Russian Pension Model Update

Contents

Introduction

This paper is a follow up to the 2002 World Bank report "The Pension System in Russia: Structure and Implementation", which analyzed the transition from the PAYGO principle to the notional defined contribution (NDC) scheme, and the introduction of the funded pillar. The report discussed three basic scenarios with different macroeconomic assumptions, provided projections for different scenarios of economic development and reviewed financial sustainability of the funded component.

Since 2002 several significant changes were introduced and among those most important are the introduction of the new tariff of the unified social tax (UST) and changes in eligibility to participate in the funded pillar. The UST rate was decreased starting with 2005. The law stipulates reduction of the maximum UST rate from 35.6 % to 26 % including sharp drop of the base part contribution rate from 14 % to 6 % and a change in this tax regressive scale. The pension fund contribution rate is to be reduced by 8 percentage points. Besides, following the government proposal, citizens born before 1967 are not eligible anymore to contribute to the funded pillar. Dropout of individuals older then 38 from the funded part starting in 2005 is accompanied by a smoother than initially planed increase of the funded part contribution rate for those remaining in the funded part (reaching 6 % only by 2008 instead of originally planned 2006).

Therefore the purpose of this study is to determine the impact of the recent tax and eligibility changes on volumes of financial flows, pension system balance and basic indicators (retirement age, benefits to the minimum subsistence level ratio, etc.) of the pension system.

One of the key issues of the pension system today is a low replacement rate. This is caused primarily by a large gap between the formal payroll and the total income part of which is not taxed. If average pension benefit is compared with average household income rather then with average wage registered by the Rosstat, the formal replacement rate drops 1.5 - 2 times. The proposed UST reform is to encourage reduction of the "shadow" part of the payroll. Given that in the new macroeconomic forecast the wage growth rate is projected to be higher than it was projected before, this step is expected to result in growth of revenues of the pension system. One of the objectives of this paper is to estimate to what extent the revenues lost due to the contribution rate reduction, may be offset by the growing share of taxed payroll in the GDP and what might be the system deficit in this case. Specialists argue that pension system budget deficit that results from the contribution rate reduction can be compensated by a high rate of growth of the GDP, real wage and, consequently, of revenues of the Pension Fund of Russia. The deficit will be reduced if pension benefit growth rate lags behind the wage growth rate. However, if growth rates stall, the deficit will not decrease. A higher-risk scenario to consider a slower pace of economic growth was discussed in order to evaluate the financial sustainability of the pension system in such case.

Objectives of the Study

Given the changes that had occurred both in macroeconomic situation as well as in the pension system related legislation, the objectives of this study are set as follows:

1. To assess the pension system financial flows in the new macroeconomic environment
2. To estimate the pension system budget deficit and identify the taxable income growth required to offset the deficit.
3. To determine the payroll growth rate which could compensate for the revenues lost due to the contribution rate reduction
4. To compare the outcomes of the 2002 set of projections with new monitoring data.
5. To forecast indexation pace and develop an equilibrium indexation line.
6. Develop a scheme to monitor financial flows.
7. Produce a CD.

2002 Model Version and Revisions Made

The projections presented in this report are based on the model developed by the IAIAC[1] in 2001 - 2002. This model was updated and some additional options were added. First, the growth rate of the minimum subsistence level and pension benefit indexation could be determined both based on statistical or projected data and on the weight-based index formula, - this is convenient for model calibration for years 2002-2004. An option was added which allow to compare trends in main indicators, numbers of contributors and beneficiaries, contribution flows constructed on the basis of statistical data and budget indicators of the Pension Fund of Russia against simulation results for the first years of the forecast. This procedure in the report is referred to as "The

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[1] Independent Actuarial Information and Analysis Center

Financial Flows Monitoring Scheme". A graphic presentation format is added that allows to present outcomes as bar charts.

Experience of economic and mathematic simulations suggests that multimedia technologies are best suited for data construction and updating; they could cover a large set of statistical data, assumptions used for interfacing the primary data and simulation results, arranged in the form of a report, a set of charts and tables. Therefore the findings of this paper are also presented on a CD.

Adjustment of Demographic and Macroeconomic Projections

The basic forecasts used in this study are demographic and macroeconomic forecasts. The basic parameters of the demographic projection developed by the CHDE[2] and updated according to the 2002 census data are shown in Table 1.

Under new scenarios, the maximum birth rate was increased to 1.45 in 2050, which resulted an increase of population by 10 million in 2050 as compared with the previous report results. Despite the fact that share of the elderly equals to 0.7 in 2050 and thus significantly differs from the value obtained in the previous projection (0.93), the difference in the dependency ratio is smaller: 0.99 and 1.1, respectively.

Table 1. Base Scenario. Demographic Projection

	2003	2004	2005	2006	2007	2008	2009	2010	2020	2030	2040	2050
Birth rate	1.31	1.33	1.35	1.37	1.38	1.38	1.39	1.40	1.45	1.45	1.45	1.45
Life expectancy	66.6	66.8	67.0	67.1	67.1	67.2	67.2	67.2	68.3	69.5	70.6	71.8
men	60.3	60.7	60.9	61.1	61.2	61.3	61.3	61.3	62.5	63.8	65.0	66.3
women	73	73	73	73	73	73	73	73	74	76	77	78
General population, million	145	145	144	143	143	142	142	141	134	124	113	103
men	68	67	67	67	66	66	66	66	62	57	51	47
women	77	77	77	77	76	76	76	76	72	67	62	56
Number of immigrants, million	0.23	0.22	0.21	0.20	0.19	0.19	0.18	0.18	0.13	0.13	0.13	0.12
Number of emigrants, million	0.11	0.10	0.09	0.08	0.07	0.07	0.06	0.06	0.04	0.04	0.04	0.03
Share of elderly 60/55 (general population)	0.33	0.32	0.32	0.32	0.33	0.33	0.34	0.35	0.46	0.49	0.57	0.70
Share of elderly 60 (men)	0.20	0.19	0.18	0.18	0.18	0.18	0.18	0.19	0.26	0.29	0.32	0.42
Share of elderly 55 (women)	0.46	0.46	0.47	0.48	0.49	0.50	0.51	0.52	0.67	0.71	0.86	1.01

Numbers for the general population, contributors and beneficiaries are presented in Fig. 1. Demographic and dependency ratios for men and women are presented in annex (1).

Fig. 1. Demographic Projection

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[2] Center of Human Demography and Ecology of the Institute of National Forecasing of the Russian Academy of Sciences

Demographic forecast
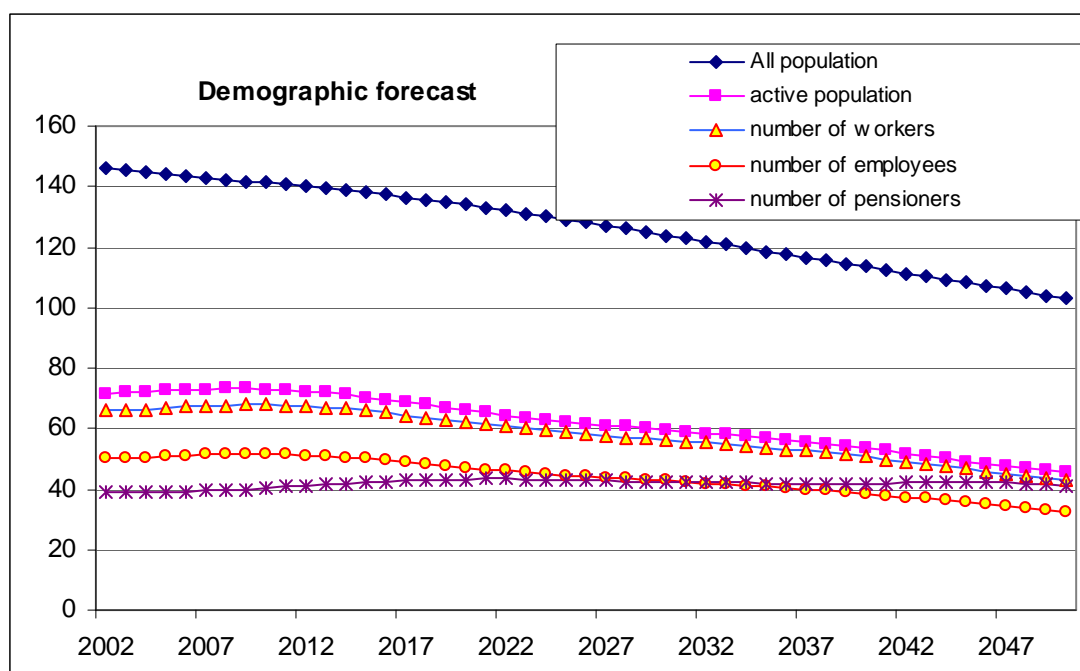
The following macroeconomic assumptions for the base scenario were included in 2002 report (Table 2). The GDP growth was calculated through the productivity growth and increase of employment. Estimated GDP growth in the first projected years exceeded the productivity growth insignificantly due to the unemployment growth; in subsequent years the GDP growth rate dropped to 1 % per annum. The wage growth was assumed to be proportionally equal to the productivity growth. To increase the payroll share in the GDP, an additional increase of the wage growth rate was introduced; it was reduced gradually from 2 % in 2002 to 0.5 % by 2015. Another assumption was that the level of 0.5 % leading to the growth of the payroll share in the GDP from 26 % in 2002 to 35.6 % in 2050, would be maintained.

Table 2. Macroeconomic Assumptions of 2002 Report

	2002	2003	2005	2010	2015	2020	2025	2030	2040	2050
Productivity growth	4.0%	4.0%	3.5%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Inflation rate	15.0%	14.0%	12.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
Interest rate	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
Unemployment rate	9.0%	8.8%	8.4%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
Employment rate	0.65%	0.66%	0.67%	0.68%	0.68%	0.65%	0.64%	0.64%	0.63%	0.59%
Wages growth vs. productivity growth	2.0%	1.9%	1.7%	1.1%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%

In this study revised macroeconomic projection was used. The basic projected parameters for the period before 2007 correspond to the short-term macroeconomic projection prepared by the RF Ministry of Economic Development and Trade. The wage growth will become closer to the productivity growth due to reduction of the "shadow"[3] wages share albeit the gap between the two will continue to exist Hence, in order to determine the wage growth rate, the model uses approximation of the payroll share in the GDP presented as an asymptotic function. The actual GDP growth smoothly reduces from 6 - 7 % early on in the projection period to 3 % by 2050.

Table 3. Basic Indicators of Macroeconomic Projection

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[3] Forecast of Socio-Economic Development of the Russian Federation in 2005.

	2005	2006	2007	2008	2009	2010	2020	2030	2040	2050
Actual productivity growth rate	5.7	5.4	5.2	5.1	5.0	5.0	5.0	4.1	4.5	4.4
Actual wage growth rate	16.6	12.7	10.3	8.7	7.5	6.9	5.1	4.2	4.5	4.4
GDP growth rate	6.3	6.0	5.7	5.4	5.2	5.0	3.7	3.3	3.1	3.0
Inflation rate	9.0	7.5	6.5	6.2	5.9	5.6	4.0	3.4	3.1	3.0
Interest rate	3.0	3.0	3.0	3.0	3.0	3.0	3.8	3.2	3.5	3.5
Unemployment rate	7.8	7.6	7.5	7.3	7.1	7.0	6.0	5.6	5.3	5.1
Labor participation rate	0.63	0.63	0.64	0.64	0.64	0.65	0.63	0.60	0.60	0.57
Payroll proportion in GDP (employees)	27	28	30	31	32	32	34	34	34	34

Pension System Parameters

Pension system parameters estimations are based on the following assumptions:

1. Regression ratio is set as 0.94 in the base year, and it does not change throughout the entire projected period. This assumption suggests that the boundaries of the regressive scale are indexed.
2. The fixed rate of contributions collected from the self-employed is wage-indexed.
3. Wage growth is proportional to the productivity growth. The excess of the wage growth early on in the projected period is proportional to the assumed growth of the payroll share in the GDP
4. Real return on investments is 3 % per annum for the first 10 years. Given the high wage growth in the future, interest rate was set at 1 percentage point below the wage growth rate.

