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The fiscal gap: An estimate for Russia ☆

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Abstract

The fiscal gap is an indicator of the long-term balance of public finance and is calculated based on the intertemporal government budget constraint, which links government tax revenues and expenditures over long intervals. The estimate of the fiscal gap for the Russian general government has been determined according to three scenarios with varying assumptions regarding demographic trends, productivity growth rates, oil and gas prices and the quantity of extractable reserves. The calculations show that the current fiscal policy cannot provide for the stability of public finance in the long run. The main factors of budget imbalances are the growth of pension and health care expenditures caused by demographic trends and the gradual decline in tax receipts from the oil and gas sector.

JEL classification: E62, H51, H52, H55, H62, H63, H68, J11.
Keywords: fiscal policy, fiscal sustainability, demographic forecast, oil and gas revenues, pension system.

1. Introduction: The current stance and expected developments of public finance in Russia and other countries

Stabilizing public finance and ensuring fiscal sustainability became a priority for economic policies following the financial crisis in 2008 and 2009. In many advanced economies, the recession caused budget revenues to decrease and expenditures on crisis-response measures to increase, which led to sizable budget

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deficits and to national debts jumping to levels that threatened long-term economic growth rates.

According to IMF data, the average general government debt among the advanced economies increased from 73% to 107% of GDP from 2007 to 2013 (IMF, 2014). Over that period, debt rose from 64% to 105% of GDP in the U.S., from 183% to 243% in Japan, from 36% to 94% in Spain, from 44% to 90% in Great Britain, and from 64% to 94% in France. General government budget deficits widened considerably in Japan (from 2.1% to 8.4% of GDP), the U.S. (from 2.7% to 7.3%), Spain (from –1.9% to 7.2%), and Great Britain (from 2.8% to 4.2%) over the same period.

On average, general government budget deficits increased from 1.1% to 4.9% of GDP among advanced economies. The fiscal positions of emerging market economies appeared much better. From 2007 through 2013, their average general government debt hovered around 35% of GDP and their general government budget deficit grew from zero to 2.4% of GDP.

Russia's fiscal stance appears sufficiently sustainable in comparison with both emerging markets and advanced economies. Russia is one of the few countries in the G20 in which the general government budget ran a surplus in 2012 and ran a moderate deficit in 2013 (1.3% of GDP). Russia's national debt was 13% of GDP in 2013, which is among the lowest in the group. In addition, Russia possesses considerable international reserves, which were USD 510 billion, i.e., ¼ of GDP in early 2014. However, 2014 was a very challenging year for the country. Falling oil prices and the reciprocal trade sanctions triggered by the Ukraine conflict led to a major devaluation of the national currency, a higher inflation rate and a reduction in output. Nevertheless, the general government budget deficit barely moved from 2013 levels and was running at 1.2% of GDP at the end of 2014, whereas international reserves shrank to RUB 390 billion (according to early 2015 data).

Judging from these indicators, one may conclude that Russia's public finances are in a relatively good shape. The consequences of the international conflict and changes in the commodities market have weakened the fiscal positions moderately, although Russia's budget continues to retain a certain margin of safety.[1]

However, standard fiscal indicators such as the actual budget deficit and the debt-to-GDP ratio reflect the current condition of the country's public finances; therefore, they are insufficient for long-term fiscal policy sustainability analysis. The coming decades are expected to have higher pension and health care spending. These trends are driven by demographic factors and will affect both emerging markets[2] (including Russia) and advanced economies. In addition, oil and gas revenues as a proportion of total budget receipts and as a percentage of GDP will gradually decline following stagnant oil and gas production. How sensitive is the Russian budget system to these trends in the long

[1] The short- and long-term fiscal challenges Russia is encountering are discussed in the following papers: Drobyshevsky et al. (2011, 2012), Idrisov and Sinelnikov-Murylev (2013, 2014), Mau (2014, 2015), Mau and Ulyukaev (2014), Ulyukaev and Mau (2015).

[2] For an overview of the pension systems of various states and an estimate of their long-term balance, see OECD (2013) and IMF (2011b). For a forecast of changes in health care spending and an estimate of their effect on the fiscal positions of various countries, see De la Maisonneuve and Martins (2013), Clements et al. (2012), IMF (2010).

term? Does the current fiscal policy allow for financing the growing deficit in the pension and health care systems without changing the policies for other expenditure items?

Long-term fiscal sustainability can be assessed by using various indicators, including the so-called fiscal gap. An estimate of Russia's fiscal gap was first obtained as part of research led by Laurence Kotlikoff (Goryunov et al., 2013). This article is a follow-up to that research.

2. Methods for estimating fiscal sustainability

Content-wise, an analysis of fiscal sustainability attempts to determine whether it is possible to maintain the projected levels of government expenditure and to meet all the obligations to creditors, provided that the basic parameters of the fiscal policy remain constant. If maintaining the current tax regime can ensure sufficient revenues and does not increase the deficit or the national debt or threaten a budget failure in the future, the tax regime is considered sustainable. Otherwise, there is no fiscal sustainability, which means that the fiscal policy must be adjusted sooner or later to avoid a crisis in public finance. It should be noted that fiscal sustainability is a concept related to a certain tax regime which, in turn, is determined by the structure and size of budget liabilities, revenues and expenditures.

