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**THE DISTRIBUTIONAL IMPACT
OF PENSION REFORM IN RUSSIA**

Working paper #2002/031

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Profound transformational decline and other side effects of economic reforms hit pension system as well as other elements of social support. Average pensions were standing in the year 2000 below 40% of their real value of 1990, and amounted to just 76% of the subsistence level.

Long-run demographic projections are unfavorable for the social security system, as dependency ratio is expected to rise more than 2 times in 50 years. Addressing this problem, the government is implementing pension reform, replacing the current 'Pay As You Go' (PAYG) system with a mixed system, which combines PAYG and funded elements.

Basing on long-term demographic and macroeconomic projections for the period 2001-2050, performance of the PAYG and funded pension systems is analyzed. It is demonstrated that joint effect of contradictory factors (labor productivity, dependency ratio, increasing share of wages in GDP) results in low expected implicit rate of return of PAYG pension system. Keeping this system would further increase gap between pensions and wages, which is already excessive by international standards. On the other hand, high projected marginal efficiency of capital gives grounds to expect high return on invested capital, and ensures relatively favorable prospects for the funded pension system.

Our analysis reveals significant distributional effects of the pension reform. Cohorts who are currently in the under-retirement age are losers, and younger cohorts are expected to win substantially from the reform. Gains differ by gender, being much less for women, as they have lower social security contributions, less employment length and longer period of retirement.

The general conclusion is that the reform is necessary, but additional measures may be required to improve social security.

Гурвич Е.Т. Распределительный эффект российской пенсионной реформы. Препринт #2002/031.- М. Российская экономическая школа, 2002.- 26 с. (Англ.)

Глубокий трансформационный спад и другие «побочные эффекты» экономических реформ в России серьезно ослабили пенсионную систему. Реальный размер пенсий в 2000 году составлял менее 40% от уровня 1990 года и лишь 76% от прожиточного минимума.

Долгосрочные демографические прогнозы крайне неблагоприятны с точки зрения пенсионного обеспечения, поскольку соотношение населения в пенсионном и рабочем возрасте в течение 50 лет должно возрасти более чем вдвое. Для того чтобы обеспечить финансовую устойчивость системы социального обеспечения правительство проводит в настоящее время пенсионную реформу, в результате которой на смену распределительной системе должна придти смешанная, сочетающая элементы распределительной и накопительной.

В работе строится долгосрочный макроэкономический прогноз на период до 2050 г. и, с учетом демографического прогноза, анализируются ожидаемые характеристики системы социального обеспечения. Показывается, что совместное действие разнонаправленных факторов (динамики производительности труда, соотношения численности пенсионеров и работников, изменения доли оплаты труда в ВВП) дает сравнительно низкую оценку «естественного темпа роста» распределительных пенсий. Таким образом, сохранение данной системы привело бы к дальнейшему расширению разрыва между пенсиями и зарплатой, который уже весьма велик по международным меркам. С другой стороны, высокая оцениваемая производительность нового капитала позволяет рассчитывать на значительный инвестиционный доход и, следовательно, открывает хорошие перспективы для накопительной системы.

Проведенный анализ выявил существенные распределительные эффекты пенсионной реформы. Когорты, находящиеся в настоящий момент в предпенсионном возрасте, проигрывают от ее проведения, а в наибольшем выигрыше остаются самые молодые поколения. Эффект также значительно различается по полу: он намного меньше для женщин, поскольку они платят меньшие пенсионные отчисления, имеют в среднем более короткий период занятости и более длительный период получения пенсий.

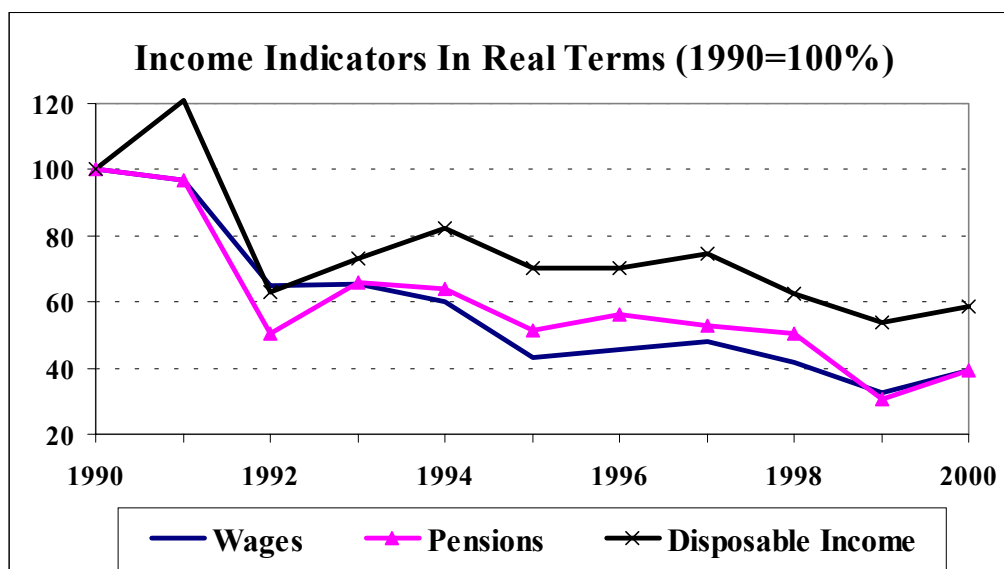
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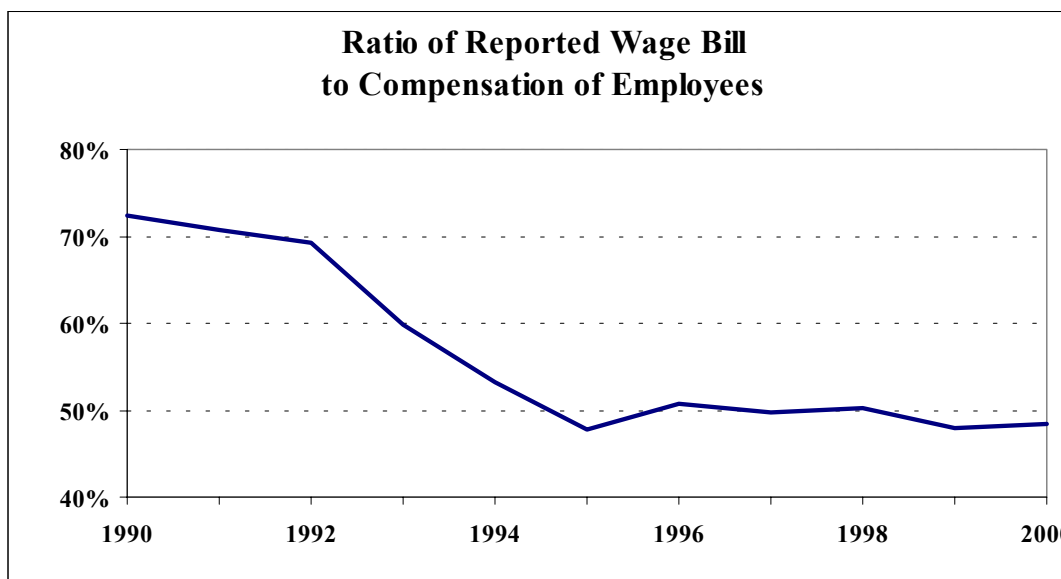
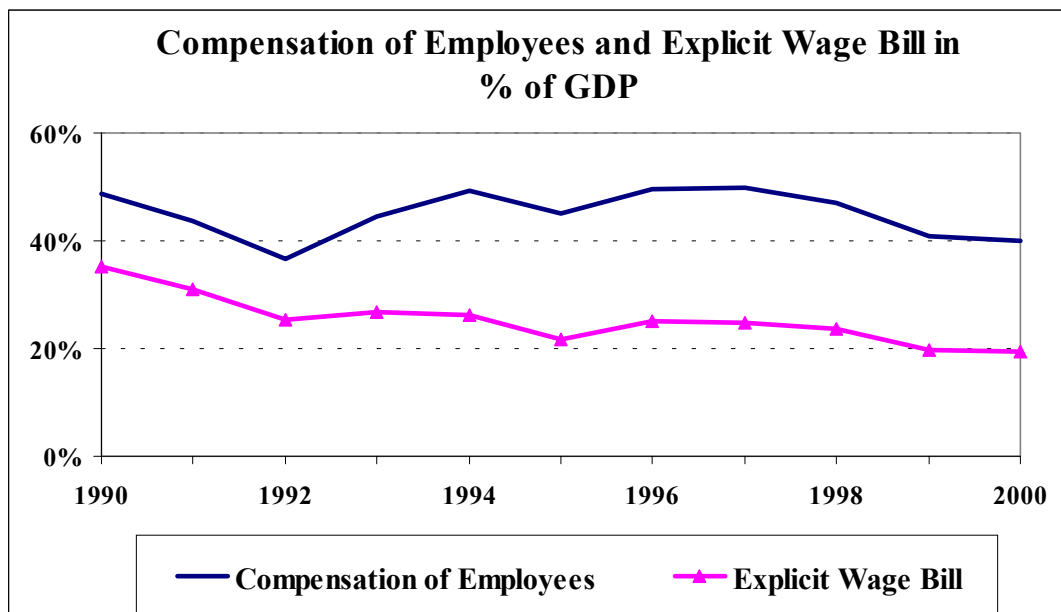
Recent trends in the Russian social security system

Profound transformational decline and other ‘side effects’ of economic reforms have hit pension system as well as other aspects of standards of living. Despite common view, losses of pensioners were roughly proportional to that of working population, though exceeded substantially decrease in the disposable income. Real income has dropped from 1990 to 2000 by 41%, while real wages and pensions – by 61%.