Contribution Rates and Regressive Scale Boundaries

The maximum contribution rates for extra-budgetary funds is be 26 % and is used if the annual payroll per worker is up to 280,000 RUR. If the annual payroll per worker is between 280,000 to 600,000 RUR, the rate shall be 72,800 RUR plus 10 % of the amount in excess of 280,000 RUR. When this amount exceeds 600,000 rubles, the rate will be 104,800 RUR plus 2 % of the amount in excess of 600,000 RUR.

Starting with 2005 within the unified social tax, social insurance contributions are reduced from 4 % to 3.2 %; mandatory health insurance contributions are reduced from 3.6 % to 2.8 %. While contributions to the regional health insurance funds are reduced from 3.4 % to 2 %; however, contributions to the Federal Health Insurance Fund are increased from 0.2 % to 0.8 %.

The contribution rate to the Pension Fund will go down by 8 percentage points. In addition, following the Government proposal, individuals born before 1967 are exempted from contributions to the funded component.

Table 4. Pension System

	2003	2004	2005	2006	2007	2008	2009	2010	2020	2030	2040	2050
Retirement age (men)	60	60	60	60	60	60	60	60	60	60	60	60
Retirement age	55	55	55	55	55	55	55	55	55	55	55	55

(women)												
Collection rate (employees)	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Collection rate (self-employed)	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Regression ratio	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Privilege ratio	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Proportion of the employed evading contributions	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Base part contribution rate	11.9	11.9	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
Insurance part contribution rate	10.1	10.0	10.4	10.3	9.8	9.2	9.1	8.9	7.6	6.9	6.8	6.8
Funded component contribution rate	1.8	1.8	1.5	1.6	2.1	2.7	2.8	3.0	4.3	5.0	5.1	5.1
Dependency ratio	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.61	0.71	0.77	0.85	0.99

Calibration (adjustment) of Primary Data. Financial Flows Monitoring Scheme

By monitoring of the primary data we mean building time series based on actual official statistical data and comparing their trends against estimation results. Statistical data for the basic indicators used in the model is provided in Table 5.

Table 5. Pension Statistical Data (actual)

Demography	1995	1996	1997	1998	1999	2000	2001	2002	2003
General population as of the end of the year, million	147.6	147.1	146.7	146.3	145.6	144.8	144.0	145.2	144,2
Economically active	70 861	69 660	68 079	67 339	72 175	71 464	70 968	71 919	72 590
Employed in economy	66 441	65 950	64 693	63 812	63 963	64 327	64 700	65 400	66 606
Total unemployed	4 420	3 710	3 386	3 527	8 212	7 137	6 268	6 519	5 984
Total pensioners	37 083	37 827	38 184	38 410	38 381	38 411	38 630	38 432	38 164
labor	35 960	36 631	36 915	37 071	37 027	36 425	37 151	36 819	365 08
old-age	29 011	29 081	28 993	29 023	28 932	28 813	28 989	29 705	29 272
disability	4 270	4 542	4 813	4 816	4 816	4 822	4 848	4 551	4 487
survivors	2 482	2 464	2 532	2 601	2 622	2 116	2 640	2 547	2 749
social	1 123	1 196	1 269	1 339	1 354	1 986	1 479	1 613	1 636
Macro-projection									
GDP (bln. RUR)	1 541	2 146	2 479	2 741	4 767	7 302	9041	10 863	13 285
Consumer prices growth index	131	21.8	11.1	84.4	36.5	20.2	18.6	15	12
Wage (RUR)	472.4	790.2	950.2	1 051	1 523	2 223	3 240	4 360	5 499
Monthly average pension benefit size as of the end of the year (RUR)									
All pensioners	242.6	320.1	366.4	402.9	521.5	823.4	1 138	1 462	1 747
old-age	258.5	333.5	385.1	430.1	549.2	894	1 246	1 589	1 906
disability	218	299.6	333.7	352.3	466.9	698.5	940	1 157	1 363

survivors	132.8	241	256.5	257.1	389.7	501.5	669	793	1 010
long service	277	337	388	390.4	488	673.7	847	-	-
social		245.7	271.6	271.6	395.3	496.7	632	1 032	1 180

See Table 6 for comparison of the base scenario outcomes in the first years of estimations with the projections data.

Such comparison allows to calibrate initial data of the model. The figures for 2003-2005 in the first three columns correspond to the official macroeconomic forecast projections of the MEDT and to the income and revenues part of the Budget of the Pension Fund of the RF (along with the laws on PFR budgets as for appropriate years). The figures in the last three columns of the table resulted from the calculations made with the model.

Their comparison allows to match /interface initial data and provides for correspondence of the data (both reported actual and official forecast estimates) with the modeling results for first years of the forecast. Such procedure of preparation of the initial data sets is called "calibration of the model" and the procedure of construction of the data sets and choice of model parameters we call financial flows monitoring scheme.

Table 6. Primary Data Calibration Scheme

	2003	2004	2005	2003	2004	2005
Demography forecast (at the end of the year)						
General population as of the end of the year, million	144,6	143,8	143,1	145,1	144,5	143,9
Economically active	71 400	71 800	72 000	71 898	72 209	72 477
Employed in economy	65 400	65 700	65 900	66 146	66 432	66 821
Wage earners			49 500	50 247	50 465	50 762
Total unemployed	6 000	6 100	6 100	5 752	5 777	5 656
Total pensioners		38 164	38 389	38 986	38 925	39 053
labor		36 223	36 380	26 972	26 773	26 760
old-age		29 100	29 468			
disability				4 905	4 980	5 060
survivors				2 519	2 438	2 353
social				1 464	1 429	1 395
Macroeconomic forecast						
GDP	13 285	16 130	18 720	13 356	16 206	18 811
Actual GDP growth rate, %	7,3	6,9	6,3	7,3	6,9	6,3
Payroll	3 291	4 140	5 050	3 203	3 903	4 933
Payroll share in GDP, %	25%	26%	27%	24,0	24,1	26,2
Consumer prices growth index	12	10	9	12	10	9
Wages	5 499	6 914	8 450	5 313	6 445	8 099
Wage growth	12,6	14,3	12,1	8,4	10,3	15,3
Average pensions (RUR)						
Base part of labor pension				619	681	767
Growth rate of the base part				10,0	10,0	14,0
Insurance part of labor pension				952	1 102	1 298
Growth rate of the insurance part	11,7			20,0	15,0	17,3
Funded component of labor pension				0,0	0,0	0,0
Total pensioners						
old-age	1 738	2 016	2 249	1 571	1 783	2 064
disability				1 308	1 474	1 664
survivors				1 200	1 354	1 536

social				896	986	1 074
Pensioner's minimum subsistence level (PMSL)	1 625	1 817	2 040	1 625	1 817	2 040
Average pension benefit to PMSL	1,07	1,11	1,10	0,967	0,981	1,012
Revenues (bln. RUR)						
Base part	417	438	261	380	463	251
Insurance part	327	379	555	345	418	545
Total revenues of PAYGO system	**744**	**818**	**816**	**725**	**881**	**796**
Transfers	50	59	65	51	56	61
Funded component	48	76	80	57	72	73
Total revenues	843	954	961	833	1 009	931
Budget revenues	**823**	**982**	**1 185**			
Expenditures (bln. rub.)						
Base part	268	298	337	279	306	346
Insurance part	460	532	607	429	496	586
Total PAYGO	**729**	**829**	**944**	**708**	**802**	**933**
Funded component		10	5	0	0	0
Delivery expenditures		10	13	7	8	9
Administrative expenditures		26	39	14	16	19
PAYGO	729	866	995	729	826	961
Budget expenditures	**865**	**947**	**1 192**			
Expenditures	16	-48	-179	-4	55	-164
PAYGO balance as % to GDP	0,1%	-0,3%	-1,0%	0,0%	0,3%	-0,87%

Running Quantitative Estimations Used for Interfacing Primary Data

Since this study builds lineal projections, the external data sets should be interfaced. To this end, statistical rows are used to analyze correlation between minimum subsistence level and wages growth rates, indexation rate and possible deficit of the system, interest rate and replacement rate in the funded component. This analysis helped to select parameters for model scenarios.

Estimation of Revenues of the PAYGO System

The Pension Fund of Russia expects its budget deficit in 2005 to be lower than planned. Mr. Gennady Batanov, Chairman of the Board of the Pension Fund of Russia, expressed this opinion at the workshop "Pension Reform Fundamentals". According to him, measures taken by the Government to reduce the UST will lead to a growth of the payroll in the country and it will reach estimated 5.5 trillion rubles in 2005. "We expect that it will be higher -", Mr. Batanov suggested noting that in this case the revenues of the Pension Fund of Russia will increase and thus the deficit will be lower than had been planned (84 billion rubles)." The Pension Fund will use federal budget resources to cover the deficit, -" indicated Mr. Batanov[4].

The recent decisions of the Government to index pensions in March 2005 instead of planned April 2005 and to increase pensions by 240 rub instead of 100 rub may ruine the optimistic projections of the PFR Chairman.

With the dependency ratio unchanged and given that the average annual payroll size is significantly lower than the first regressive scale boundary, it may be assumed that the contributions growth rate is proportional to the wage growth rate. Let's estimate possible deficit

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[4] Bulletin "Pension Provision", No. 21, November 29, 2004

of the PAYGO system in 2005. In 2004[5], revenues of the PAYGO system were 818 billion RUR. In fact, these revenues should be higher because the wage growth rate was about 26 % this year and the revenues of the PAYGO system only increased 10 %; while, in 2003 such increase amounted to 25 %, which fully corresponded to the wages growth rate. Revenues of the PAYGO system in 2005 are set in the Law on the PFR Budget at the level of 816 billion RUR (plus 80,95 billion RUR of budget allocations). Expenditures of the PAYGO system are 944 billion RUR. Hence, the deficit amounts to 128 billion RUR. Wage growth rate in 2005 is approximately estimated at 23.5 %, therefore the deficit will be roughly 818 x 1.235 - 816 = 194 billion RUR, that exceeds the above deficit figure. This could be explained by the pension indexation rate lagging behind the wage growth rate. For example, in 2003, the wage growth rate was 26.1 % whereas the index of growth of the RF Pension Fund revenues allocated to pay benefits under the insurance part of pension was 11.7 %[6]. According to the Law on PFR Budget, the expenditure growth rate in 2005 will be 13 %.

Estimation of Pensioner's Minimum Subsistence Level Growth

Along with the replacement rate in evaluation of the pension system efficiency, the pension benefit size to the pensioner's minimum subsistence level (PMSL) ratio is used. The average size of pension benefit is calculated based on the size of assigned pensions and subsequent indexation pace. How can the PMSL growth be estimated? In the long run, when wage growth rate is high and the PMSL level is indexed to the consumer price index (CPI), an unnaturally large gap between the two appears. Certainly, these parameters may not drift apart indefinitely. The table 7 provides an example of CPI and PMSL growth rates and their correlation. Projections prepared by the RF Ministry of Economic Development and Trade were used for the period of 2004 - 2007[7].