A set of methods has been developed over the decades to conduct a practical evaluation of fiscal sustainability. This field was originally explored through the works of Horne (1991), Blanchard (1990) and Blanchard et al. (1990). The authors articulated the general concept of fiscal sustainability and proposed indicators for evaluating it. The concept is the pillar of contemporary applied research in the field of fiscal sustainability and is centered on the so-called "intertemporal government budget constraint."

The main purpose of this concept is to analyze whether budget expenditures and tax revenues are balanced over a long period, provided that the factors which determine the fiscal position are relatively predictable. Fiscal sustainability indicators are normally used to gage the effect of demographics on the fiscal stance. It is these indicators that provide an understanding of the probability of a crisis in public finance precipitated by an anticipated upward movement in the budget deficit, caused by growing pension and health care expenditures as a result of population aging. The main function of these indicators is to establish whether persistent discrepancies will occur between revenues and expenditures if the development of the economy follows a certain known trend.

The methodology described herein is not suitable for a comprehensive analysis of budget crisis risk. The empirical studies prove that budget crises occur not only when a state chronically fails to curtail its deficit but also when the fiscal position appears very satisfactory. In this case, a crisis may be caused by adverse macroeconomic shocks, e.g., sharp swings in foreign exchange rates and an abrupt increase in borrowing costs on global capital markets.

The probability of a macroeconomic shock triggering a rampant crisis in public finance depends on numerous factors. These include the currency and term structure of national debt, the presence of contingent liabilities, the banking sector stability, and access to global capital markets (see Reinhart and Rogoff, 2009).

An assessment of the government budget's resilience to those shocks requires other methods, which essentially comprise a comprehensive stress test of public finance. These methods actually exist, and research is rapidly progressing in that area (see IMF, 2011a). However, these methods are outside the scope of this paper and are not reviewed here. While acknowledging the importance of exogenous shocks as factors capable of causing budget crises, this paper addresses the long-term sustainability of the current fiscal policy solely, using the fiscal gap indicator. A number of papers provide estimates of fiscal gaps for several countries (see Auerbach et al., 1991, 2003, 2004; Evans et al., 2012; Gokhale and Raffelhuschen, 1999; Gokhale and Smetters, 2003; Kotlikoff and Green, 2009; Kotlikoff and Burns, 2012). This paper is concerned with the size of Russia's fiscal gap.

2. Theoretical foundations of fiscal sustainability analysis and fiscal gap accounting

The fiscal gap depends on the intertemporal government budget constraint, which reflects the balance between public revenues and expenditures aggregated over the entire period of government life. The intertemporal government budget constraint can be derived from the single-period budget constraint:

$$B_t - B_{t-1} = G_t - T_t - rB_{t-1}$$

where G_t is the primary government expenditures, T_t is the budget tax revenue, r is the interest rate, and B_t is the total government debt at period t.

The above equation clearly suggests that there may be no strict equality between income and expenditures during each single period, provided that access to credit is available. Accordingly, the debt growth rate depends on the overall budget deficit. At the same time, if the debt is not capped, the single-period budget constraint provides no link between total expenditures and income. Nevertheless, with no boundaries for the government debt, the condition restricting the possibility of a permanent rollover of outstanding credit must be met. Instead of full repayment of the national debt, this policy would result in constantly refinancing it, increasing the debt at a rate equal to the interest rate for each period. This practice is essentially a "Ponzi scheme" that cannot be maintained ad infinitum and is considered an unfeasible strategy for government. The condition barring such a practice is known as the "transversality condition" and requires that the national debt growth rate should not exceed the interest rate in the long run.

Provided that this condition is met, we can, through algebraic transformations,[3] obtain the intertemporal government budget constraint expressed in terms of present values discounted to initial period $t = 0$:

$$B_0 + \sum_{t=1}^{\infty} \frac{G_t}{(1+r)^t} = \sum_{t=1}^{\infty} \frac{T_t}{(1+r)^t}$$

[3] For transformations enabling the transition from a set of single-period budget constraints to an overall intertemporal constraint, see Goryunov et al. (2015). These transformations are standardized and can be found in a great number of articles on fiscal sustainability.

This expression means that the present value of future budget expenditures, including the repayment of debt, must not exceed the present value of future budget revenues.

The intertemporal government budget constraint can be rewritten as follows:

$$B_0 = \sum_{t=1}^{\infty} \frac{T_t - G_t}{(1+r)^t}$$

This condition means that the actual amount of national debt at the current moment must be fully covered by the sum of projected present primary budget surpluses $\{T_t - G_t\}$. A progressive discount means that postponing repayment from the current period to the next one results in an increase of debt at a rate equal to the interest rate. Accordingly, the value of income in the next period must be greater than in the current period for the debt to be fully repaid.

Based on this budget constraint, fiscal sustainability can be defined as follows: the current fiscal policy regime is considered sustainable in the long-term if it ensures a primary surplus flow sufficient to repay outstanding debt. Consequently, to estimate the sustainability of a fiscal policy, one needs to calculate the projected values of budget revenues and expenditures that will be received and incurred if this policy is pursued, sum the discounted values of primary surpluses, and check whether they are sufficient to cover the national debt. An insufficient present value of projected primary surpluses means there is inconsistency between the current fiscal policy and the intertemporal government budget constraint, which calls for adjustments of the fiscal policy to prevent the national debt from snow-balling and causing a default.