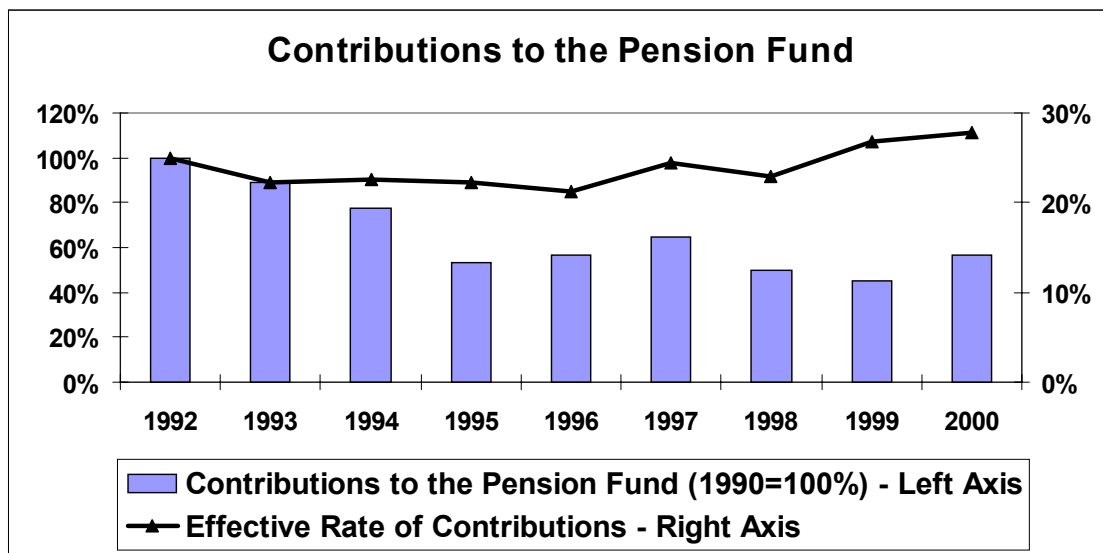
What is lying behind these trends? First, production decline, but it accounts for only part of the sharp fall in pensions, as GDP has fallen by ‘only’ 34% since 1990. Other important factor was contraction of employees compensations in percentage of GDP. Their share has dropped from 49% in 1990 to just 40%. In addition to that, growing part of wages was paid in a hidden form. Share of hidden wages, as reported by the statistics agency (Goskomstat) is currently standing close to one third of the total wage bill. As a result, weight of the reported wage bill (on which payroll taxes are charged) in GDP fell even more dramatically: it dropped from 35% in 1990 to less than 20% in 2000. Following these trends, tax base for pension contributions diminished in real terms threefold over the period 1990 to 2000.

One of the most vicious diseases of our economy – arrears, also contributed to depletion of social security funds. The next chart shows that effective rate of pension contributions fell to just 21% in 1996, while their notional rate amounted to 29%, though recovered then to almost 28%. All factors taken together resulted in contraction of pension funds almost by half only over the period 1992 to 2000.



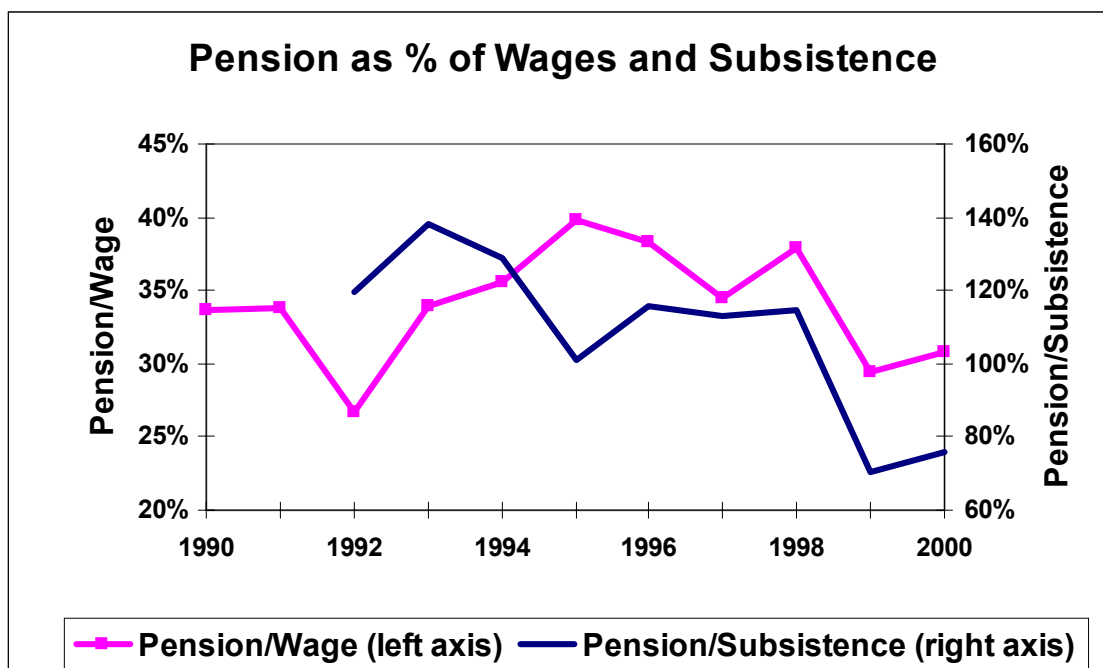
How can we characterize the current situation in the social security system? It was close to collapse in the aftermath of the financial crisis of 1998, when average pension dropped to just 30% of its real level in 1990. Average pension fell for the first time below the subsistence level - to just 70% of it.

In the year 2000 it recovered somewhat, but less than wages, and reached 79% of the subsistence level. As a matter of fact this result was affected by conservative policy pursued by the government: Pension Fund, like the federal budget, ran a large surplus (23% of revenues). If pension budget were balanced, average pension would recover to 48% of the 1990 level, and 94% of the subsistence level, i.e. almost to the pre-crisis figures. This is important as in our analysis we will use as a benchmark this feasible level of pensions rather than the actual level.



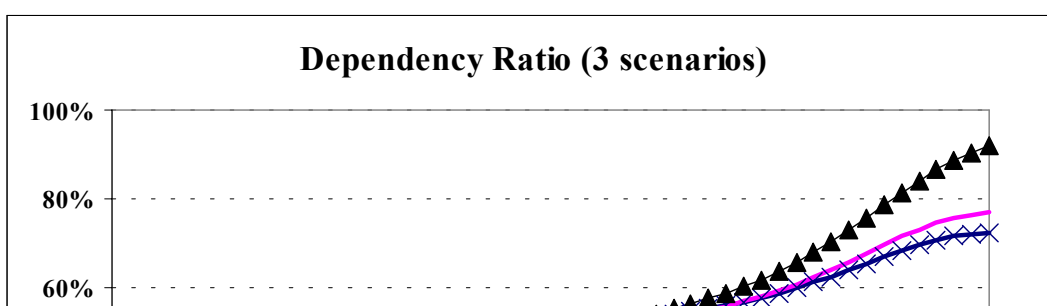
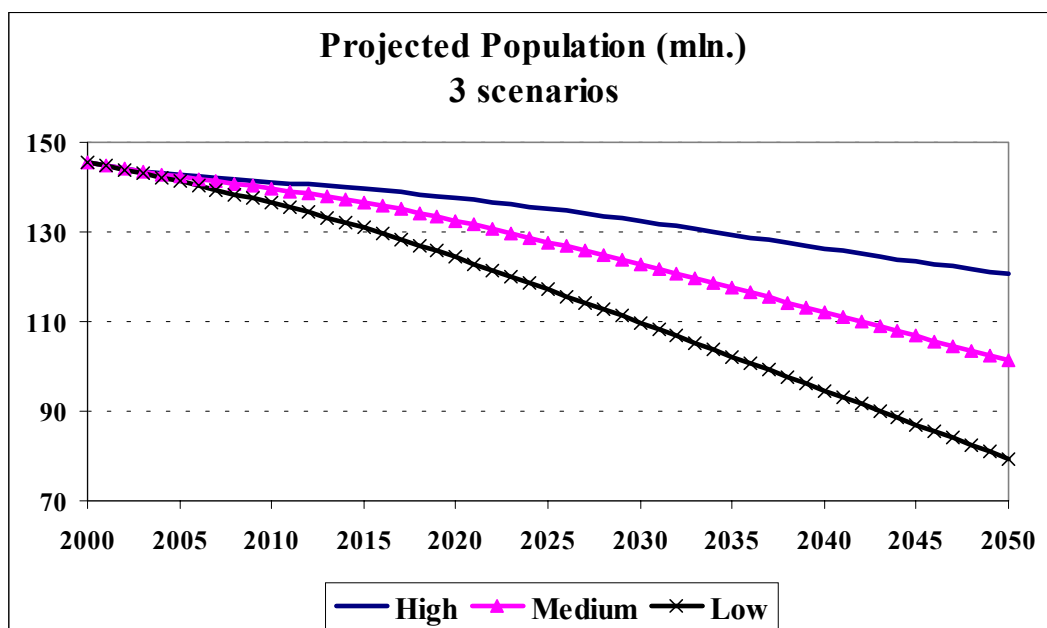
Ratio of pensions to wages throughout reforms period varied around its initial level (33%). Currently it is standing a bit lower than that (at 31%), but potentially could exceed it, reaching 38% of the 1990 ratio, if pension funds were fully used.