The obtained results show that the real PMSL growth is 3 - 4 %, which is 35 - 40 % higher than the average annual CPI growth rate. A similar analysis shows that the real wage growth is 9 % per year. Therefore the calculations during the entire projection period assume that the PMSL growth rate is 30 % of the real wage growth rate. Hence, with an average real wage growth of 4 % per annum, the ratio between the wage size and the PMSL within 50 years will increase roughly in

$$((1 + 0.04) / (1 + 0.3 \text{ x } 0.04))\wedge 50 = 4 \text{ times.}$$

Table 7

	995	996	997	998	999	000	001	002	003	004	005	006	
PI	31	1,8	1,1	4,4	6,5	0,2	8,6	5,1	2	0		,5	
MS	86	61	90	48	40	09	144	379	605	817	040	255	
Pensioner's minimum subsistence level growth index													
	995	996	997	998	999	000	001	002	003	004	005	006	
995		.40	.56	.87	.44	.88	.14	.41	.62	.76	0.96	2.11	3

[5] Law on the Budget of the Pension Fund of the Russian Federation for 2005
[6] RF Government Resolution No. 576 of October 25, 2004
[7] Basic Projected Indicators of Socio-Economic Development of the Russian Federation up to 2007 (www.economy.gov.ru)

	995	996	997	998	999	000	001	002	003	004	005	006	007
996			.11	.34	.46	.49	.39	.29	.16	.98	.83	.66	
997				.20	.21	.14	.95	.76	.54	.27	.04	.78	
998					.84	.61	.29	.96	.61	.22	.86	.48	
999						.42	.79	.16	.51	.84	.19	.52	
000							.26	.52	.77	.00	.24	.48	
001								.21	.40	.59	.78	.97	
002									.16	.32	.48	.64	
003										.13	.27	.40	
004											.12	.24	
005												.11	
006													
007													

Consumer price growth index

	995	996	997	998	999	000	001	002	003	004	005	006	007
995		.22	.35	.50	.41	.09	.86	.59	.26	.89	.51	.07	
996			.11	.05	.80	.36	.99	.59	.14	.65	.16	.62	
997				.84	.52	.03	.59	.13	.63	.09	.55	.96	
998					.37	.64	.95	.24	.51	.76	.01	.23	
999						.20	.43	.64	.84	.02	.20	.37	
000							.19	.37	.53	.68	.83	.97	
001								.15	.29	.42	.55	.66	
002									.12	.23	.34	.44	
003										.10	.20	.29	
004											.09	.17	
005												.08	
006													
007													

Average annual real growth rate of pensioner's minimum subsistence level, percentage points

	995	996	997	998	999	000	001	002	003	**004**	**005**	**006**	**007**
995	.00	4.86	.26	9.19	.22	.58	.00	.10	.08	.95	.86	.76	

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
996		.00	.17	19.26	4.23	.94	.95	.41	.63	.66	.70	.71	.
997			.00	34.92	6.35	.20	.41	.87	.04	.02	.02	.00	.
998				.00	4.75	6.19	9.11	5.34	2.96	1.22	0.01	.08	.
999					.00	8.18	1.99	.51	.09	.03	.35	.84	.
000						.00	.12	.42	.92	.41	.13	.91	.
001							.00	.73	.32	.85	.64	.48	.
002								.00	.92	.42	.28	.17	.
003									.00	.92	.96	.92	.
004										.00	.00	.91	.
005											.00	.83	.
006												.00	.
007													.

Estimation of Replacement Rate

Tentatively it may be assumed that reduction of the contribution rate in the PAYGO component, -including both the base and insurance [NDC] parts - by 8 percentage points will lead to the replacement rate reduction by approximately $1 - 14/22 = 35$ %.[8] This estimate will remain correct after final transition to a 6% contributions rate to the funded component for all age groups of contributors. However, given a possible offsetting growth of tax base, it may be assumed that under new conditions the ratio between the pension benefit and PMSL would increase.

With the outpacing wage growth and almost zero real returns, introduction of the funded pillar would result in losses. The funded pension system is efficient when the wage growth rate does not exceed the rate of return or the interest rate on the invested pension assets. Currently the real wage growth is about 10 % a year, the real interest rate of fixed yield instruments is zero, the stock market is highly volatile. The question is, whether the funded pillar should be a mandatory or voluntary pillar of the pension system? According to different estimates, if the purchasing power of savings is preserved (when the wage growth matches the interest rate) during the working life of 30 - 35 years, the replacement rate at retirement may increase by 9.6 to 11 percentage points - in case the future pension benefit is wage-indexed. If the future pension benefits are price-indexed, the growth could be some 13 to 15 percentage points. This is comparable with the average replacement rate as offered by the PAYGO system after reduction of the contribution rate in the PAYGO system to 14 % with the dependency ratio approaching 1.

Replacement rates for various combinations of the wage growth rates and interest rates are shown in Table 8.

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[8] 1-28-8-6/28-6 where 28 is pre 2005 contribution rate, 8 is reduction of contribution rate for base and NDC pensions, forthcoming contribution rate to the funded pillar (will be in effect starting 2008)

Replacement rate in the funded component of the labor pension at retirement with the employment history of 35 years[9].

Table 8

		Interest rate									
		1	2	3	4	5	6	7	8	9	10
Wage growth rate	1	10.5	12.48	14.94	18.03	21.92	26.82	33.01	40.85	50.79	63.42
	2	8.92	10.5	12.45	14.89	17.93	21.75	26.55	32.6	40.25	49.92
	3	7.67	8.94	10.5	12.43	14.84	17.83	21.59	26.29	32.21	39.67
	4	6.67	7.69	8.95	10.5	12.41	14.79	17.74	21.43	26.04	31.83
	5	5.85	6.69	7.72	8.97	10.5	12.39	14.74	17.64	21.27	25.8
	6	5.19	5.88	6.72	7.74	8.98	10.5	12.37	14.69	17.55	21.12
	7	4.64	5.22	5.91	6.75	7.76	8.99	10.5	12.35	14.64	17.46
	8	4.19	4.67	5.25	5.94	6.77	7.78	9.	10.5	12.33	14.59
	9	3.8	4.21	4.7	5.28	5.97	6.8	7.8	9.02	10.5	12.32
	10	3.48	3.83	4.24	4.73	5.3	5.99	6.82	7.82	9.03	10.5

Funded Pillar Efficiency Analysis under High Wage Growth

Now let us estimate how the accumulations change during the preset accumulation period (e.g., 15 years) depending on the interest rate. For the purposes of estimation, the wage growth rate for the entire projection period was set at 5 % per year. The annual interest rate varied from 0 to 10 %. The table provides estimates of losses/growth of the accrued annual contributions. When the interest rate coincides with the wage growth rate, contributions made in any year preserve their purchasing power. Let's call this a zero line. When the wage growth rate exceeds the interest rate level, in the area to the left of the zero line in the table contributions loose their value, while in the area to the right of the zero line the value increases. The current macroeconomic situation in Russia corresponds to the area found to the left of the zero line. The wage growth rate substantially exceeds the interest rate. However, a high wage growth rate may not be sustainable for a long period of time because it is constrained by the maximum share of payroll in the GDP (in this paper it is assumed at the level of 35 %). Therefore, it may be assumed that in the future the funded system will become efficient.

Table 9. Ratio of accrued contribution as of the date of final contribution to the value of the last contribution depending on the level of interest rate, with payroll growth rate of 5 %

	Interest rate										
Year	0	1	2	3	4	5	6	7	8	9	10
1	51%	58%	67%	76%	87%	100%	114%	130%	148 %	169%	192%
2	53%	60%	69%	78%	88%	100%	113%	128%	144%	163%	183%
3	56%	63%	71%	79%	89%	100%	112%	125%	140%	157%	175%
4	58%	65%	73%	81%	90%	100%	111%	123%	136%	151%	167%
5	61%	68%	75%	83%	91%	100%	110%	121%	133%	145%	159%
6	64%	70%	77%	84%	92%	100%	109%	119%	129%	140%	152%

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[9] A life expectancy at retirement of 20 years is used as the annuity.

7	68%	73%	79%	86%	93%	100%	108%	116%	125%	135%	145%
8	71%	76%	82%	87%	94%	100%	107%	114%	122%	130%	138%
9	75%	79%	84%	89%	94%	100%	106%	112%	118%	125%	132%
10	78%	82%	87%	91%	95%	100%	105%	110%	115%	121%	126%
11	82%	86%	89%	93%	96%	100%	104%	108%	112%	116%	120%
12	86%	89%	92%	94%	97%	100%	103%	106%	109%	112%	115%
13	91%	93%	94%	96%	98%	100%	102%	104%	106%	108%	110%
14	95%	96%	97%	98%	99%	100%	101%	102%	103%	104%	105%
15	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Rationale for Selecting Interest Rate

Table 10 provides RTS index values. Despite substantial growth in the RTS index as of the end of the year during years 200-2004, variations within each year are high, which indicates a high degree of stock market volatility. The return to fixed-yield instruments today is at par with inflation; therefore, the real return on these instruments is zero. Given that the real return of a combined portfolio is positive in the long run, the projection assumes a real interest rate of 3 % per annum for the period up to 2015. Moreover, given a high wage growth rate assumed in the base scenario, interest rate was selected at 1% lower than the real wage growth. Due to the projected reduction in the number of those employed in the economy, productivity growth should exceed the GDP growth. Since the share of the payroll in the GDP reaches its maximum during the first 10-15 years, additional wage growth in the future stops and the curve coincides with the productivity growth. Therefore, if the productivity growth outpaces the GDP growth by 1%, the interest rate will also be higher than the GDP growth rate. Calculations suggest that the drop in the employment is approximately 1 – 1.5% per year starting in 2015; hence productivity growth with the GDP growth at 3% should be 4 – 4.5% per year, and according to our assumptions the interest rate will reach 3 – 3.5% per year.

Table 10. RTS index closing values

Date	Maximum value per year	Minimum value per year	As of end of year
28.12.1995	101.3	68.09	83
31.12.1996	227.79	66.69	201
31.12.1997	571.66	213.38	398
31.12.1998	421.55	38.53	59
31.12.1999	177.71	54.49	178
29.12.2000	255.89	132.07	143
29.12.2001	260.05	131.02	260
31.12.2002	426.91	267.7	359
31.11.2003	650.09	336.08	567
31.12.2004	**781,55**	**518,15**	**609**
29.04.2005	**719,74**	**591,74**	**670**

Degree of Freedom in Pension Benefits Indexation. Equilibrium Indexation Curve.

Currently, the indexation rules are linked to the actual inflation rate. Nevertheless the law (Federal Law No. 173, Article 17) allows to increase indexation of NDC components in cases growth in wages exceeds the size of basic pension indexation.
In the previous report we assumed the following indexation rates: the base part of the pension was price-indexed, the insurance [NDC] capital and insurance [NDC] part of the labor pension were price-indexed and additionally wage-indexed for 50 %.

In the long run the constant indexation leads to a substantial discrepancy between the budget revenues and expenditures. An opposite problem may be considered: what level of indexation is required to preserve the system in equilibrium? In this series of estimations the indexation level was assumed to be constant with the pension base part indexed against the PMSL growth rate and the insurance [NDC] part – indexed against 50 % of the wage growth rate. Pension benefits thus calculated determined the real replacement rate and the balance of the PAYGO system. In addition, affordable replacement rate was calculated, - i.e. the rate at which the benefit size is such that the PAYGO system balance is zero.

Fig. 2 illustrates the zero balance lines of the PAYGO system depending on the projection year for two scenarios of the payroll share in the GDP. The base part of labor pension (BPLP) was indexed against the PMSL growth rate that was assumed at 30 % of the real wage growth rate. In the first case (dash line) it was assumed that the payroll share does not change in time. In the second case (solid line) it grows exponentially during the first years of projection by 20 %. The vertical axis indicates the indexation level for the insurance [NDC] part of labor pension depending on the real wage growth. For the insurance [NDC] part indexation, the following weighting formula was used:

$$NDCP(t+1) = NDCP(t) * (1 + a * Infl(t)) * (1 + b * Wgr(t)),$$

where t - projection year;
        NDCP(t) - size of the insurance [NDC] part at time t;
        Infl(t) - level of inflation;
        a - weight coefficient determining the insurance [NDC] part growth rate depending on the inflation rate (the projection assumption is a = 1);
        Wgr(t) - wage growth rate;
        b - weight coefficient determining the insurance [NDC] part growth rate depending on the wage growth rate (the projection assumption is a varying from -1 to 1).

For example, in order to maintain the PAYGO system balance without additional budget transfers and to maintain the base pension part size, it would be necessary to index the insurance [NDC] part at a rate that would be below the CPI growth rate. If with the payroll share growing the insurance [NDC] part is indexed at 50 % of the real wage growth, the PAYGO system deficit will be eliminated only by 2010. It is noteworthy that a neutral indexation area exists where the zero balance is preserved with the constant level of indexation in the course of 10 to 15 years, starting in 2010.

At the right-hand border of the figure the two lines merge due to the fact that in the scenario taking into account the payroll share growth, the change occurs during the first years of the projection. Because of existence of such area in the projection, the indexation rate for the insurance [NDC] part and the insurance [NDC] capital was assumed to be at the level of 50 % of the real wage growth rate.