The value below presents a suitable measure of budget imbalance that can be associated with the current tax regime:

$$\Delta = B_0 + \sum_{t=1}^{\infty} \frac{G_t}{(1+r)^t} - \sum_{t=1}^{\infty} \frac{T_t}{(1+r)^t}$$

In the above expression, $\{G_t\}$ and $\{T_t\}$ represent the flows of primary expenditures and tax revenues, respectively, which will occur if the current tax regime is maintained, whereas the Δ represents the difference between the present values of budget income and expenditures, including the repayment of accumulated debt. In other words, Δ measures the long-term fiscal imbalances under actual policy, i.e., it shows to what extent the current fiscal policy is inconsistent with the budget constraint. The term Δ is known as the fiscal gap.

The Δ indicator is used in the analysis of fiscal sustainability similar to the method for evaluating investment projects based on calculating the net present value of projected cash flows. A project is considered profitable if investment costs during its earlier stages are outweighed by projected revenues, which should not only exceed the expenses but also cover opportunity costs, determined as potential proceeds from other investments. For those costs to be reflected in the assessment of the project's attractiveness, the income and expenditure flows are adjusted, i.e., they are discounted with a certain interest rate to the present time period. Having obtained the net present value of projected income for an

investment project, one can estimate its present fair market value. If the latter is positive, debt can be repaid from the project's future profits.

This method can be applied to public finance by following similar logic. For a country's budget to remain stable and retain the capacity for loan repayment, the present value of projected primary budget surpluses must not be lower than the current value of the national debt.

In the same manner that the government's annual budget deficit is usually expressed as a ratio to GDP for the respective year (not an absolute value), the fiscal gap, which represents the difference between the current government debt and the present value of future primary budget balances summed over an infinite period, can be normalized by the present value of GDP summed over the same period. Denoting GDP flow in real terms as $\{Y_t\}$, we can obtain the so-called normalized fiscal gap:

$$\delta = \frac{B_0 + \sum_{t=1}^{\infty} \frac{G_t}{(1+r)^t} - \sum_{t=1}^{\infty} \frac{T_t}{(1+r)^t}}{\sum_{t=1}^{\infty} \frac{Y_t}{(1+r)^t}}$$

This value shows by how much the budget deficit should be reduced to ensure fiscal sustainability. For example, if an estimate of fiscal gap value sustainability is positive, the current tax regime is unsustainable, and a new, more conservative one should be adopted to stabilize public finances. There are many possible means for government to allocate deficit reductions over time and achieve fiscal sustainability. One includes an immediate and permanent reduction of the primary deficit by an amount equal to $\delta \times 100\%$ of GDP. In other words, in each subsequent year under the new regime, the primary deficit measured as a ratio to GDP will be lower by δ than the primary deficit corresponding to the initial regime. Thus, the value of the normalized fiscal gap quantifies long-term budget imbalances. Similarly, the fiscal gap can be normalized by the present value of projected budget income or expenditures flows.

3. Fiscal gap concept assumptions: a discussion

A number of issues should be considered when using the indicator reviewed above to analyze fiscal sustainability. First, a calculation of the fiscal gap should be based on a model of the anticipated movements in projected income and expenditures, within a scenario assuming key parameters of the fiscal policy are held constant. It would be fundamentally wrong to include an event of default or national debt restructuring in scenario projections, although there are reasons to expect that these may occur in the future. The purpose of fiscal sustainability analysis is to determine whether following current policy leads to a crisis that requires a study of a respective scenario. A calculation of the fiscal gap based on a scenario assuming default would effectively mean an a priori assumption of a budget imbalance.

Second, to perform the calculations, one needs to have knowledge of the budget revenue and expenditure flows from the current moment to infinity, which is impossible. In practice, the movements of budget indicators are estimated un-

til a certain moment in the future. Revenue and expenditure dynamics are then extrapolated for the remaining infinite period.[4]

Third, the fiscal gap is calculated in real variables, thus excluding a great number of factors from the analysis related to the sensitivity of real variables with respect to monetary shocks. In particular, the calculations ignore the impact of inflation on economic growth and the actual value of nominal liabilities. In fact, fiscal sustainability is assumed to be immune to monetary shocks, i.e., when inflation rises, the actual value of the national debt is not devalued because price growth will be fully offset by a corresponding increase in the nominal interest rate.

Fourth, the quantitative value of the fiscal gap depends on the particular method used to calculate government income and expenditure flows. It is often difficult to clearly identify the key parameters of a fiscal policy and decide on a method for modeling budget income and expenditures based on the assumed stability of such parameters. This difficulty also concerns the assumptions regarding the long-term economic growth rate and the real interest rate. A natural limitation is thus placed on the precision of fiscal gap estimates.

Fifth, a serious flaw in the fiscal gap indicator is that it disregards macroeconomic shocks, essentially relying on structural variables. This reliance is solely applicable in verifying consistency between revenues and expenditures over long time periods, albeit it cannot be used to evaluate the exposure of the fiscal position to market fluctuations in the economy, which, as noted above, are critical factors of budget crises.