To summarize, the current situation with the social security system is definitely unsatisfactory, as pensions are lying even below the subsistence level. But, on the other hand, trends in pensions were similar to that of wages, i.e. were falling in line with them. Current trends are looking positive, both for pensions and for the economy as a whole.



Let us look now at the further prospects of our pension system. It is clear that they depend primarily on two things: macroeconomics and demography. Most analysts assume today that Russia is on a good track and its growth prospects are estimated as more favorable than for most emerging markets. We will discuss this issue in more details below, and now let us turn to demographic situation. It is well known that population of Russia is rapidly declining in the recent years. Less known are long-term demographic forecast (we use projections produced by the Center for Demography and Human Ecology). Unfortunately they predict sustained fall in population, with its speed increasing after the year 2015. According to the ‘pessimistic’ scenario permanent population will drop in the forthcoming 50 years *almost by half* (45%), ‘moderate’ scenario envisages its decline *by one third* (30%), and in the ‘optimistic’ scenario population falls *by ‘only’* 17%. In the further analysis we will focus on the moderate projection, which predicts population decrease from 145 mln. in 2000 down to 100 mln. in 2050.

Still more important for the pension system is expected rapid aging of population. As shown in the chart, ratio of population in the pension age to population in working age (‘dependency ratio’) is expected to grow more than two times from the current 33%. This ratio is growing uniformly by scenario for some 35 years, but then projections diverge. Predicted total increment of this ratio over 50 years exceeds 100% in all scenarios and reaches 170% for the pessimistic scenario. This problem is common for most European countries (Feldstein, Siebert, 2002), but in Russia it is especially acute, and has other source, being caused rather by sharp decline in birth rate than by growing life expectancy.



As a result, number of pensioners per one employed is projected to increase immensely. Currently this ratio is standing at 47%, and by the year 2050 this ratio will come close to 100%. This proves that long-run prospects for our pension system are far from being bright.

Fully realizing these problems the government is implementing pension reform that (like in many other former socialist countries) envisages transition from the current pay-as-you-go (PAYG) system to a mixed one, combining PAYG and funded systems. The key points of this reform can be summarized as follows:

- The modified pension system supposedly will start to operate on January 1 2002.
- The new pension system will include 3 pillars: basic, insurance, and funded pensions. The size of the basic pension will not depend on employment duration and amount of past wage. The insurance pension will be paid from the current contributions (according to the PAYG principle) but will depend on the past contributions of the pensioner. Finally the third component will perform as a fully funded system.
 - Past contributions (for both employed and retired) will be reflected in the ‘pension capital’, which will depend on the duration of employment and wage level.
 - Pension contributions will constitute 28% of the payroll.
 - Half of pension contributions will be used for basic pensions. Long-term proportion of splitting another half into insurance and funded systems is 9:5.
 - During the transition stage proportions of contributions to the insurance and funded systems will change over time depending on age. Those who are to retire in 10 years or earlier will

not participate in the funded system at all. For those who are to retire in 11 to 25 years (men) or 11 to 20 years (women) the proportion will constitute 12:2. For those who are now younger than 35 this proportion will change in 4 years from 11:3 in 2002 to 9:5 in 2005 (and will remain then at this level).

Some important details are not specified as yet – say, how exactly social security funds can be invested, hence our further analysis is based on some plausible assumptions in all such cases.

We try to address below the following questions:

- What could be implications of keeping the current PAYG system?
- What can we expect from the pension reform under implementation?
- Who are the major beneficiaries of the reform and who is bearing losses?
- How large are benefits and losses of the reform?
- Can the reform be adjusted to minimize losses for the vulnerable groups?

To answer these questions we need first macroeconomic forecast.

Macroeconomic Projection

The long-term projections were based on a model, describing capital and labour developments. The entire time horizon was divided into two stages. The first stage (2001-2010) covers adjustment period, when structural and institutional reforms are carried out. As a result, first, speed of economy modernisation is hiking, and, second, by the end of this stage economy is approaching the state of full utilisation of available resources. The rapid modernisation is based on extensive investment (their rate is rapidly growing) and increasing efficiency of the new capital. We envisage that at the second stage (2011-2050) economy will follow more standard growth patterns, characterised with models of labour-saving progress.

The forecast of the labour supply was based on the medium of the three demographic scenarios.

The following indicators were used as inputs (for the years 2001-2050):

- Projected estimates of labour force LF_t ,
- Inflation CPI_t ,

- Real exchange rate RER_t (constant roubles per constant dollars – this implies that index exceeding 100% indicates rouble depreciation, and that below 100% - rouble appreciation),
- Price indices for Russian exports (price level at the year 2000 is taken as 100%) PX_t .

These figures are taken as exogenous for the current model, but they are also based on forecasting models. In particular, the real exchange rate was estimated with account of forecasted prices of the major goods exported by Russia (including crude oil, gas, metals, etc.), foreign debt service schedule, expected development of capital flows, and assumptions on the Central Bank currency policy.

In addition, GDP break-down by use was partly taken as an exogenous assumption (like exports and imports shares), and partly simulated (like investment rate).

The model output includes annual projections of the following variables:

- GDP at constant prices of the year 2000,
- GDP deflators,
- Employment,
- Labour productivity (overall and by economic sector),
- Gross wages,

The same macroeconomic model was used to implement forecasting for the first and the second stages, differences concerned mainly definition of the model parameters, as stated below.

GDP volume

Forecasted growth rates are based on the production function of Cobb-Duglas type:

$$Y = \alpha KE^{0.4} LE^{0.6}$$

where Y is GDP at constant prices, KE – effective capital amount, LE – effective labour amount, and α - coefficient.

$$Y_t = Y_{t-1} (KE_t / KE_{t-1})^{0.4} \cdot (LE_t / LE_{t-1})^{0.6}$$

Capital Formation

Effective capital is calculated as sum of the effective ‘new’ and ‘old’ capitals (KEO and KEN correspondingly).

$$KE_t = KEO_t + KEN_t$$

Both are calculated stepwise with due regard to capital depreciation (at rate δ_t) and investment. The effective old capital is equal to a product of the old capital (KO) by capacity utilisation rate (CUR), which depends both on macroeconomic conditions and structural adjustments.

$$KEO_t = KO_t \cdot CUR_t$$

$$KO_t = KO_{t-1} \cdot (1 - \delta_t)$$

The effective new capital (KEN) is reduced at each step by the annual depreciation rate, and augmented by the amount of effective gross investment at constant prices IE_t .

$$KEN_t = KEN_{t-1} \cdot (1 - \delta_t) + IE_{t-1}$$

Effective investment are a product of investment volume at constant prices I_t and efficiency level E_t . The investment amount is calculated as GDP volume by the rate of gross investment (σ_t):

$$IE_t = I_t \cdot E_t$$

$$I_t = Y_t \cdot \sigma_t.$$

The latter is taken from an exogenous forecast for the years 2001-2010 (see below). Convergence of actual investment rate σ_t to the equilibrium level σ_t^* is assumed for the subsequent years:

$$\sigma_t = \sigma_{t-1} + \rho_t \cdot (\sigma_t^* - \sigma_{t-1}),$$

where ρ_t is an adjustment speed.

The equilibrium investment rate is calculated as:

$$\sigma_t^* = (g_t + \delta_t + n_t) / \alpha \cdot (KE_t / LE_t)^{0.6}$$

where g_t is a technical progress rate, and n_t – rate of labour force growth

Other elements of GDP by use were estimated to add up to 100%.