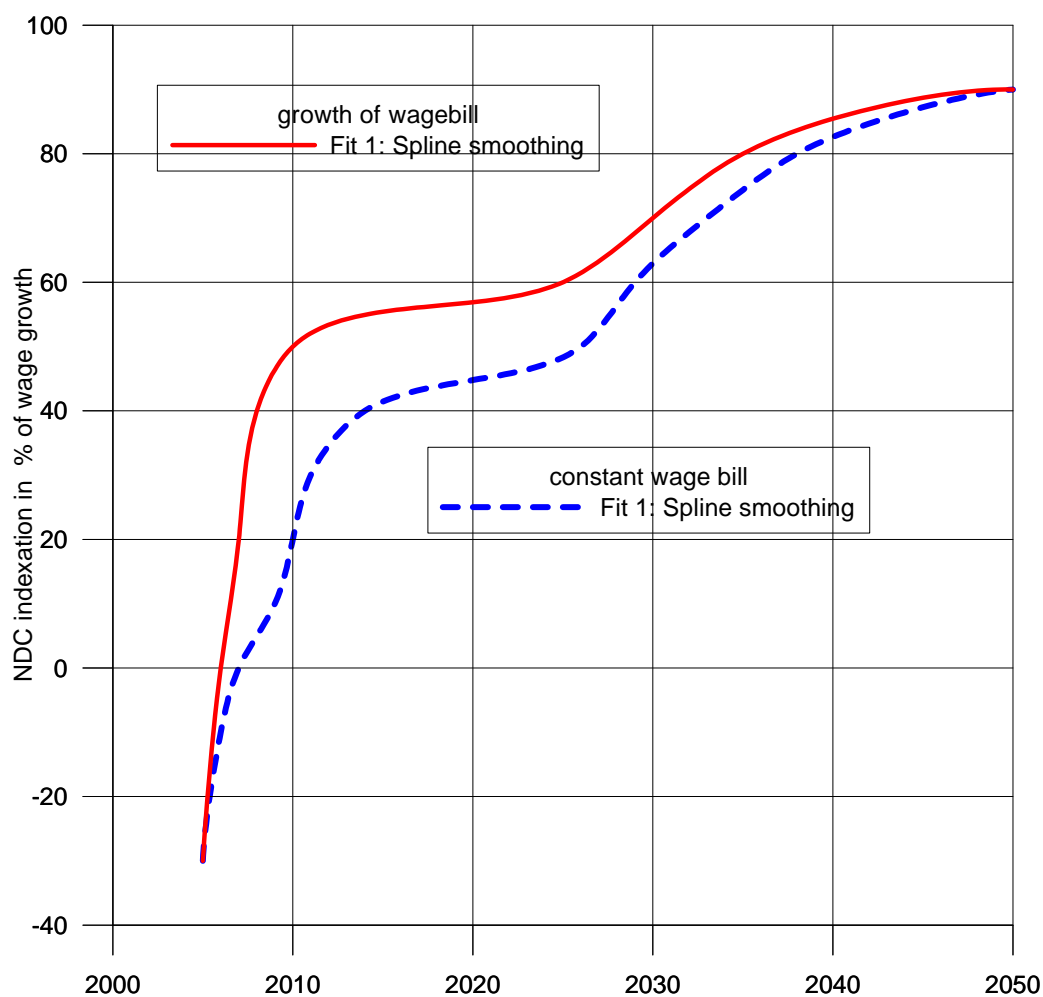**Fig. 2. Zero balance curves of the PAYGO system**

PAYGO zero balance line

Table 11. Selected Indexation Parameters

Parameter	Inflation level	Actual wage growth rate
Pensioner's minimum subsistence level	100	30
Pension base part indexation	100	30
Pension insurance [NDC] part indexation	100	50
Insurance [NDC] capital indexation	100	50
Interest rate	100	3

Calculation Scenarios

Several scenarios are analyzed in this paper. The base scenario considers additional growth of the employees' payroll share up to 35 %, reduction of contribution rate to 20 %, exclusion of individuals older than 38 year of age from the funded pillar. Given a high real wage growth rate and substantial reduction of the purchasing power of pension benefits in case it is inflation-indexed, the base part of the labor pension was indexed against the PMSL growth rate. For comparison purposes an additional scenario was run, its only difference being in the base

pension part indexation rate that was set at the level established by legislation, i.e. equal to the inflation rate. Given the fact that a substantial part of the financial deficit caused by reduction of contribution rates is offset by a high real wage growth, two scenarios were run with different risk levels. In a higher risk scenario, the GDP growth rate was lower than in the base scenario while the taxable payroll share in the GDP reaches only 30 %. In the maximum risk scenario, an extremely low GDP growth was assumed. In this case the payroll share in the GDP does not increase; instead, it stays at the level of 25 %. To determine the size of revenues lost due to the legislative framework changes in 2005, a scenario was run that does not consider the UST reform, reflects new macroeconomic conditions and baseline parameters of the pension system in 2002. The basic scenario data are provided in the table. Figures of macroeconomic projection are provided in the annex.

Table 12. Scenarios

Scenario	Aggregate contribution rate, %	Maximum wage bill share in GDP, %	Macroeconomic projection	Labor pension base part indexation
1. Base (PMSL)	20	35	High	PMSL
2. Base (CPI)	20	35	High	Price
3. Increased risk	20	30	Low	Price
4. Maximum risk	20	25	Extremely low	Price
5. Without SST reform	28	30	High	PMSL

Increasing Retirement Age

This paper does not address scenarios with the retirement age increase. Such an increase is "a most difficult political decision, but sooner or later we will come to it". This was opinion voiced by Mr. Gennady Batanov, Chair of the Board of the Pension Fund of Russia, in an interview to the Izvestia newspaper published on December 6. For instance, he noted, in Kazakhstan, Russia's neighbor country, retirement age was raised to 63 years for men and 58 for women. Such step helped to attract additional revenues to the system and reflects the trend that is common for all countries. However, "I feel that such a measure would be somewhat premature for our country", said the head of the Pension Fund of Russia[9].

Study Findings

Assessment of Deficit Caused by Contribution Rate Reduction

The revenue / expenditure balance of the PAYGO component of the pension system is illustrated in Fig. 3. The largest deficit is observed in the maximum risk scenario. As Fig. 3 shows, with the contribution rate reduced, the pension system will be constantly in deficit in case of extremely low economic growth and in case no growth of tax base is observed. Under this scenario the maximum deficit is 1 % of the GDP in 2020. Later on the deficit goes down thanks to inflation-based indexation of the base part. In the increased risk scenario, the pension system deficit will stay up to 2025. The subsequent surplus reaches the maximum value of 1 % of the GDP in 2050. This may be explained by a relatively high GDP growth rate in the increased risk scenario and the selected indexation rate: price indexation for the base pension part, 50% of wage indexation – for insurance [NDC] component and insurance [NDC] capital. If the GDP

[9] Bulletin "Pension Provision", No. 24, December 10, 2004

grows faster (as do the pension fund revenues) - as assumed in the base scenario-, the deficit will be covered by 2010 and the maximum surplus will reach 1.5 - 2 % of the GDP depending on the base part indexation rate. If the contribution rates remain at the level of 2002 with new macroeconomic conditions, the PAYGO system will continuously be in surplus.

**Fig. 3. Revenues vs. expenditures of the PAYGO (base and insurance [NDC] components) system, % of GDP**
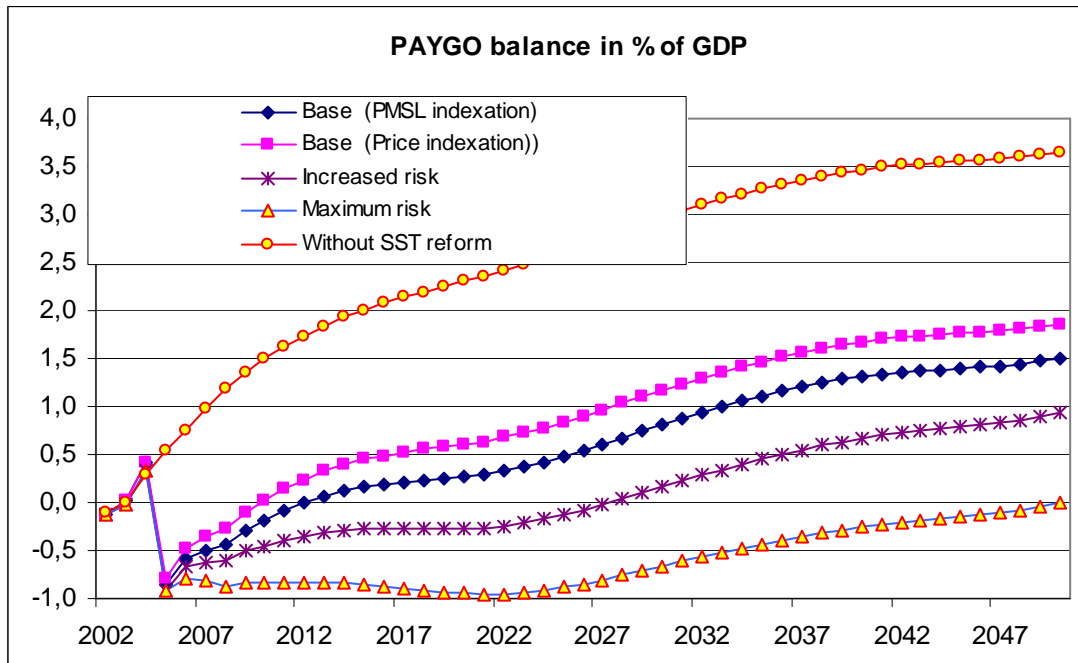
The linear projections are just one of the possible options despite the fact that the initial data have been interfaced. In order to understand which of the scenarios is more probable and how sensitive outcomes are to the primary data variations, the field of solutions is to be analyzed]. E.g., accumulated (at 3 % interest rate) PAYGO deficit/surplus curves (field of solutions) were constructed for the base scenario. These figures (see Fig.4) were used to analyze how sensitive the PAYGO system balance is to indexation levels of the insurance [NDC] part of labor pension and insurance [NDC] capital. These figures corresponds to the base scenario parameters. The calculations were made for the base scenario with additional indexation conditions: base part – PMSL indexation, insurance [NDC] capital – 100% wage indexation. The size of insurance [NDC] part in 2002 is set at 850 RUR. For example if we need to give an answer to the question: how fast the insurance [NDC] part should be indexed to maintain the accumulated balance of the PAYGO system at zero? The figure below shows that the indexation rate is variable during the first years, then the PAYGO system does not suffer any deficit for a sustained period in case the insurance [NDC] part is wage-indexed at 40 %. Later on indexation rate of the insurance [NDC] part may be gradually increased to 60%. However, if a constant indexation rate is selected (e.g., at 60%), the PAYGO system will constantly run a deficit, and the highest accumulated deficit in 2030 may reach 6% of the GDP.

