and 8136 rubles for pensioners.[11]

A significant threat to the financial sustainability of PFR and the Russian pension system is posed by the high share of the shadow economy. According to the Head of the Federal State Statistics Service A. Surinov, "on average, the share of the shadow economy in Russia is 10–14 %. At the same time, the shadow economy involves millions of hired workers. For example, in agriculture, the figure is 50 %, because there are personal subsidiary farms. In operations with real estate, the figure is 50 %, these are people renting their apartments. In trade, the figure is approximately 10–11 %; in construction, about 16–18 %; in education, about 5–6 %, mostly in the area of tutoring".[12] According to the estimates of some experts, the ratio of hidden wages to the payroll in 2014 was 58.48 %, which is 14.4 % of GDP (79,199.7 billion rubles) [9,14]. It is estimated that PFR did not receive more than 2.5 billion rubles in insurance contributions, which corresponds to 10 % of the deficit in the PFR for 2016 (Fig. 8).

## Conclusion

The results of the analysis suggest the following conclusions. The main risks posing serious threats to the Russian pension system are as follows:

— Demographic risks (population aging, higher life expectancy);
— Financial risks (financial sustainability of PFR);
— Macroeconomic risks (lower household incomes, a high share of shadow economy).

[10] The Pension Fund of the Russian Federation. Retrieved from: http://www.pfrf.ru/ (date of access: May 31, 2017).

[11] Calculations based on: Federal State Statistics Service. Retrieved from: http://www.gks.ru (date of access: May 3, 2017).

[12] Federal State Statistics Service. Retrieved from: http://www.gks.ru (date of access: May 3, 2017).

It should be noted that the Russian pension system in general and financial condition of PFR, in particular, are currently not in a critical state, and they have a substantial financial reserve, as evidenced by the resources accumulated in the National Welfare Fund. It is expected that, in 2017, the situation with the collection of insurance contributions to the pension fund will improve following the transfer of powers to administer insurance contributions for compulsory pension, social and health insurance to the tax authorities.

In this case, we view the sustainability of the pension system in a narrow sense as the performance of short-term obligations. However, the nature of pension risks implies a long-term time horizon, which includes labor record and the period in retirement. In that case, the Russian pension system requires urgent strategic reforms.

Raising the retirement age and increasing insurance contributions, as proposed by most reformers, will not only fail to save, but amid the stagnant economy, will harm, and lead to higher unemployment, a larger share of the shadow economy and negative social sentiments among the public.

The reform of the pension system should not be an isolated process, but part of reforming the economy in general, an effect, rather than the cause of socio-economic processes in society.

In our view, the contemporary model of pension provision is designed to address two equally important tasks:

1) To ensure the fulfillment of the state's obligations to today's pensioners, whose employment began in the USSR, including the inflation risks;

2) To guarantee the economically active population the level of income for generating their future pension savings.

The purpose of building a new model of pension insurance is to achieve an optimal balance between such two basic principles, as ensuring the social justice and integrating the funded element into it.

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Translation

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