An overall estimate of the sustainability of public finance cannot be reduced to the calculation of a single indicator and requires a comprehensive analysis covering a multitude of various areas. The fiscal gap solely reflects one important aspect, i.e., the long-term consistency between budget income and expenditures and the value of accumulated national debt.

4. Budget revenues and expenditures projections

An estimate of the fiscal gap requires projections of budget revenues and expenditures, as well as those of GDP trends. Below, there is a simple model for obtaining the relevant flows used to analyze revenues and expenditures for the consolidated budget of the Russian Federation and public non-budgetary funds. Revenues and expenditures are divided into groups based on the factors that determine them most accurately. Of the entire set of factors, we identify three basic factors to be used for modeling revenue and expenditure movements.

First, the long-term trends of budget tax revenues and expenditures are related to the rate of economic growth. As per capita output grows in real terms, tax revenues and government expenditures also increase.

Second, certain types of expenditures are contingent on demographic factors, such as health care and pension expenditures. Because this type of expenditure represents a considerable share of total budget expenditures, its anticipated increase as a result of an aging population will have a sizable effect on public finances in the ensuing decades.

[4] This approach is used in all papers addressing estimates of the fiscal gap with an infinite time horizon (see, e.g., Auerbach et al., 2003; Auerbach, 1994).

Third, oil and gas revenues play a critical role in Russia's budget. The long-term trend of these revenues depends on oil and gas production rates, prices and reserves.

To summarize, the model can be used to analyze GDP and budget revenue and expenditure trends, considering demographic factors and the critical role of the oil and gas industry. Finally, annual trends are calculated for each group of revenues and expenditures. Combining these factors produces an estimate of the fiscal gap value.

Because fiscal gap accounting implies developing long-term projections, the uncertainty factor places serious limitations on the precision of estimates. These limitations can be partly overcome by considering alternative scenarios covering a wide range of possible courses of events. For a more thorough understanding of fiscal sustainability under uncertainty, we calculated the fiscal gap for three scenarios: pessimistic, intermediate and optimistic. The scenarios differ in assumptions regarding demographic trends, long-term energy prices, and oil and gas reserves. The scenarios are also consistent with the scenarios used in the 2030 forecast by the Ministry of Economic Development (MED) of the Russian Federation (see MED, 2013).

The model of joint dynamics of GDP and budget revenues and expenditures was developed in three steps. The first step included obtaining GDP and demographic projections under three scenarios, followed by a calculation of the trends for each component of budget revenue and expenditure until 2100. Later periods are not implicitly modeled. Instead, the same growth rate is assumed for expenditures, revenues and GDP from 2100 onwards.

The projection scenarios are based on the MED economic forecast and Rosstat demographic forecast through 2030.[5] The model assumes changes in the population and basic economic indicators to be in accordance with these forecasts through 2030. Extrapolation is used to extend the demographic forecast until 2100. Different assumptions with respect to migration, birthrate and mortality are made for each of the three scenarios.

According to the intermediate scenario, the total population will decline from the current 143 million to 132 million by 2100, whereas the working-age population will decrease from 95 million to 65 million over the same period. Under the optimistic scenario, the population grows to 167 million by 2100, of which 87 million are the working-age population. The pessimistic scenario assumes a reduction in the total and working-age population to 81 million and 44 million, respectively. All three scenarios suggest significant population aging. Whereas in 2013, the median age in Russia was 39, it may rise to 44 by 2050, depending on the scenario. The share of individuals who are over 60 years old (19% in 2013) grows to more than 30% by 2050, depending on the scenario.

Annual changes in labor productivity after 2030 are modeled separately. The productivity growth rate is expected to be 1.7% by 2100, which is in accordance with the estimated long-term productivity growth rate in the U.S.[6] Knowing the annual changes in labor productivity and the size of the working-age population, we can calculate the GDP value for any chosen year by multiplying the above values.

[5] http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/population/demography/#.

[6] Similar estimates are provided by the US Congress Budget Office (CBO) (see http://www.cbo.gov/publication/43902).

According to the intermediate scenario, the average economic growth rate between 2014 and 2100 is 2.7%. By 2100, the GDP will increase by 9.7 times compared with the value in 2013. The pessimistic and optimistic scenarios assume an average growth rate of 2.2% and 3% per annum, respectively, whereas the GDP will increase in real terms by 6.2 and 12.2 times, respectively, during the same period. As can be observed, the above scenarios cover a wide range of possible economic development trajectories.

As noted above, there is a separate group including the types of budget expenditure whose values are to a great extent determined by demographic factors, such as pension and health care expenditures. In 2013, their shares of the overall general government budget expenditure were 24%, 12% and 10%, respectively (Fig. 1). The growth rate in housing and social policy expenditures (excluding pension expenditures) is assumed to be equal to that of per capita GDP. The growth rates of other expenditures are assumed to be equal to that of the GDP; i.e., their values are fixed as percentages of GDP.