Labour

Effective labour LE is assumed to equal the product of number of employees L by labour efficiency E2:

$$LE_t = L_t E2_t$$

At each step the optimum number of employed L^* (given the current levels of gross wages W and capital) is calculated:

$$L_t^* = KE_t [0.6 \cdot \alpha \cdot E2_t^{0.6} / W_t]^{1/0.4}$$

It is assumed that actual number is approaching this target, if the latter does not exceed the labour supply. Labour supply is defined as labour force minus ‘natural’ unemployment (its rate is denoted u):

$$LS_t = LF_t \cdot (1-u)$$

The speed of approaching the target depends on the size of free labour resources:

$$L_t = L_{t-1} + \beta_t \cdot (L_{t-1}^* - L_{t-1}) \cdot (LS_{t-1} / L_{t-1} - 1), \quad \text{if } L_{t-1} < LS_{t-1},$$

$$\text{or} \quad L_t = LS_{t-1} \quad \text{otherwise.}$$

These formulas reflect one-step lag in the employment formation.

Labour productivity was calculated then:

$$LP_t = Y_t / L_t$$

Wages

The target gross wages W^* are taken equal to the marginal product of labour:

$$W_t^* = 0.6 \cdot \alpha \cdot E2_t (KE_t / LE_t)^{0.4}$$

Actual wages are approaching at each step these target values:

$$W_t = W_{t-1} + \gamma_t \cdot (W_{t-1}^* - W_{t-1})$$

Deflators

GDP deflators DEF are estimated basing on three factors: inflation (CPI), exchange rate (ER), and prises of Russian exports (PX):

$$DEF_t = (1 - \omega_t) I_t + \omega_t \cdot (ER_t / ER_{t-1}) \cdot (PX_t / PX_{t-1}),$$

where ω_t is a share of exports in the GDP.

This reflects the fact that GDP can be defined as costs of all final goods produced in the country. All exported goods are final, and they should be included to the GDP at their export prices converted into roubles.

Exchange rate depends on inflation, real appreciation or depreciation of the rouble, and inflation in the USA (I\$):

$$ER_t = ER_{t-1} \cdot CPI_t \cdot (RER_t / RER_{t-1}) / I\$_t.$$

The following assumptions and estimates were used in the forecast below.

GDP

Assumed shares of GDP elements by use reflected the following considerations:

- Contracting share of net exports with gradual real appreciation of rouble,
- Decrease of government consumption in the years 2002-2003 reflecting tightened fiscal policy at this stage, and constant level of these consumption in % of GDP in 2004-2008.

Speed of adjustment of gross investment rates was evaluated as $\rho=10\%$.

Table 1. Estimated Weights of GDP Elements by Use (2001-2010)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
GDP total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Consumption	66%	68%	69%	69%	69%	70%	70%	70%	70%	70%
<i>O/w:</i>	49%	52%	53%	53%	53%	54%	54%	54%	53%	53%
Public										
Private	15%	14%	14%	14%	14%	14%	14%	14%	15%	15%
Non-profit institutions	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Gross Investment	20%	21%	22%	23%	24%	24%	25%	25%	26%	27%
Net export	15%	11%	9%	8%	7%	6%	5%	5%	4%	4%
Export	39%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Import	24%	24%	26%	27%	28%	29%	30%	31%	31%	32%

Capital formation

Depreciation rates were taken at 6% both for the old and new capital, but for the new capital (that appeared after 2000) depreciation begins only after the year 2010.

Rate of capacity utilization is assumed to grow from 71% in 2000 to 80% in 2006, and then to remain at this level.

Efficiency of new capital was assumed to grow by 3% per year in the years 2001-2010. Subsequently capital efficiency was assumed to remain flat, as labour-saving progress is assumed.

Labour

The long-term ‘natural’ unemployment rate was estimated as 6% of the labour force.

Speed of adjustment towards the optimal employment (β_t) is taken at 10% for the years 2001-2003. Then it increases up to 20% in 2014 (with development of labour force mobility), and remains at this level for the rest of the period (2015-2050).

Labour efficiency $E2$ was evaluated to grow during the years 2001-2010 by 2.3% per year on average.

Beginning in 2011 another model of technological progress was used. In the framework of the labour-saving progress rate g of labour efficiency growth was taken 4% for the year 2011, and then gradually declining to 3% in 2016, and 2.5% in 2021. After that the progress rate was taken unchanged.

Wages

The speed of wage convergence to the optimum level was taken as proportional to the ratio of natural and actual rates of unemployment:

$$\gamma_t = 0.3 u / (1-L_t/LF_t).$$

Deflators

The following estimated inflation rates, real appreciation, and indices of export prices were used for the years 2001-2010:

Table 2. Price indices and exchange rates

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CPI (year average)	22%	15%	14%	11%	10%	9%	9%	8%	7%	7%
Exchange rate (rouble per US\$)	29.2	31.5	34.5	36.4	38.5	40.3	42.1	43.5	44.9	46.0
Index of export prices (in % to the year 2000)	94%	89%	85%	85%	85%	86%	87%	88%	88%	89%

In the subsequent period inflation is assumed to gradually decline to 4% in 2021, and remain at this level through the year 2050. Real exchange rate of the rouble is assumed to

appreciate vs. dollar by 1% a year in 2011-2021, and then stabilize at this level. Inflation in the USA is taken at 1.5% a year.

Overview of Results

The key conclusion of the projection is that production growth is slowing down by the end of the period under consideration. Its rate falls close to zero in the scenarios with medium demographic forecast and becomes negative after the year 2040 in scenarios with low demographic forecast. The fundamental reason for this is rapid decline of population and, correspondingly, labour supply. The latter becomes quite significant around 2015, and strengthens after 2030. As a result, though labour productivity is estimated to rise more than 5 times over the period 2001-2050, GDP volume may increase only 3 times.

A salient feature of the current economic situation in Russia is relatively low level of wages. Our model envisages gradual approach of gross wages to the labour marginal productivity, in line with general principles of economic theory. As a result, share of wages in GDP is going up, from 40% in 2000, to 50% in 2012, and further to 65% in 2050. Overview of the major findings are presented in the table below.

Table 3. Projected average annual growth rates

	2001-2010	2011-2020	2021-2030	2031-2040	2041-2050	2001-2050
Labour force	0.1%	-1.1%	-1.2%	-1.8%	-2.4%	-1.3%
GDP at constant prices	4.1%	3.0%	2.1%	1.4%	0.6%	2.2%
Total number of employed	0.4%	-0.8%	-1.2%	-1.7%	-2.4%	-1.1%
Labour productivity	3.6%	3.9%	3.4%	3.1%	3.0%	3.4%
Real wages	6.1%	5.3%	3.9%	4.6%	3.8%	4.7%
Reported wage bill	6.2%	4.1%	2.5%	2.8%	1.3%	3.4%

Interest rates

Analysis of funded social security system requires projections of interest rates. Two approaches were used in our study. First, we projected marginal capital efficiency as a possible measure of return on investment. On the other hand, possible rates for Russian government bonds were estimated, taking into account interest rates parity.

The former estimates were derived from the production function and constructed long-term projections.

Long-term interest rates on foreign currency government bonds were forecasted basing on the model constructed in the World Bank (Min H.G., Determinants of Emerging Market Bond Spread: Do Economic Fundamentals Matter?, World Bank Working Paper #1899, 1998). According to this model (which is based on analysis of around 500 observations) bond spreads S (i.e. excess of interest rates over rates of risk-free securities) have statistically significant dependence on fundamental characteristics, including foreign debt stock (D) in % of GDP at current prices (V), amount of international reserves (R), debt service due (DS), growth rates of exports value (X) and imports value (M), inflation rate (CPI), terms of trade TOT (proportion of price indices of exported and imported goods), and bond maturity in years (MT):

$$\ln(S) = 7.5 + 0.005 \cdot (D_t/V_t) - 0.026 \cdot (R_t/V_t) + 0.030 \cdot (DS_t/X_t) + 0.039 \cdot (M_t/M_{t-1} - 1) - 0.011 \cdot (X_t/X_{t-1} - 1) + 0.016 \cdot CPI_t - 0.019 \cdot TOT_t - 0.015 \cdot MT_t.$$

This model was used jointly with assumptions on fiscal policy (primarily proportion rf of foreign debt refinancing, i.e. size of new borrowing in proportion to the redemption due) and currency policy (presumed targets of international reserves) to construct year by year projections of interest rates, amount of new foreign borrowing, and debt service due.

It was assumed that amount of international reserves covers 3 months of imports plus external debt payments due.