Fig. 4. Accumulated deficit / surplus curves, % of GDP

Accumulated deficit/proficit constsnt lines
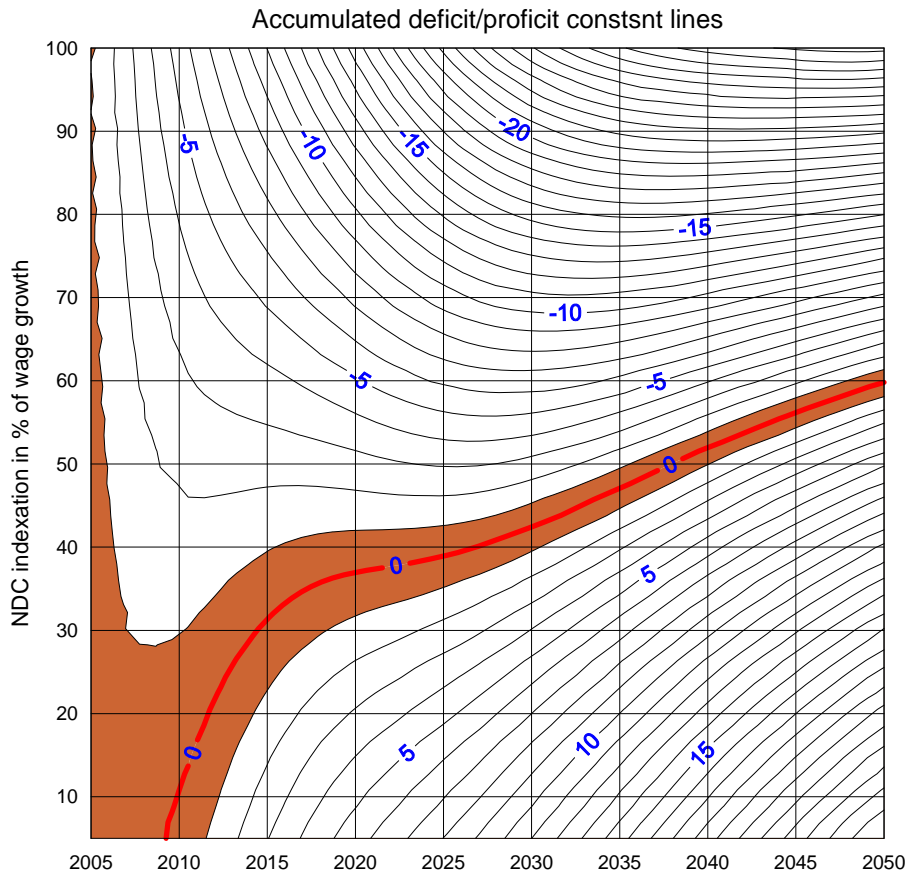
Additional calculations were made to identify impacts of the insurance [NDC] capital indexation option; the following parameters were used: base part of the labor pension – PMSL indexation, insurance [NDC] capital – 50% of wage indexation. The size of the insurance [NDC] part of the labor pension in 2002 was 850 RUR. The results are presented in Fig. 5.

Fig. 5. Accumulated Deficit / Surplus Curves, % o GDP

Accumulated deficit/proficit constant lines
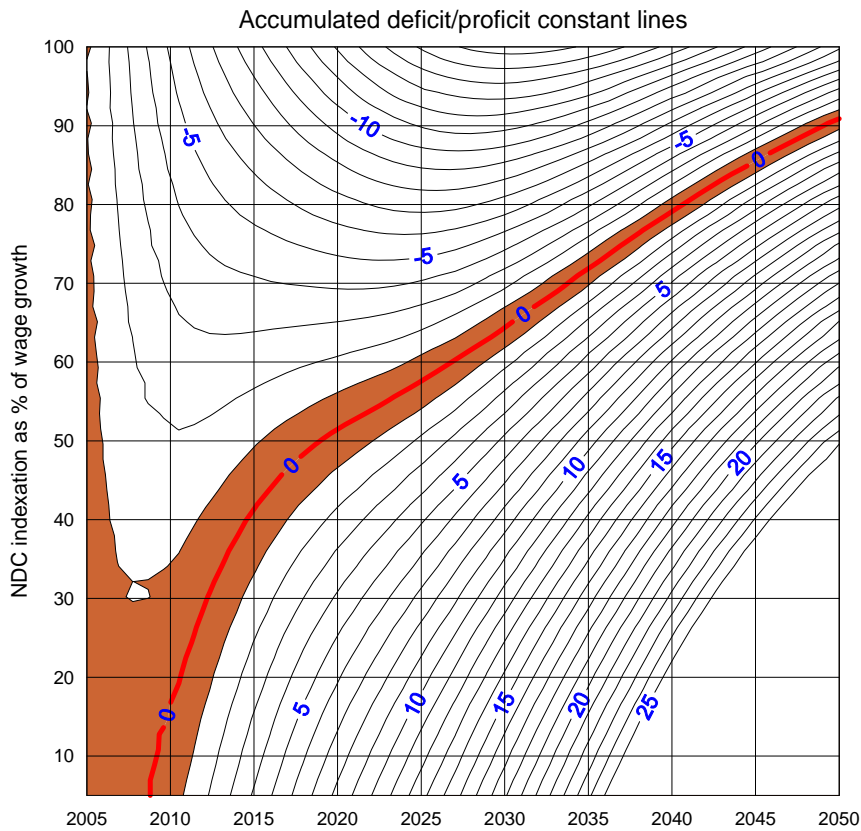
Assessment of the Pension System Solvency

In the maximum risk scenario, a marked reduction of the pension purchasing power is observed. Almost throughout the entire projected period the average pension benefit size is below the minimum subsistence level of the pensioner. Given the system is in deficit under this scenario, the pension system would need continuous additional financing. In the increased risk scenario, the ratio of the pension benefit to the minimum subsistence level of the pensioner starts growing after 2025. This is obviously due to the completion of the transition period related to the reduction of the contribution rate, as well as to the impact of macroeconomic factors. In the base scenario, despite reduction of the purchasing power in the first years after the contribution rate reduction, this indicator monotonously increases later; by 2010 it almost equals 1 and then reaches 3 by 2050. A scenario without the UST reform shows an average pension benefit always exceeding the PMSL and reaching the maximum value of 3.5.

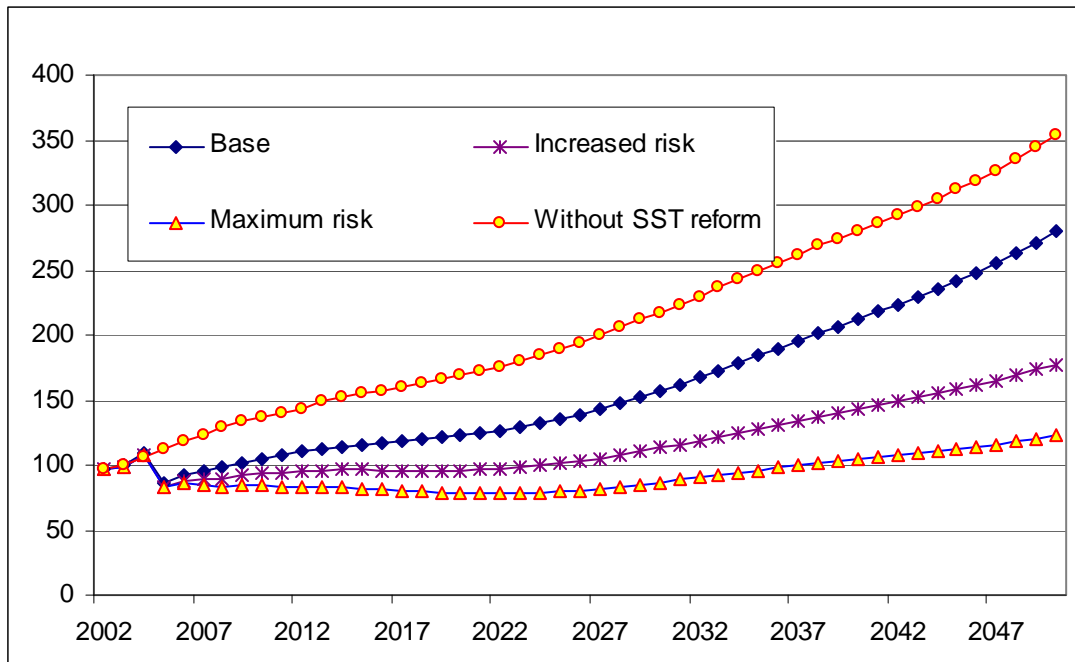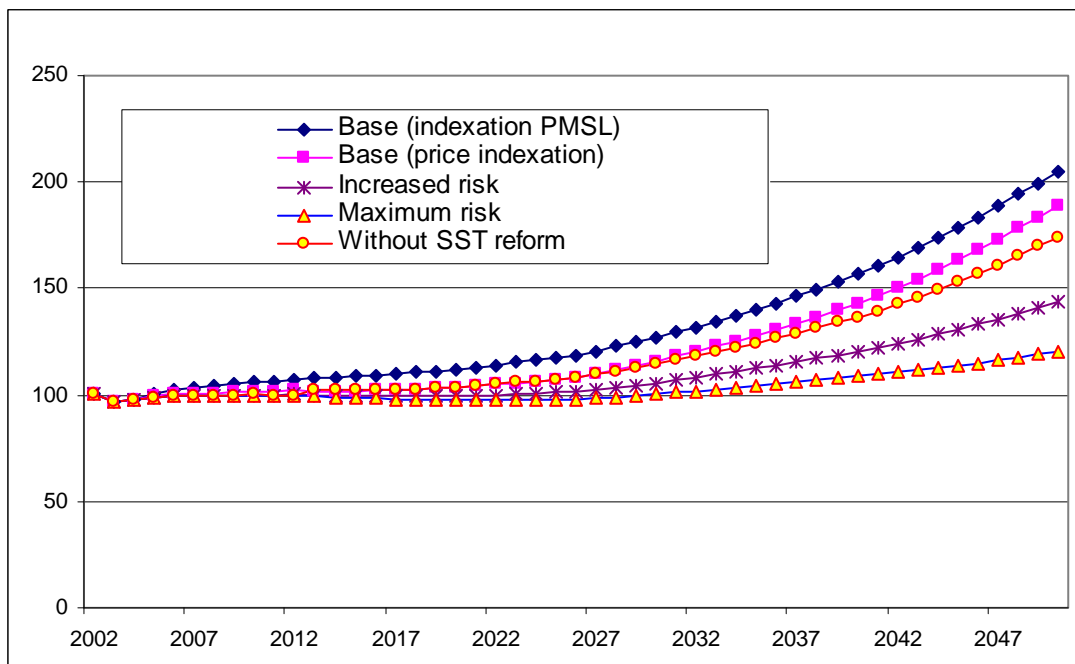**Fig. 6. Affordable Pension Benefit Size vs. Pensioner's Minimum Subsistence Level**

Fig. 7 Actual Pension Benefit Size vs. Pensioner's Minimum Subsistence Level

Values of the aggregate affordable replacement rate are provided in Fig. 7 (the affordable rate differs from the actual rate. Affordable rate is one based on such size of benefits which provides for the zero balance of the PAYGO system).

The affordable replacement rate (*RRaf*) is calculated with the following formula:

$$RRaf = RRreal * \frac{TotalIncome}{TotalExpence},$$

where *RRreal* - replacement rate at the selected benefit indexation rates;
TotalIncome - total revenues of the PAYGO system;
TotalExpence - total expenditures of the PAYGO system.

Fig. 8. Affordable replacement rate
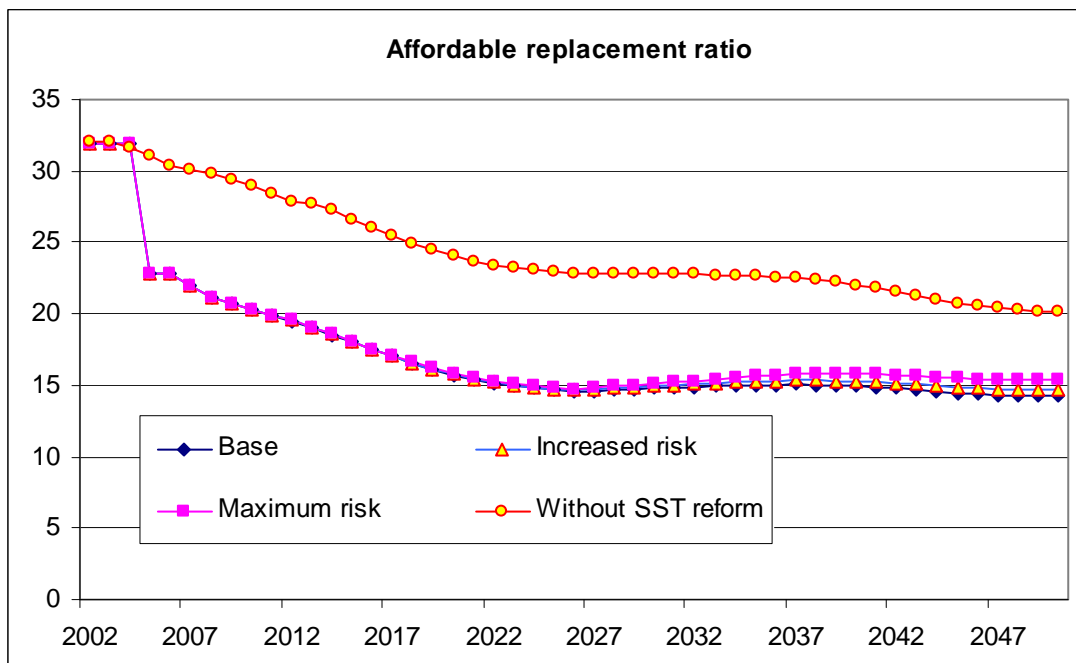
As the figure shows without cuts in the contribution rate, the affordable replacement rate (ARR) will decrease to about 22 % in 2050. With the contribution rate reduced, this indicator would reach approximately 16 %.