Per capita budget expenditures on health care, pensions and education vary depending on the age of a particular person. This heterogeneity should be appropriately captured by the model used to obtain expenditures projections because the age distribution of the population varies sharply. To consider this heterogeneity, we use the so-called "age profile" of expenditures. The age profile reflects the distributions of per capita expenditures among different age groups and is assumed to be constant for all three scenarios (see Hagist and Kotlikoff, 2009). For every age group, per capita expenditures are assumed to increase at the same rate as labor productivity does. Because each scenario differs in population trends and population structure, each produces a different trajectory of expenditure on education, health care and pensions.

Oil and gas revenues comprise a separate group in the budget, representing 27.5% of the general government budget income in 2013 (Fig. 2). Tax revenues from the oil and gas sector (energy sector revenues) are modeled separately. It is assumed that the government budget annually receives a certain fixed share of the total value of the oil and gas extracted, which, in turn, is determined by hydrocarbon prices and production. The limited nature of those natural resources is also considered, and a depletion of oil and gas will eventually lead to oil and gas revenues achieving zero. Each scenario contains different assumptions with respect to long-term oil and gas prices, reserves, and the share of the value of extracted resources, paid into the government budget. The intermediate scenario assumes the long-term price of Brent crude oil as fixed at USD 100 per barrel. The gas price is derived from the oil price and the oil and gas price parity, calculated based on one British Thermal Unit (BTU). The pessimistic (optimistic) scenario assumes an annual reduction (increase) in oil prices by 1% in real terms until 2030 with prices remaining constant thereafter. This range of long-term energy prices is consistent with the existing oil price forecasts (see IEA, 2014; OPEC, 2014) and with the MED forecast underlying our calculations. Current oil prices are considerably lower than those used in the calculations. However, because we are focusing on long-term trends, this price reduction is regarded as temporary and has no effect on the long-term fiscal sustainability.

The intermediate scenario assumes the total volume of extractable oil and gas resources to be in accordance with estimates by the Ministry of Natural Resources

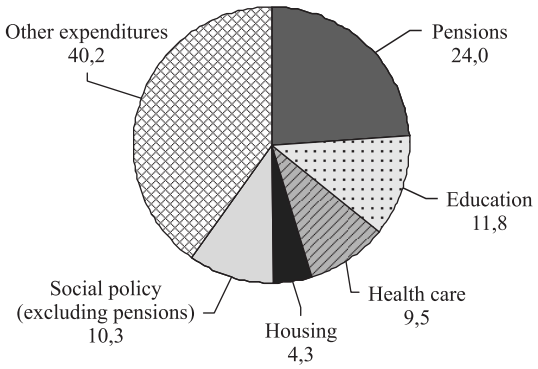

Fig. 1. The distribution of Russia's general government budget expenditures in 2013 (%).
Source: Ministry of Finance of the Russian Federation.

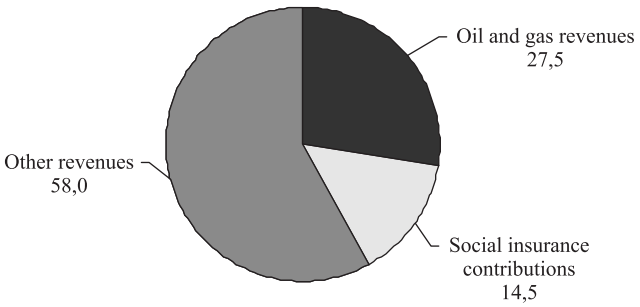

Fig. 2. The distribution of Russia's general government budget revenues in 2013 (%).
Source: Ministry of Finance of the Russian Federation.

and Ecology of the Russian Federation. The pessimistic and optimistic scenarios assume the volume of recoverable oil and gas reserves to be 75% and 125%, respectively, of that in the intermediate scenario.

It should be noted that, in our paper, the flow of oil and gas revenues is modeled as completely exogenous, i.e., economic development is assumed to be independent of the share of revenues from hydrocarbon production in the total budget receipts. This correlation does exist; however, considering all the factors described would require a considerably more sophisticated theory, and this is outside the scope of our research.

Similar to oil and gas revenues, social insurance contributions to budget revenues are also grouped separately. All other revenues, representing 58% of income in 2013, are assumed to be fixed as a share of GDP throughout the period.

We use a discount rate equal to 3% throughout the infinite period, which is consistent with the long-term OECD forecast, according to which the average real interest rate in OECD countries will range from 2% to 4% (Johansson et al., 2012).[7]

[7] Fiscal gap estimates for 2% and 4% real interest rates are presented in Goryunov et al. (2015). Effects of fiscal adjustment postponement within the above scenarios are also considered in this paper. To provide an illustration of the effects, the authors calculated the values of the fiscal gap expected in 2024, 2034 and 2044 assuming no measures are taken to strengthen the fiscal position.

5. Results and discussion

The fiscal gap estimated under the intermediate scenario is RUB 1,613 trillion, or 13.6% of the present value of GDP. This indicates a dangerous long-term imbalance in Russia's budget. Ensuring fiscal sustainability will require either a permanent reduction of expenditures by ⅓ or a 49% increase in tax revenue or a combination of these. The other scenarios also reveal significant imbalances in public finances. The fiscal gap is estimated to be RUB 931 trillion, or 11.8% of the present value of GDP, in the pessimistic scenario, and RUB 2,065 trillion, or 14.1%, in the optimistic one. Fiscal gap estimates, expressed as proportions of the present value of GDP, revenues and expenditures under the three scenarios considered, are shown in Fig. 3. Components of the fiscal gap are presented in Table.