Interest rates (r_t) were obtained from the calculated spreads by adding their values to the projected risk-free rates (rf_t):

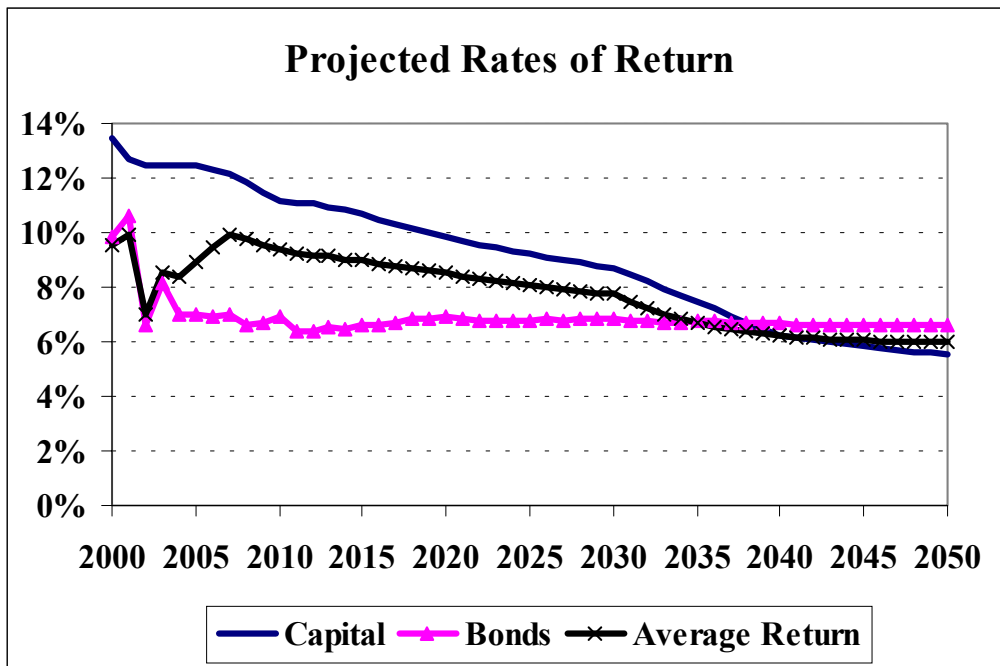
$$r_t = s_t + rf_t.$$

Equivalent rates for bonds nominated in rubles (rr_t) were estimated via interest rates parity, assuming perfect currency expectations:

$$rr_t = (1+r_t) \cdot (1+ER_{t+T} / ER_t) - 1.$$

It was assumed that return of the funded system equals to a weighed average of these two rates adjusted for operation costs. The results are presented in the chart. Average rate of return over the period 2002 to 2050 amounts to 7.7%, reflecting estimated high efficiency of investment and relatively high costs of external capital. Annual rates fall from some 9% over the next decade to 6% in the last decade. Both approaches produce thus very close estimates in the long run, and this evidences to my mind that they are reasonable enough. The next problem was constructing discount

rates. We estimated them as an average of the same interest rates adjusted for taxation. Estimated discount rate gradually declined from some 7% to 5%, with the period average amounting to 6.2%.

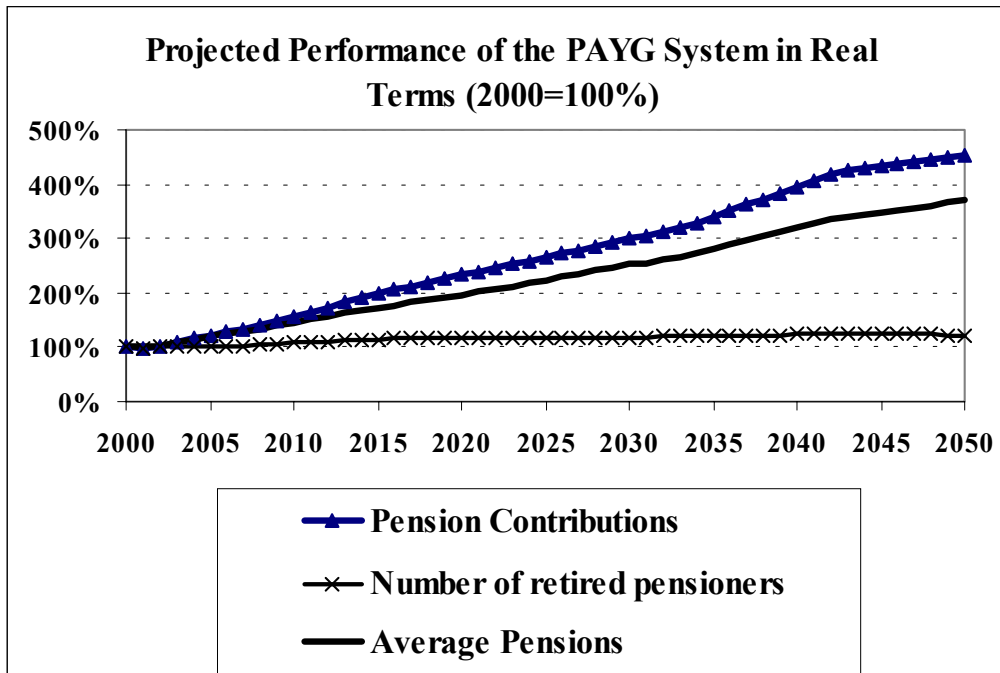


Prospects of the current social security system

Building on the macroeconomic forecast we constructed possible performance of the current PAYG social security system for the period 2001-2050. Two approaches to simulation of the pension system performance are possible in principle: to fix contribution rates or to fix benefits. We assume below, that effective rate of contributions to the social security system remains the same over the entire period. In fact this implies growing burden of these contributions in % of GDP, as share of reported wage bill in GDP is estimated to increase by almost 80%.

Total social security contributions in real terms were estimated and then divided by the projected number of aged pensioners to obtain real average pensions. Comparing security system resources rather than pensions is important because, as noted above, the former are currently underused, and this may distort the benchmark initial level of pensions. The projected trends are presented in the next chart.

Real pension is projected to grow with an average rate 2.7%, and speed of the growth is gradually decreasing. Average rate for the period 2001-2030 (for a man who is today at age 40, this covers range from the middle of his work period to the middle of his pension age) equals 3.1%, for the period 2010-2040 (which covers similar period for men who are now 30) it declines to 2.7%, and for the period 2020-2050 it amounts to 2.1%.



Hence, estimated average implicit rate of return of the current social security system over the next 50 years amounts to 2.7%. Implicit rate of return is affected by three major factors, of which two are standard, and one relates to the expected elimination of structural distortions. The first one is a labour productivity, which is growing by 3.4% per year. Contribution of demographic factor is negative, as ratio of employed to aged pensioners is falling on average by 1.5% per year. Hence joint effect of these two factors would provide implicit annual rate of return of only 1.8%. But one more factor positively affects pension revenues: increase of wage bill as a proportion of GDP (both due to growing share of employees compensations and to falling weight of hidden wages). This factor adds about 1% of annual return to the implicit rate. The reverse side of increased weight of wage bill in GDP is rising load of social security contributions: their ratio to GDP is increasing from the current 19% to 34% in 2050, which is exactly the level of the year 1990. Contribution of various factors to the implicit rate of return by period is presented in the Table 4.

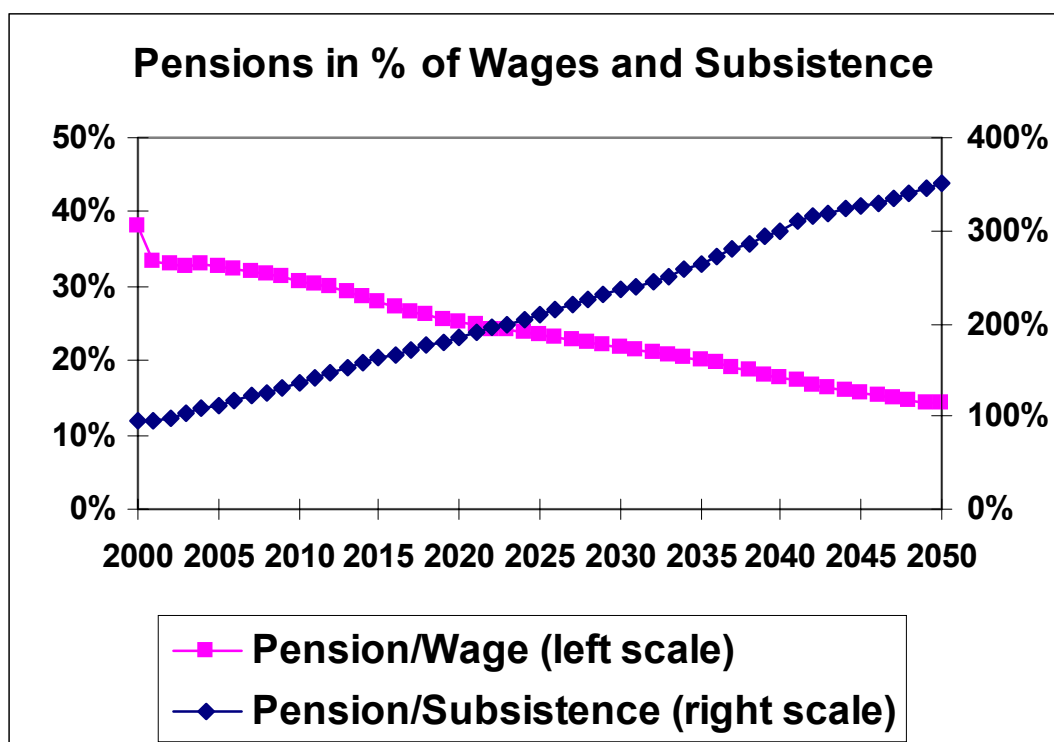
Comparison of average pensions to wages and subsistence level proves that trends are quite unfavourable in this respect. Gap between pensions and average wages (which is already large by international standards) is projected to further increase, so that their ratio is falling to just 14% by 2050 (current ratio adjusted for underused pension resources stands at 41%). Average pension is projected to exceed subsistence level by a factor of 2 only by 2024, and the real magnitude of pension will restore to the level of 1990 by the year 2022.