Impact of Migration Processes on the Pension System Solvency

The model assumed net migration flows at 100,000 persons per year. Previous estimates show that any increase in the net flow does not substantially change the dependency ratio. This is explained by the migration profile. Clearly, under the new legislation, the size of the labor pension for individuals of older-age groups who come for permanent residence to the Russian Federation would be lower than the average benefit size for appropriate age group. However, if they have 5 years of employment record, they shall be eligible for base pension benefits.
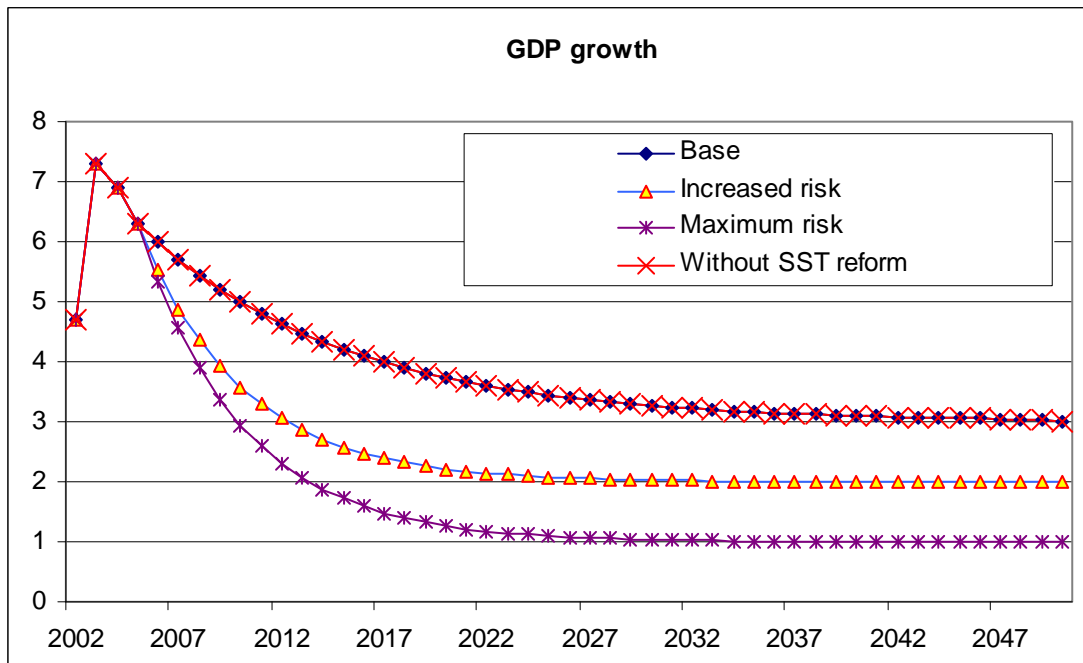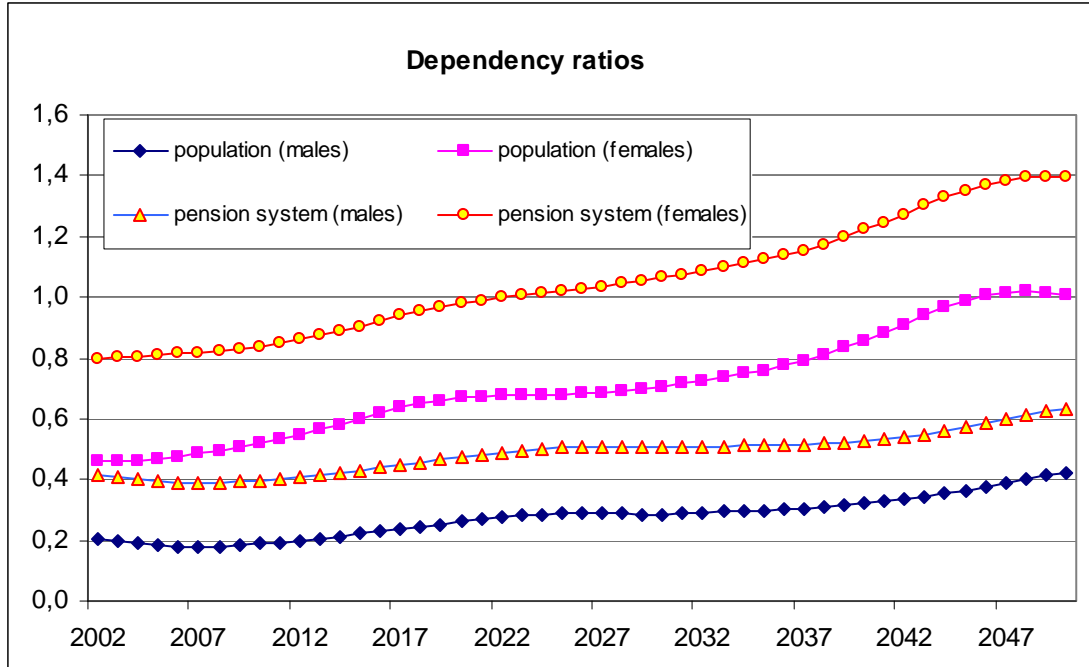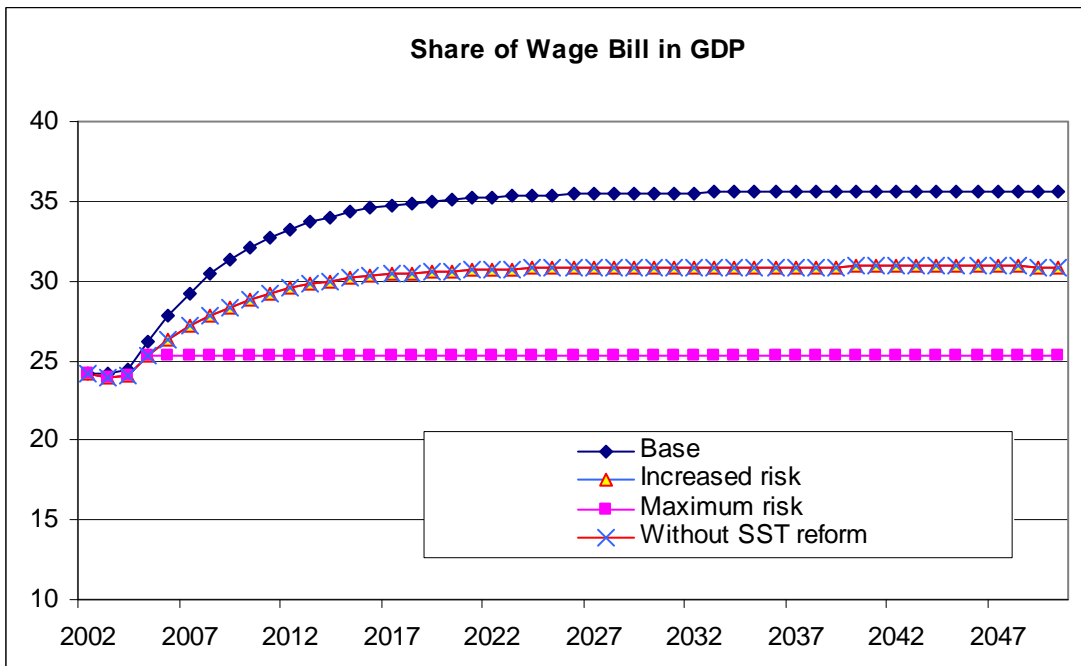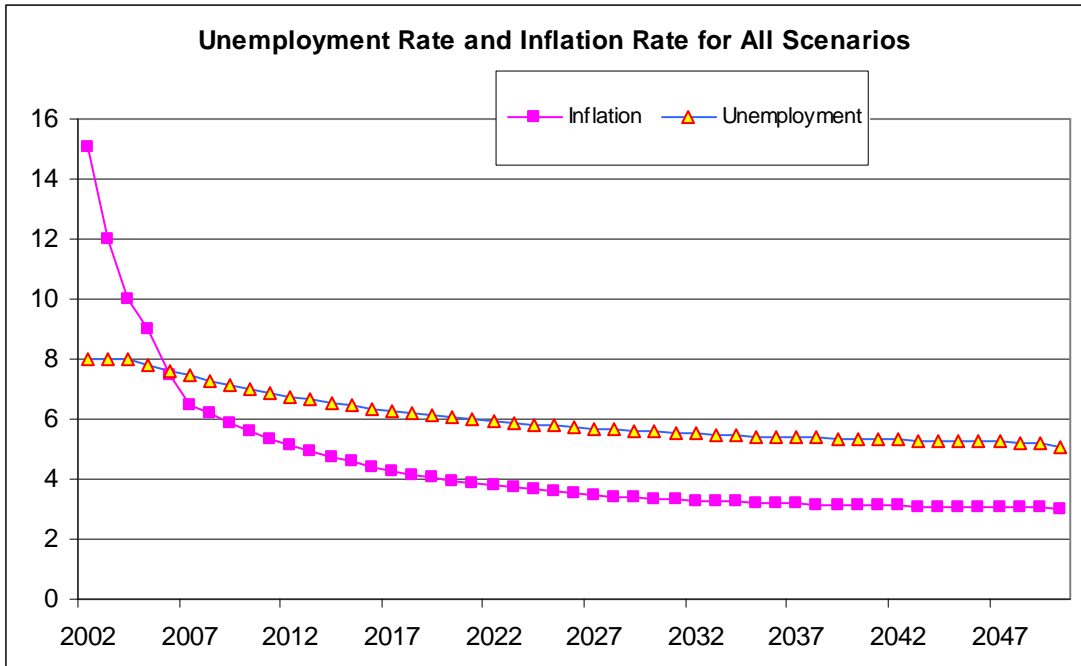
Conclusions
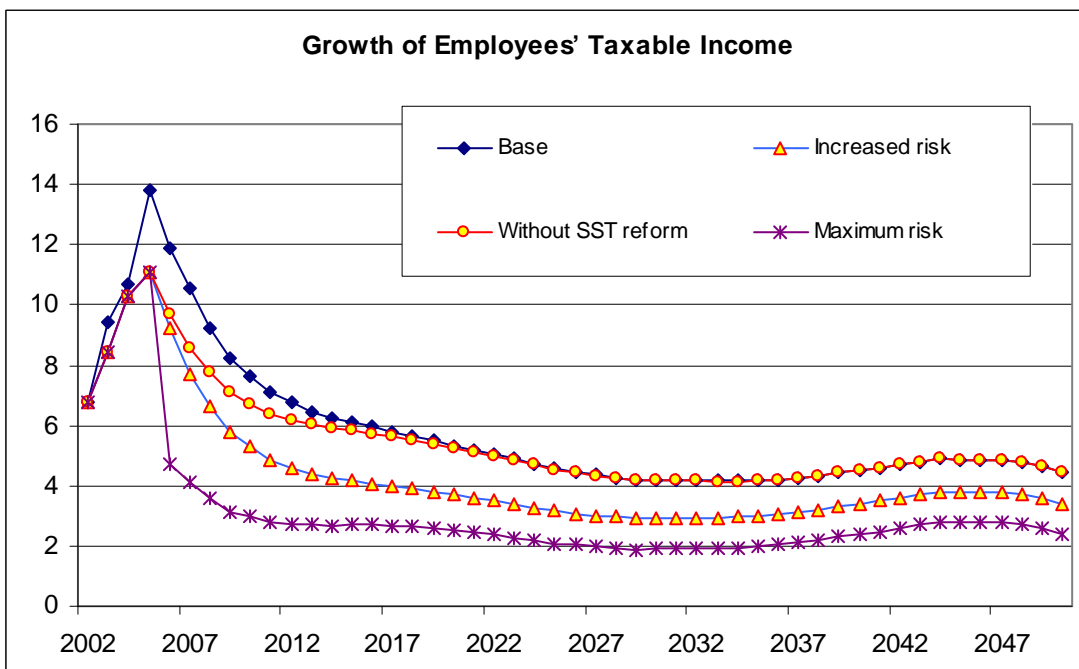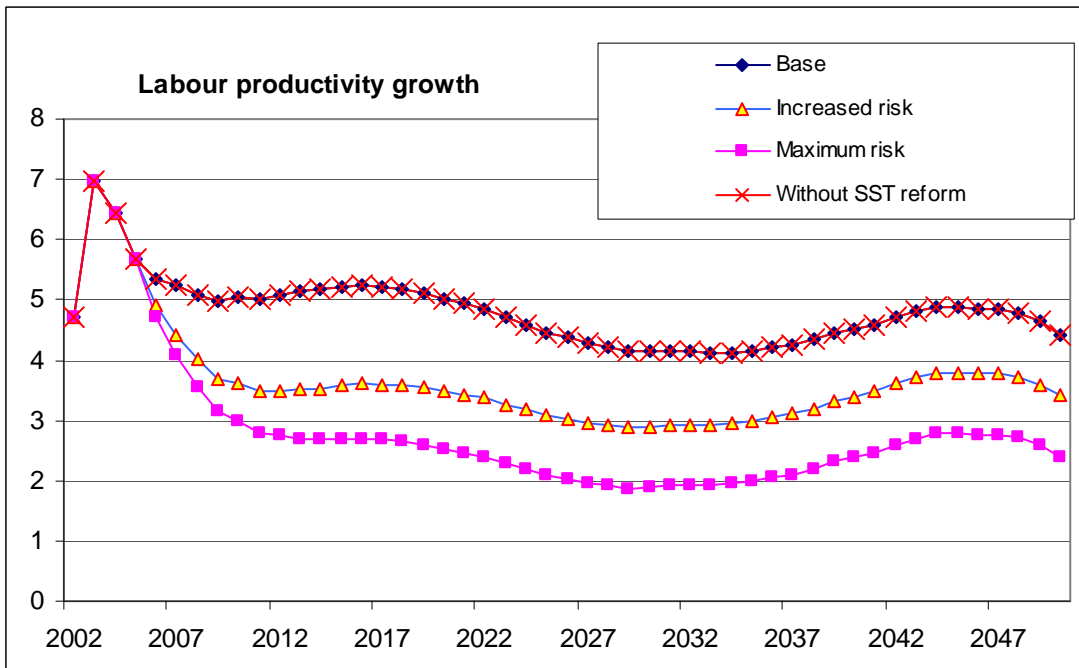
The key findings of the study are.