An analysis of the values obtained demonstrates that the long-term imbalance is caused by both income reduction and expenditure growth. In 2013, budget revenues and expenditures represented 36.7% and 35.8% of GDP, respectively. The intermediate scenario assumes that expenditures grow to 40.7% and reve-

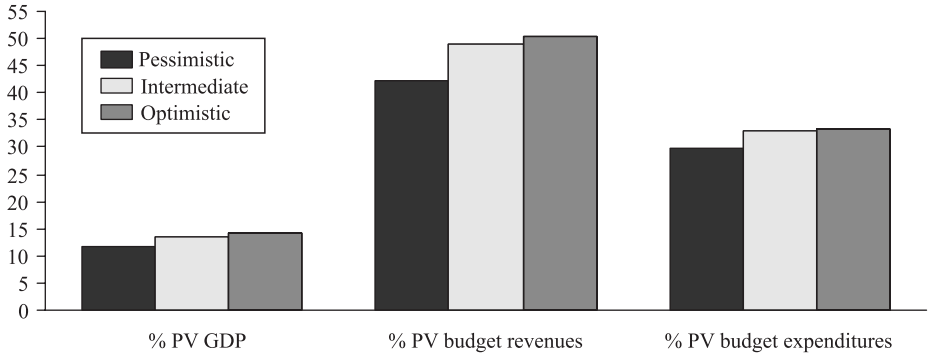

Fig. 3. Fiscal gap expressed as a percentage of the present value (PV) of GDP, budget revenues and expenditures flows under the three scenarios.

Table
Components of the fiscal gap: revenues, expenditures and net financial liabilities (RUB billions and % of gross present value of GDP).

	Pessimistic	Intermediate	Optimistic	Pessimistic	Intermediate	Optimistic
	RUB trillions (in 2014 prices)			% PV GDP		
Revenues	2219	3287	4085	27.86	27.80	27.97
oil and gas revenues	132	191	260	1.67	1.61	1.78
social insurance contributions	505	755	933	6.39	6.39	6.39
other revenues	1565	2341	2892	19.80	19.80	19.80
Expenditures	3143	4910	6160	39.78	41.53	42.17
pensions	816	1317	1626	10.35	11.14	11.13
social policy (w/o pensions)	341	539	685	4.32	4.56	4.69
health care	355	577	727	4.50	4.88	4.97
education	341	538	717	4.32	4.55	4.91
housing	143	226	287	1.81	1.91	1.97
other expenditures	1146	1714	2119	14.50	14.50	14.00
Net financial liabilities	–9.7	–9.7	–9.7	0.12	0.08	0.07
Fiscal gap	931	1613	2065	11.79	13.64	14.14

nues decrease to 29.0% of GDP by 2050. There are similar changes in revenues and expenditures in the other two scenarios (Fig. 4).

The growth of budget expenditures is mainly driven by the increase in pension and health care expenditures which, in turn, is caused by the increasing proportion of the elderly among the population; this explains the greater portion of those expenditures. In 2013, pension and health care expenditures were 8.8% and 3.5% of GDP, respectively. The intermediate scenario implies that pension and health care expenditures increase by 2.0% and 1.1% of GDP, respectively (Fig. 5). Other expenditures remain at their current levels as percentages of GDP (Fig. 6).

According to the results, all three scenarios suggest a sharp decrease in tax revenues from the energy sector as a share of GDP. Budget revenues decrease

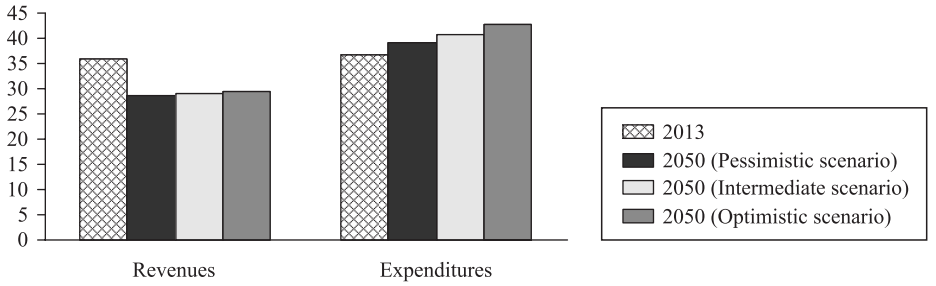

Fig. 4. Budget revenues and expenditures in 2013 and 2050 under the three scenarios (% of GDP).

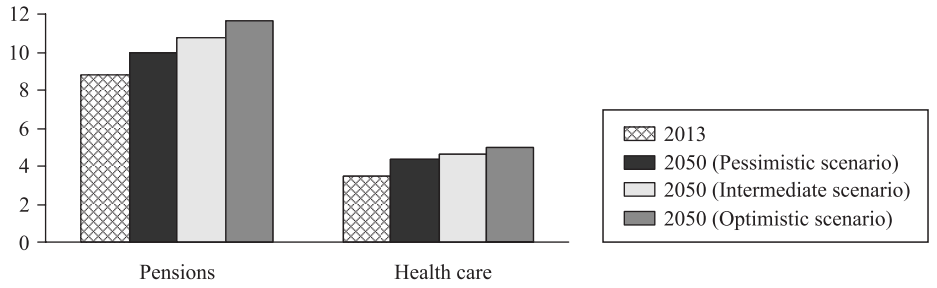

Fig. 5. Pension and health care expenditures in 2013 and 2050 under the three scenarios (% of GDP).