Replacement rate (defined as proportion of initial pension to wage at retirement age) is projected to fall as low as 28% for men and 20% for women by the end of period.

Table 4. Contribution of factors to the implicit rate of return

	2001-2030	2011-2040	2021-2050	2001-2050
Labour productivity	3.6%	3.4%	3.2%	3.4%
Number of employed per pensioner	-1.1%	-1.7%	-1.8%	-1.5%
Ratio of reported wage bill to GDP	1.2%	1.0%	0.9%	1.1%
Effective contribution rate	-0.5%	0.0%	0.0%	-0.3%
Implicit rate of return	3.1%	2.7%	2.1%	2.7%

What general conclusion can be made on the prospects of the current social security system? One cannot tell that it is entirely non-viable, as average pensions are expected to grow gradually. But, on the other hand, current system is definitely far from being satisfactory. Growing gap between pensions and wages, and very slow recovery of average pensions makes the PAYG system quite unacceptable in a long run.



Mixed Social Security System

The next step to make is analysis of the mixed social security system, which the government is going to introduce starting next year.

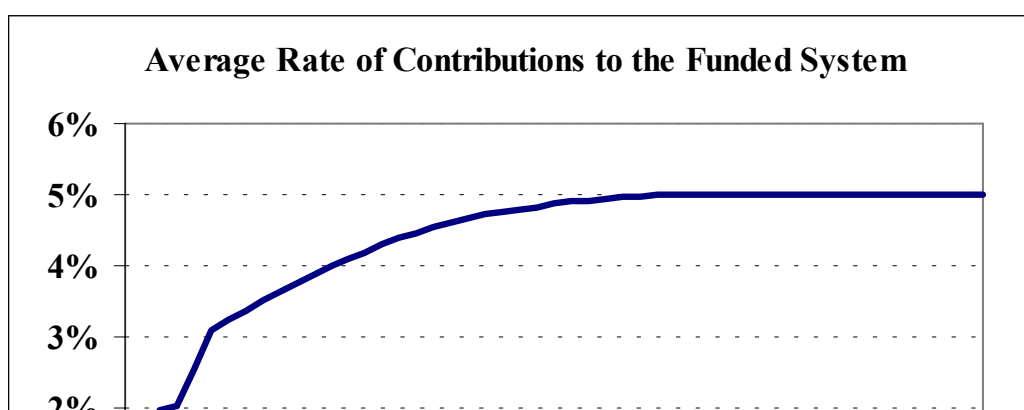
Exact mechanisms of setting pensions under new system are not established as yet, hence in case of uncertainty we applied reasonably looking rules.

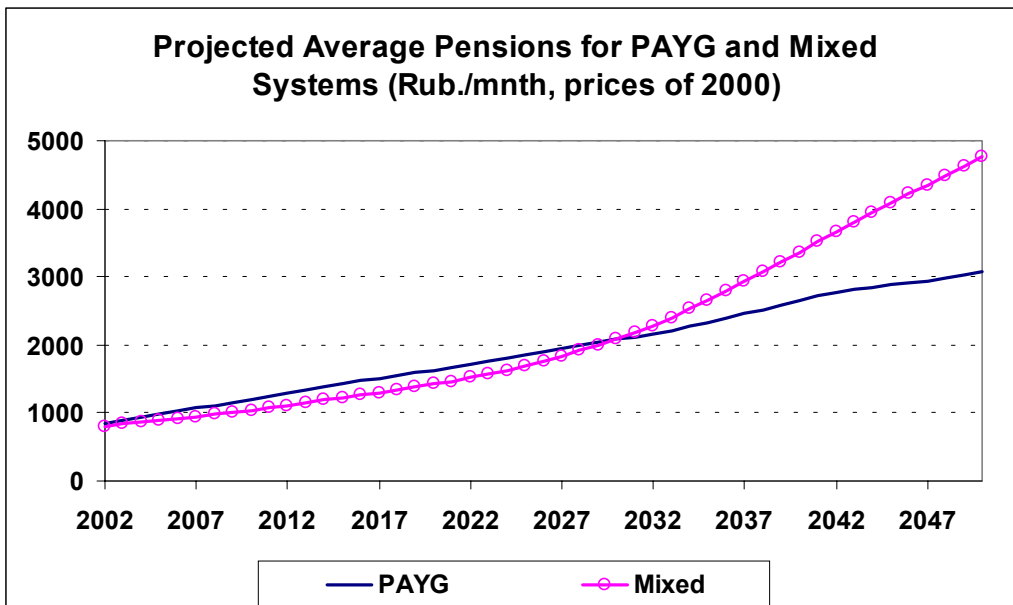
In this simulation we used participation rates and employment rates for different age and gender groups reported by Goskomstat, and wage differentiation by age/gender from the last RLMS statistic (referring to the year 2000). We assumed that share of all social security funds used to pay pensions to aged does not change, remaining at 75% (the rest going to disabled, orphans, etc.). Unlike the currently suggested by the bill 'On Labour Pensions' rule that size of funded pension depends on the investment accumulated at the personal account by the moment of retirement, we assumed that investment income obtained during the retirement period is also used as a source of funded pensions. Payments from the funded components were distributed over the expected life period, which was derived from the demographic forecasts and amounted to 15 years for men, and 24 years for women.

Estimated effective rates of payments to the funded systems are presented in the chart. One can see that the effective rate reaches 3% in the year 2005, 4% in 2012, and 5% in 2029. This means, that share of contributions taken from base and insurance components to the funded system (and thus cutting payments from the former) is gradually rising, up to 18%.

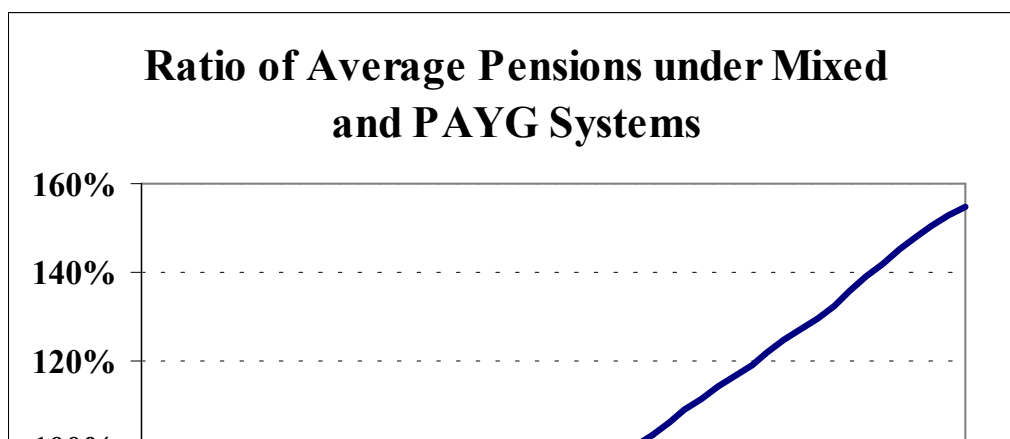
What does this mean for performance of the social security system over transition stage? No pensions will be paid from the personal accounts in the next ten years, while contributions for basic and insurance pensions will fall. It is clear hence that the mixed system initially leads to lower average pensions (as social security contributions are used at this stage to accumulate capital for the funded system). Our projection evidences, that the largest losses are observed in the period 2011 to 2018, when the difference of average pensions reaches 14%. After the year 2030 pensions obtained from the funded component of the social security system overweigh losses of the PAYG component, and advantages of the mixed system become more and more significant. Growth rate of average pensions exceeds at this stage that for the PAYG system more than 2 times. As a result, in the year 2050 average pensions in the mixed system are expected to exceed that of the PAYG system by 54%. Annual growth rate of the average pension for the period 2001-2050 rises from 2.7% ensured by the PAYG system to 3.6% ensured by the mixed system, and this advantage is increasing with years.