1. It has been demonstrated that with the offsetting growth of the payroll share in the GDP and 50% indexation rates, the deficit of PAYGO in 2005 may reach 1 % of the GDP. Later, thanks to the outpacing wage growth, the deficit could be eliminated by 2010-2012 in the base scenario, and by 2025 – in the high-risk scenario.

2. The PAYGO system accrued deficit was calculated with various indexation rates of the insurance [NDC] pension. Accumulated deficit/surplus curves have been constructed that help to estimate the indexation rate for the insurance [NDC] part of the labor pension and insurance [NDC] capital. Maximal accrued deficit of PAYGO system reaches 4% of GDP in 2025 in case of 70% NDC indexation based on the real wage growth. On the other hand if NDC indexation is 40% of real wage growth, the accrued surplus of PAYGO in the same year will be 5% of GDP.

3. Under the reviewed macroeconomic scenarios, it has been shown that the PAYGO balance deficit formed as a result of the contribution rate reduction goes down faster if the payroll share in the GDP grows at a higher rate. It was demonstrated that it is possible that pension system balance remains stable for a long term period. It could happen if the insurance (NDC) pension is indexed by 50% of the wage growth.. The base part of labor pension in this case could be indexed based on the pensioner's minimum subsistence level (PMSL) growth rate.

4. It has been demonstrated that with a considerable growth of wages the pensioner's minimum subsistence level grows faster than the consumer price index, - at approximately 30 % of the wage growth rate.

5. Despite reduction of the replacement rate, the ratio of average benefit size to pensioner's minimum subsistence level keep growing because of the fast projected growth of wages.

6. Scenarios of increased and maximum risk were run where low growth rates of the GDP and wages were used. Such conditions lead to a reduction in the pension fund revenues. Under the increased risk scenario the deficit of the pension system will remain till 2030. In the maximum risk scenario the system suffers deficit throughout the entire projection period.

7. The funded scheme under high wage growth conditions is not efficient. However, given the slowdown of the wage growth and development of the financial market, the funded component of the labor pension in the future may become commensurate with the size of the benefit provided by the PAYGO system.

8. Development of the non state pension system could achieve the following characteristics: number of participants from 10% could increase to 25% of all pensioners; replacement ratio for voluntary pension could reach 25% (compared to 12% as of nowadays). Risk factors for such developments are inflation risks (high wage growth), small absorbing capacity of financial markets, and unpredicted regulations changes (i.e taxation regulations changes and other). The developed non state pension system could be a tool to mitigate possible unforeseen risks/failures of the state pension system development.

Annex 1

Figures

Dependency ratios

- population (males)
- population (females)
- pension system (males)
- pension system (females)

GDP growth

- Base
- Increased risk
- Maximum risk
- Without SST reform

Unemployment Rate and Inflation Rate for All Scenarios

Share of Wage Bill in GDP

Labour productivity growth

Legend: Base, Increased risk, Maximum risk, Without SST reform

Growth of Employees' Taxable Income

Legend: Base, Increased risk, Without SST reform, Maximum risk

Annex 2

Tabulated Data

Base scenario

	2005	2006	2007	2008	2009	2010	2020	2030	2040	20
Economically active population	**72,5**	**72,8**	**73,0**	**73,1**	**73,1**	**73,0**	**66,0**	**59,5**	**53,5**	**45**
Economically active population (men)	37,9	38,1	38,2	38,3	38,3	38,2	34,6	31,1	28,4	24
Economically active population (women)	34,6	34,7	34,8	34,8	34,8	34,7	31,4	28,4	25,1	21
Employed in economy	**66,8**	**67,2**	**67,5**	**67,7**	**67,9**	**67,9**	**62,0**	**56,2**	**50,6**	**43**
Employed in economy (men)	34,9	35,2	35,3	35,5	35,6	35,6	32,5	29,4	26,9	23
Employed in economy (women)	31,9	32,0	32,2	32,3	32,3	32,3	29,5	26,8	23,7	20
Unemployed	**5,7**	**5,5**	**5,4**	**5,3**	**5,2**	**5,1**	**4,0**	**3,3**	**2,9**	**2**
Unemployed (men)	3,0	2,9	2,8	2,8	2,7	2,7	2,1	1,7	1,5	1
Unemployed (women)	2,7	2,6	2,6	2,5	2,5	2,4	1,9	1,6	1,3	1
Employees – contributors	**50,8**	**51,1**	**51,3**	**51,5**	**51,6**	**51,6**	**47,1**	**42,7**	**38,4**	**32**
Employees – contributors (men)	26,5	26,7	26,9	27,0	27,0	27,0	24,7	22,3	20,4	17
Employees – contributors (women)	24,2	24,3	24,4	24,5	24,6	24,5	22,4	20,4	18,0	15
Self-employed – contributors	**12,7**	**12,8**	**12,8**	**12,9**	**12,9**	**12,9**	**11,8**	**10,7**	**9,6**	**8**
Self-employed – contributors (men)	6,6	6,7	6,7	6,7	6,8	6,8	6,2	5,6	5,1	4
Self-employed - contributors (women)	6,1	6,1	6,1	6,1	6,1	6,1	5,6	5,1	4,5	3
Total pensioners	**39,1**	**39,2**	**39,4**	**39,7**	**40,0**	**40,4**	**43,3**	**42,3**	**41,9**	**41**
Total pensioners (men)	13,8	13,7	13,8	13,8	13,9	14,0	15,3	14,7	13,9	14
Total pensioners (women)	25,2	25,4	25,7	25,9	26,1	26,3	28,0	27,6	28,0	27
Number of labor pensioners	**37,7**	**37,8**	**38,1**	**38,4**	**38,7**	**39,2**	**42,1**	**41,2**	**41,0**	**40**
Number of labor pensioners (men)	13,1	13,0	13,1	13,2	13,2	13,4	14,7	14,1	13,4	13
Number of labor pensioners (women)	24,5	24,8	25,0	25,3	25,5	25,7	27,5	27,1	27,5	26
Dependency ratio	**0,59**	**0,59**	**0,59**	**0,60**	**0,60**	**0,61**	**0,72**	**0,77**	**0,85**	**0,**
Dependency ratio (men)	0,40	0,39	0,39	0,39	0,39	0,40	0,47	0,51	0,53	0,
Dependency ratio (women)	0,81	0,81	0,82	0,82	0,83	0,84	0,98	1,06	1,22	1,

	2005	2006	2007	2008	2009	2010	2020	2030	2040	20
Contributions to base part of pension	230	259	288	315	342	368	608	862	1 179	1 5
Contributions to base part of pension (% of GDP)	1,3	1,4	1,5	1,5	1,6	1,6	1,8	1,8	1,8	1
Contributions to insurance [NDC] part of pension	500	558	591	612	654	693	982	1 278	1 725	2 3
Contributions to insurance [NDC] part of pension (% of GDP)	2,9	3,1	3,1	3,0	3,1	3,1	2,9	2,7	2,7	2
Budget transfers	56	56	56	56	56	56	56	56	56	5
Revenues in the PAYGO system, RUR	731	817	878	928	996	1 061	1 590	2 140	2 904	3 9
Base part payouts	318	327	337	347	356	366	457	503	562	63
Base part payouts, % of GDP	1,8	1,8	1,7	1,7	1,7	1,6	1,3	1,1	0,9	0
Insurance [NDC] part payouts	538	575	612	646	677	710	1 002	1 202	1 432	1 8
Insurance [NDC] part payouts, % of GDP	3,1	3,1	3,2	3,2	3,2	3,2	2,9	2,5	2,2	2
Administrative expenditures	17	18	19	20	21	22	29	34	40	5
Total expenditures	873	920	969	1 013	1 054	1 098	1 489	1 738	2 034	2 5
Balance of revenues and expenditures	-142	-102	-90	-85	-57	-36	101	401	871	1 3
PAYGO balance, % of GDP	-0,82	-0,56	-0,47	-0,42	-0,27	-0,16	0,30	0,84	1,34	1,

	2005	2006	2007	2008	2009	2010	2020	2030	2040	20
Contributions	67,3	80,6	118,7	165,1	188,8	213,6	514,9	846,1	1178,9	159
Funded part payouts	0,2	0,2	0,4	0,7	0,9	1,2	10,2	147,8	552,8	123
Contributions to Payouts	67,1	80,3	118,2	164,4	187,9	212,4	504,7	698,4	626,1	36
Contributions to Payouts, % of GDP	0,39	0,44	0,61	0,81	0,88	0,94	1,48	1,46	0,96	0,
Savings	269	355	480	654	855	1 085	5 298	13 571	25 055	39
Savings, % of GDP	1,6	1,9	2,5	3,2	4,0	4,8	15,6	28,5	38,5	45

	2005	2006	2007	2008	2009	2010	2020	2030	2040	20
Base part replacement rate	10,0	9,1	8,4	7,9	7,4	7,0	4,5	3,2	2,4	1
Base part of labor pension (base year prices)	703	721	738	753	766	780	905	1016	1144	13
Insurance [NDC] part replacement rate	16,8	16,0	15,3	14,7	14,1	13,6	9,9	7,7	6,1	5
Insurance [NDC] part of labor pension (base year prices)	1 190	1 267	1 340	1 400	1 457	1 510	1 983	2 428	2 912	3 9
PAYGO benefit replacement rate	26,8	25,1	23,8	22,6	21,5	20,6	14,4	11,0	8,5	6
PAYGO benefit replacement rate (base	1 894	1 988	2 078	2 153	2 223	2 290	2 887	3 444	4 056	5 2

year prices)										
Funded benefit replacement rate	0,0	0,0	0,0	0,0	0,0	0,0	0,1	1,0	2,6	3
Funded benefit (base year prices)	0	0	0	0	0	0	16	325	1 225	2 7
Total replacement rate	26,8	25,1	23,8	22,6	21,5	20,6	14,5	12,0	11,1	10
Total size of pension benefit (base year prices)	*1 894*	*1 988*	*2 078*	*2 153*	*2 223*	*2 290*	*2 903*	*3 769*	*5 281*	*7 9*
Affordable replacement rate for base part	7,2	7,2	7,2	7,2	7,1	7,0	6,0	5,5	5,0	4
Affordable size of base part (base year prices)	510	572	630	684	736	783	1 202	1 742	2 398	3 2
Affordable insurance [NDC] part replacement rate	15,7	15,6	14,8	13,9	13,6	13,3	9,7	8,2	7,4	6
Affordable size of insurance part (base year prices)	1 107	1 231	1 292	1 328	1 408	1 475	1 943	2 582	3 510	4 8
Total affordable replacement rate of PAYGO system	22,9	22,8	22,0	21,1	20,8	20,3	15,7	13,7	12,4	10
Total affordable replacement rate	22,9	22,8	22,0	21,1	20,8	20,3	15,7	14,8	14,9	14
Total affordable benefit size (base year prices)	*1 617*	*1 802*	*1 922*	*2 012*	*2 144*	*2 259*	*3 161*	*4 649*	*7 133*	*10*
Minimum subsistence level (base year prices)	*1 872*	*1 938*	*2 000*	*2 055*	*2 106*	*2 154*	*2 581*	*2 960*	*3 361*	*3 8*
Total affordable benefit to minimum subsistence level ratio	*86*	*93*	*96*	*98*	*102*	*105*	*122*	*157*	*212*	*2*

Annex 3
 Interest rate variations influence on calculation results.