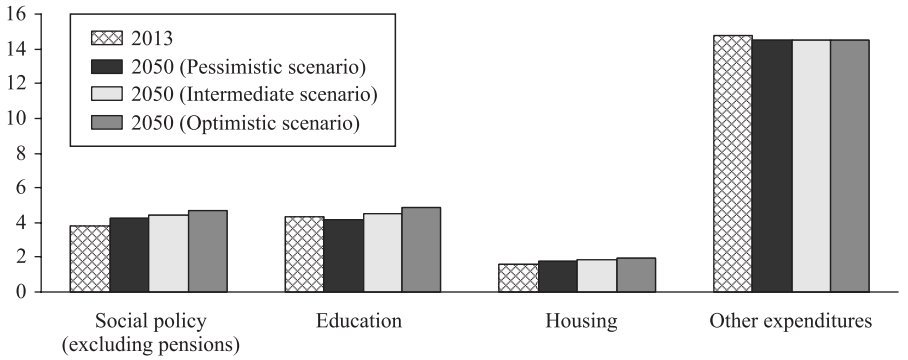

Fig. 6. Social policy (excluding pensions), education, housing, and other budget expenditures in 2013 and 2050 under the three scenarios (% of GDP).

because of a gradual decline in the energy sector share in a growing economy. Eventually, in the long run as oil and gas reserves are depleted, the budget loses energy revenues completely. Although all of the scenarios assume zero oil and gas revenues after depletion, the limited quantity of reserves is not the main reason behind the reduction in oil and gas revenues. A more important factor is the difference between the rate of economic growth and that of tax revenues from the energy sector. Because the scenarios considered herein assume stagnant oil production and no permanent growth of hydrocarbon prices, the budget receipts from the energy sector shrink as a share of output.[8] Our calculations show that under the intermediate scenario, oil and gas budget revenues decrease from nearly 10% of GDP in 2013 to 6.2% of GDP in 2025 and to 2.8% of GDP in 2050 (Fig. 7).

It is the growth rate of oil and gas revenues being lower than the economic growth rate that partly explains the fact that the fiscal gap in terms of the present value of GDP is the highest in the optimistic scenario even assuming the highest economic growth rate. Conversely, the estimate of the fiscal gap in the pessimistic scenario is the lowest. The main conclusion is as follows: in the event of stagnant oil and gas revenues and a high economic growth rate, maintaining fiscal sustainability will require either curtailing the increasing government expenditures or promptly replacing the disappearing oil and gas revenues with income from other sources.

There is very high uncertainty regarding oil and gas prices in the long run. Accordingly, the uncertainty regarding budget revenues from taxing the energy sector is also high. In addition to the above, it is difficult to predict the volumes of resources that will be available for extraction over the long-term. To assess the sensitivity of our results to particular assumptions regarding energy prices and reserves, we analyzed two additional groups of scenarios (Fig. 8).

The scenarios in Group *A* are based on the assumption that oil prices will remain at current low levels over the long term. In the baseline scenario for Group *A,* the price of Brent crude oil is fixed at USD 50 per barrel. The pessimistic (optimistic) scenario for Group *A* assumes an annual decline (growth) in oil prices of 1% until 2030 with constant prices from then onwards. Thus, the fiscal gap estimates for the Group *A* scenarios point to fiscal sustainability under permanently low oil prices, whereas the comparison of these estimates

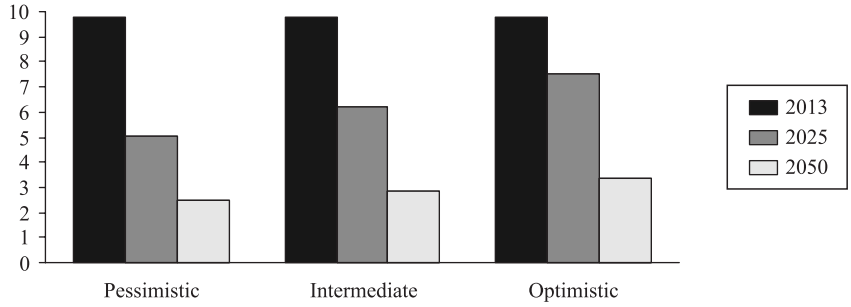

Fig. 7. Oil and gas budget revenues dynamics under the three scenarios (% of GDP).

[8] The assumptions of stagnating oil production and stable oil prices in real terms are in accordance with the MED (2013) forecast with respect to trends in the fuel sector.