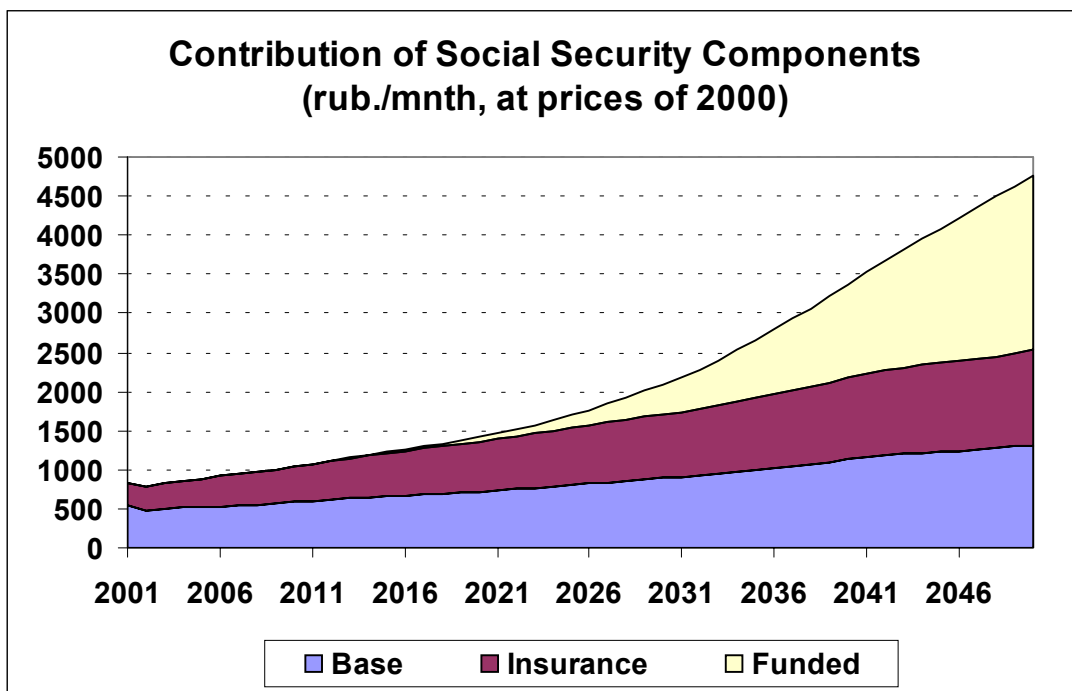
Role of funded component becomes noticeable only after 2020, when its contribution exceeds 5% of total pensions. By the year 2050 this component already accounts for more than a half of total pensions.



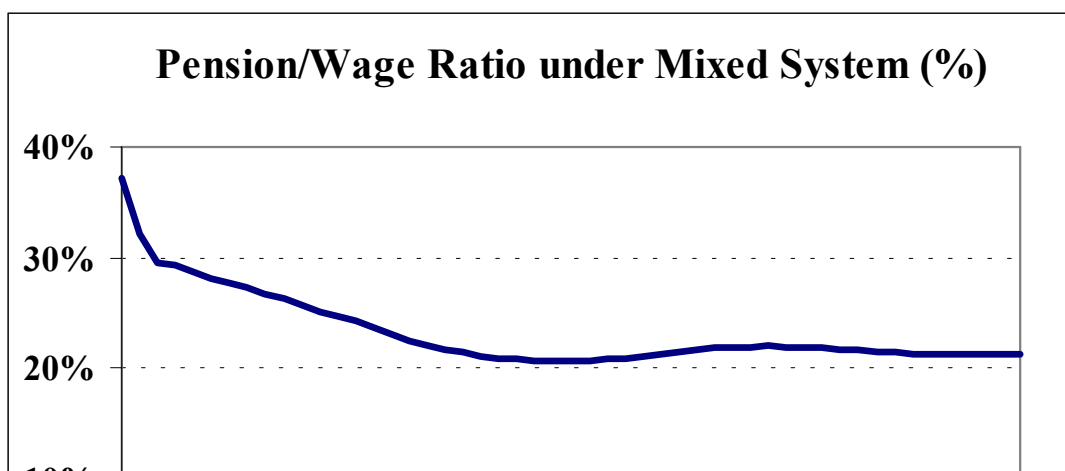


Is the gap between pensions and wages getting smaller? One can see this at the next chart. It evidences that the mixed system makes it possible to prevent pension-to-wage ratio from falling (as it was the case in the PAYG system). This proportion is stabilised in the mixed system at 21-22%. Replacement rate after reaching bottom level around 2020 starts to rise to reach 62% for men and 32% for women.



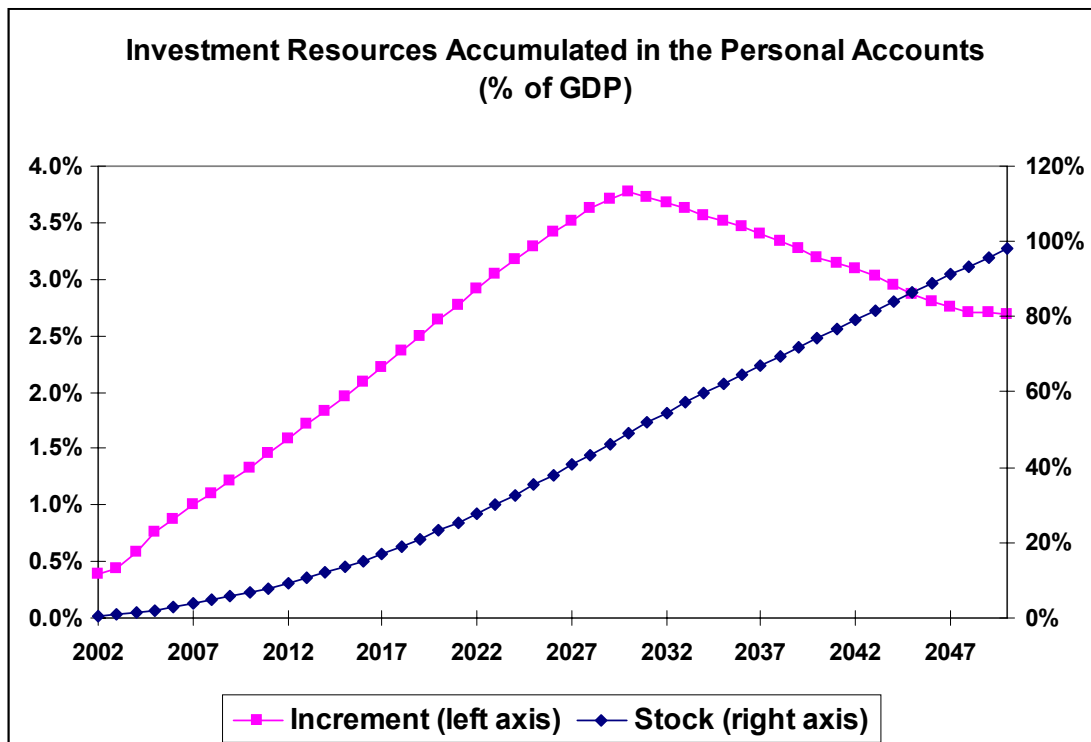


We did not consider macroeconomic and institutional effects of introducing funded system, though some of them may turn to be quite substantial. First, we assume that in a short run this will increase significantly investment. The elder population will consume less, while decisions of the younger population will be hardly affected by the fact that their contributions are invested rather than spent for current pensions. But possible longer-term implications require special study. An important institutional effect is that employees will be interested in paying social tax, as their future pensions will depend on that. This may well decrease share of wages paid in a hidden form.



Kuznetsov, Ordin (2001) built a two-period model to analyze scenarios of transition to a funded pension system. They have found that pension reform increases capital stock per worker in the second period by 9%, and output per worker by 5%.

Worth noting is measuring contribution of pension funds in investment. Increment in the real value of pension fund (with account of return on earlier made investment and payments to retired pensioners) is peaking at 3.8% of GDP by 2030, and then is somewhat declining to 2.7% of GDP.

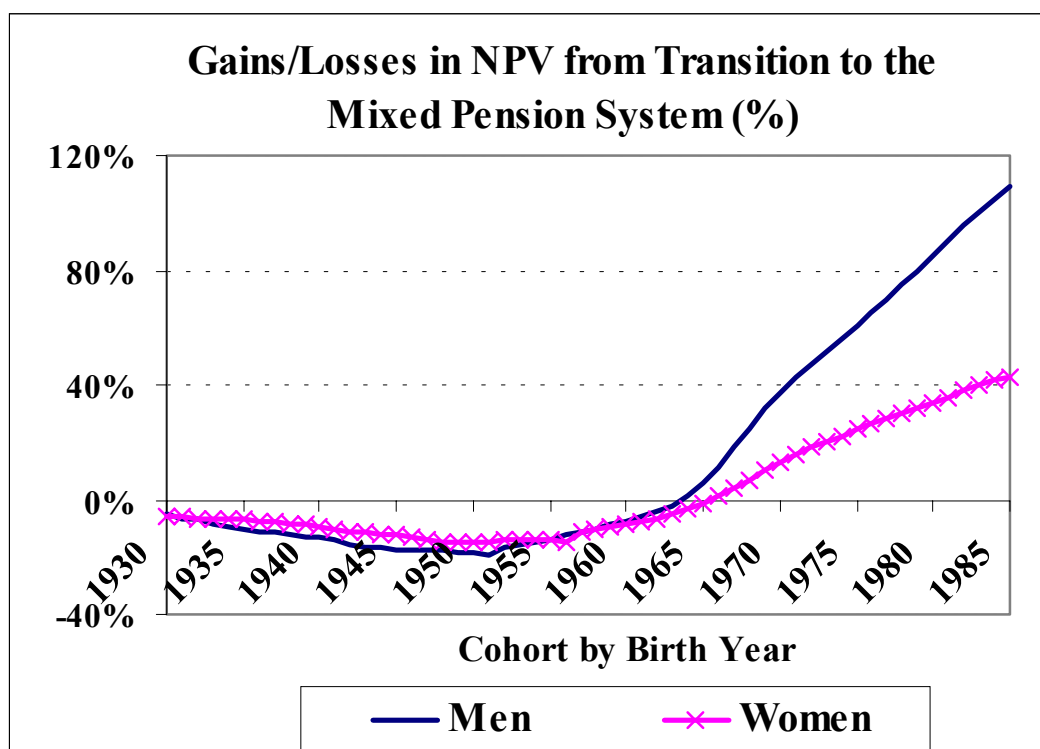


This means that contribution of pension funds accounts for up to one seventh of total investment and thus will affect significantly investment patterns. Accumulated stock of pension funds gets equal to GDP by 2050.