        The main purpose of this analysis was to review the factors of the financial stability of
the PAYGO system. Assumptions on funded pillar are consistent with main macroeconomic
parameters. For all scenarios interest rate value was initially assumed to be less than real wage
growth. The   real wage growth   used for the period of forecasting was high as it should
correspond to the GDP and productivity growth. The official GOR GDP growth forecast was
used in the model. Upon discussion of the modeling results we came to conclusion that in long
term forecasting period the interest rate should be higher than real wage growth. If to assume that
this is the case than a question   could be asked about the link between interest rate and total
affordable replacement ratio. To answer this question one more scenario was calculated with the
only new assumption on interest rate. The new assumption was – the interest rate exceeds wage
growth by 1 pp starting with 2013. New values of interest rate are presented in Fig1.

Fig. 1 Interest rates.
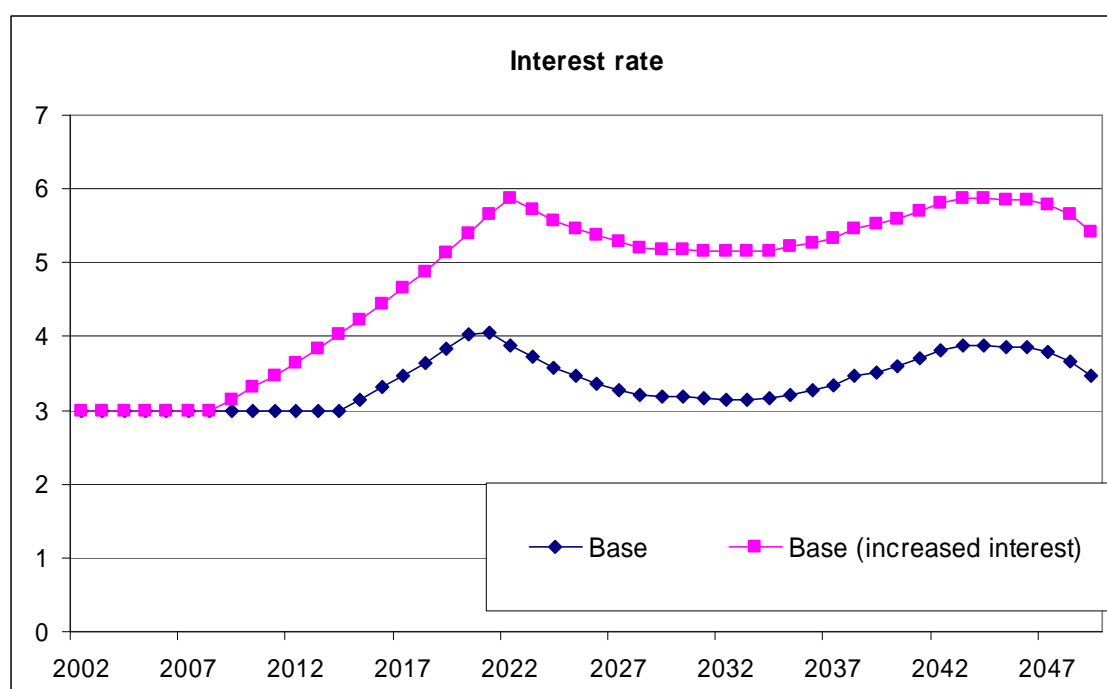
Values of affordable replacement rates are presented in Fig. 2. Increase of average value of
interest rate from 3.5% to 5.5% results in increase of replacement rate for funded pillar in 2050
year from 3.6% to 4.5%. Low replacement ratio for funded pillar could be explained by high
wage growth rate. In 2050 the affordable total replacement rate will increase from 14.3% to
15.2%

Conclusion: calculation results are robust to interest rates changes and the fluctuations of
interest rate are not critical for sustainability of main parameters.

Fig. 2. Replacement ratios

Affordable replacement ratio (increased interest rate)
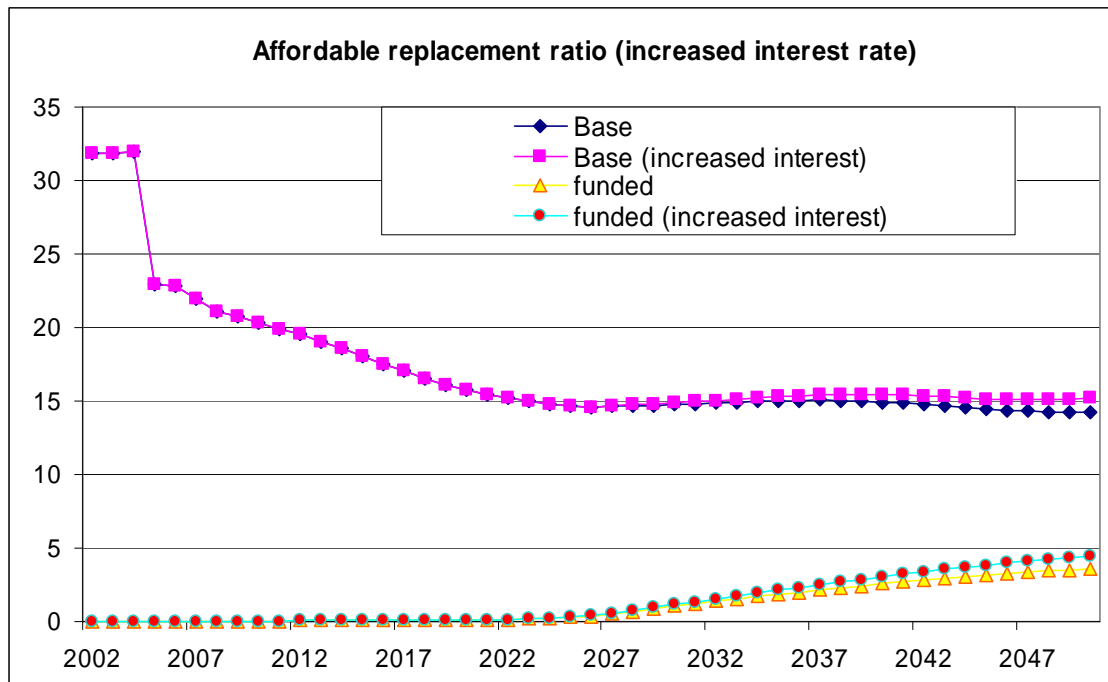
Annex 4.

Non-State Pension Funds Development in Russia: Forecasts with Respect to 2004 Outcomes

This forecast is a follow-up to calculations done in 2003. This paper considered financial outcomes for 2004 and adjusted some macroeconomic assumptions. Forecast outcomes are presented in the Table. Complexity of the forecast is explained by unequal pension reserves distribution among pension funds. The first 10 non-state pension funds (NPF) accumulate 85% of all pension reserves; non-funded pension schemes are present, there is a gap between total liabilities and pension reserves due to re-evaluation.

According to calculations that do not consider pension devaluation risks, under the prevailing macroeconomic conditions and in case the assumptions used for calculations hold, pension reserves with NPF may reach the level of the public funded pillar. The number of NPF contributors and pensioners may reach 25% of the total number of pensioners. The ratio between average NPF benefit and average wage may be equal to 25%. The development of the market is slow due to inflation risks, inadequate absorption capacity of the market (no effective demand for investment proposals) as well as structural changes that occur in the market.

	2004	2005	2006	2007	2008	2009	2010	2011
Population (mln)	144,5	143,9	143,4	142,8	142,3	141,7	141,2	140,6
Population in age cohorts 10 years prior to retirement age (mln.)	19,9	20,6	21,3	21,6	21,8	22,0	21,8	21,6

Retirement age population (mln)	1,2	1,4	1,5	1,7	1,8	1,8	2,0	2,0
Retiring this year (mln)	1,3	1,5	1,5	1,7	1,7	1,8	1,9	1,9
New NPF beneficiaries	**107 278**	152 091	196 372	256 158	307 308	357 478	425 218	470 325
New NPF beneficiaries retired this year	**8%**	10%	13%	15%	18%	20%	23%	25%
NPF beneficiaries receiving non-state pension (mln)	0,44	0,58	0,76	1,00	1,29	1,62	2,00	2,43
NPF beneficiaries not receiving non-state pension (mln)	4,98	5,47	6,03	6,63	7,27	7,91	8,54	9,15
Total NPF beneficiaries (mln)	5,42	6,05	6,79	7,64	8,55	9,53	10,55	11,58
Average NPF benefit (RUR)	**800**	1 072	1 358	1 675	2 024	2 407	2 832	3 300
Total benefits (bln RUR)	4,2	7,5	12,4	20,1	31,3	46,7	68,1	96,1
Average wage (RUR)	6 445	8 099	9 741	11 467	13 297	15 233	17 312	19 528
Average NPF benefit/ average wage (%)	12,4%	13,2%	13,9%	14,6%	15,2%	15,8%	16,4%	16,9%
Total contributions of new pensioners (bln RUR)	8,1	16,2	27,4	45,3	68,4	98,2	142,2	190,2
Average funding level at the payout stage	**60%**	**63%**	**66%**	**69%**	**71%**	**74%**	**77%**	**80%**
Pension liabilities of NPF beneficiaries (bln RUR)	31	57	100	169	272	419	631	918
Average funding level at the accumulation stage	**15%**	**17%**	**19%**	**21%**	**24%**	**26%**	**28%**	**30%**
Pension liabilities for those not receiving benefits (bln RUR)	87	144	221	328	469	650	879	1 161
Total pension liabilities (bln RUR)	118	201	322	497	740	1 069	1 510	2 080
Total pension liabilities in base year prices (bln RUR)	118	185	274	398	559	762	1 020	1 333
Total NPF liabilities, as % of GDP	0,7%	1,1%	1,5%	2,1%	2,7%	3,6%	4,5%	5,6%
Contributors to public pension system	56,4	56,7	56,9	57,0	57,1	57,2	57,1	56,9

Contributions to the public funded pillar (bln RUR)	83,1	84,8	108,9	170,6	251,5	304,0	362,7	427,5
Pension reserves in the public funded pillar (bln RUR)	183	292	436	653	973	1 375	1 873	2 479
Total pension reserves in the public funded pillar as % of GDP	1,1%	1,8%	2,3 %	2,8%	3,6 %	4,3%	5,1%	5,9 %

Currently PAYGO systems are taxable in the NPF market. This move by the Ministry of Finance is aimed to promote individual retirement accounts. However, the market does not have a developed product to support the individual retirement accounts system. Therefore we are likely to see a slow-down in the market development rate under the prevailing conditions. However, the NPF market is a feasible option that could be used to address issues related to pension provision and it will definitely be in demand.