We can now look at the distributional impact of the pension reform. Who will benefit from it and who is loosing? The period under consideration is too short to make full comparison of all social security contributions and transfers. Taking this into account we just compared present value of pension transfers under the PAYG and mixed social security systems. The result for cohorts of men and women born in various years is presented in the chart.

One can see, that all cohorts of men born before 1964, and all cohorts of women born before 1966 are losers, and benefits are rapidly growing with birth year after this point. It means that generations that will not participate in the funded system, or will pay there only 2% contributions will lose from the pension reform. The largest losses in NPV are incurred by cohorts of men born in 1950-1951 (19% of NPV), and cohorts of women born in 1948-1956 (15% of NPV). In other words, the major losers are last cohorts not participating in the funded social security system.

Men born after 1982, i.e. involved into the funded social security system from the start of their employment, more than double NPV of their proceeds from the social security system.



The conclusion that cohorts born before 1951 incur significant losses is quite expected. These cohorts get lower pensions, and do not have chance to compensate this by gains from the funded pensions. Some doubts arise on the fairness of the transition period arrangements. Indeed, the major beneficiaries of the reform are the youngest cohorts. On the other hand, all losses are put

on the older cohorts with 10 or less years to retirement. They use less funded PAYG system on retirement, and pay highest contributions to the PAYG system over the transition period. It looks like it may make sense to modify transition arrangements by shifting start of funded contributions for younger and introducing personal funds for the elder employed. The possible implications are though ambiguous. On the one hand, losses of the elder cohorts would not be that big. But the reverse side would be that even less share of the current active population will benefit from the reform.

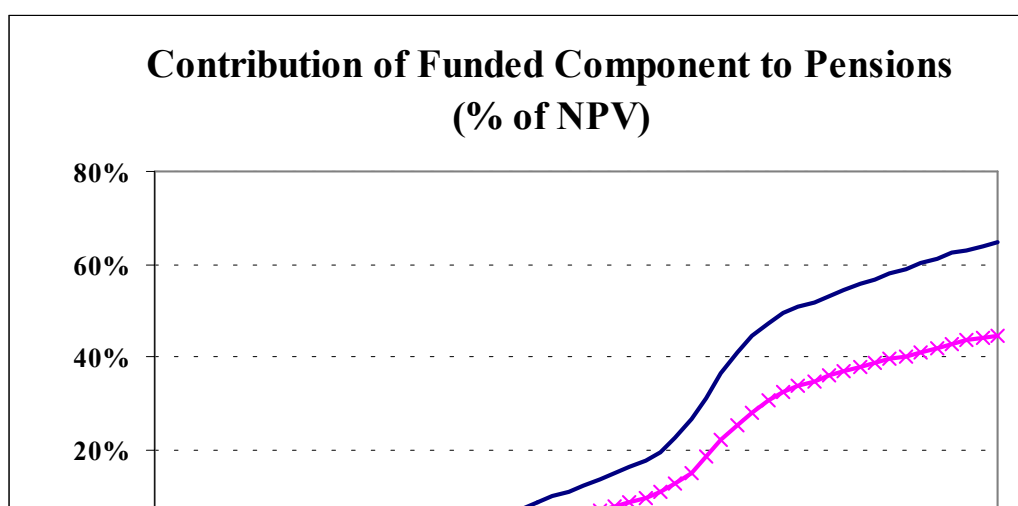
Cohorts of women born before 1955 have slightly smaller losses as compared to men of the same age. The reason is that women on average have lower wages and hence base pensions, not affected by the reform, have larger weight in their total pensions.

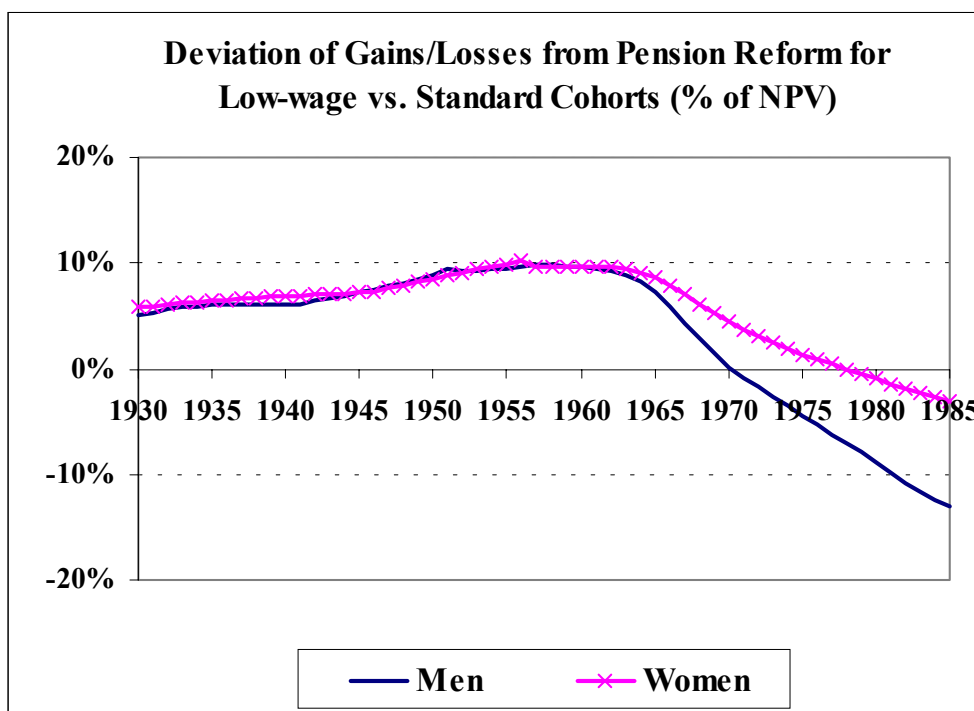
The reverse side is that gains of younger women lag far behind that of men. Relative gains from reform for cohorts of women born after 1985 are about two times less as compared to that of men retiring in the same year. This is explained by combination of two facts. First, women accumulate less funds during their employment period, having lower wages and shorter length of employment. Funds accumulated by women by the moment of retirement amount to about half of that for men (with the same contribution rates). Second, women have much larger life expectancy at retirement (due to both younger retirement age and longer life) – hence their pension funds should be distributed over larger period. As a result, reform increases differences in the pension size by gender.

It is important also to analyse how effect of pension reform varies depending on wage level. This variance is illustrated by the next chart, which presents gains/losses from reform for cohorts with low average wages, amounting to just 50% of average levels.

One can see, that poorer groups incur smaller losses from the reform (as weight of base pensions unaffected by the reform is more important for them). On the other hand, they also benefit less from the reform as compared to the entire cohorts of the same age.

To summarise, our analysis evidences, that the current social security system in Russia badly needs modification, not being able to ensure acceptable level of pensions in a long run. The suggested mixed system may improve projected performance of the social security after a transition





period. We have found, that the expected return on investment exceeds by far estimated implicit rate of return. This proves efficiency of transition to a funded social security system. The general considerations were supported also by direct simulation.

Estimated costs of transition to the mixed system (which reach 14% losses in average pension in some years, and 19% losses in NPV for some cohorts) can be characterised as substantial. It is desirable to take some measures to restrain losses for the most vulnerable cohorts.

We have found, that the reform does not fully resolve some important problems. First, gap between pensions and wages remains too large, and replacement rate – too low. Next, difference of pension magnitude by gender is expanding. In other words, additional measures may be required to improve social security. They may include:

- raising age of retirement (which is low by international standards),

- increasing in future share of contributions to the funded component (possibly keeping overall rate unchanged),
- raising contribution of women to the funded system (by setting for them higher contribution rates, or increasing their retirement age to that of men).

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