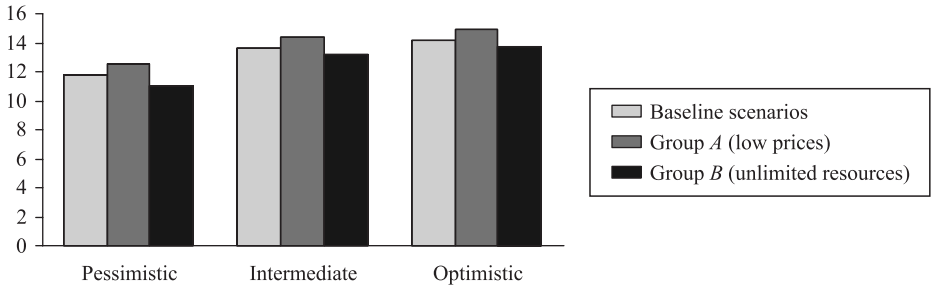

Fig. 8. The fiscal gap under alternative assumptions regarding oil and gas revenues (% of the gross present value of GDP).

with those for the scenarios of the baseline group reflects the impact of long-term oil prices on fiscal sustainability.

The Group *B* scenarios assume unlimited energy resources. In other words, the incremental growth of reserves outstrips production rates. Consequently, oil and gas are extracted in desired quantities for an unlimited period of time, and the budget receives a corresponding flow of revenues. The Group *B* scenarios were suggested to estimate the relevance of limited natural resources as a factor of fiscal sustainability.

A comparison of fiscal gap values in the base case and the two groups of scenarios considered above shows that neither long-term oil prices nor limited natural resources have a decisive influence on fiscal sustainability. A comparison of fiscal gap values across the three variations of the intermediate scenario (baseline group, group *A* and group *B*) shows that the three values are very similar (see Fig. 8), namely, 13.6%, 14.3% and 13.2% of the gross present value of GDP, respectively; i.e., the difference is less than one percentage point. A comparison of the pessimistic and optimistic scenarios yields a similar result. Thus, the level of long-term budget imbalance remains constant both in the event of low oil prices and in the event of unlimited resources.

The main reason for this effect is that the key factor of fiscal sustainability over the long term is not the quantity of extractable oil and gas reserves but the low growth of energy revenues. Whenever the economic growth rate surpasses that of energy revenues and budget expenditures increase at a rate close to that of GDP growth, the share of energy revenues in GDP decreases, whereas the deficit widens. Preserving the share of energy revenues in the budget is possible if either oil prices in real terms or production rates grow permanently, provided that the rates are sufficiently high to ensure an energy revenue growth rate close to that of GDP growth. Because our calculations are not based on any assumption of permanently growing oil prices, although the MED forecast predicts production stagnation, tax revenues from the energy sector decrease gradually as a share of output. This process occurs irrespective of long-term oil prices and although the flow of revenues never stops.

In view of these estimates, one can conclude that Russia's fiscal gap proves to be higher than in the U.S., Greece and Japan, where it is nearly 10% of the gross present value of GDP (Fig. 9).

Russia's public finances currently appear to be in considerably better shape than in the U.S., Japan, or Greece. However, the estimated fiscal gap values sug-

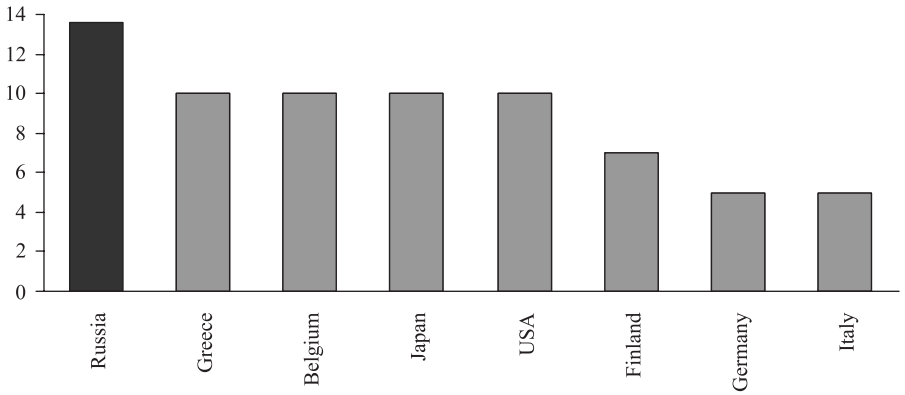

Fig. 9. Fiscal gap estimates for selected countries (% of the gross present value of GDP).
Source: Kotlikoff (2013).

gest that the risk of fiscal destabilization in Russia is higher than, or at least comparable to, that in the above countries over the long run. It should be stressed that the long-term imbalance of public finances in Greece, the U.S., Japan, Germany, Finland, Belgium and Italy is caused by an anticipated substantial increase in expenditures resulting from an aging population (see BIS, 2013), whereas in Russia, the problem is aggravated by the effect of the declining share of the fuel and energy sector in the economy.

The component of Russia's fiscal gap related to increasing expenditures on pensions and health care comprises 4.8% of the gross present value of GDP. This is lower than in all the other countries listed, but still points to a significant increase in the burden of social expenditure on the government budget in the following decades, caused by demographic factors rather than by changes in social policy. Consequently, ⅓ of the long-term imbalance of Russia's budget is caused by increased expenditures in connection with demographic factors, and ⅔ — by an anticipated reduction in the share of oil and gas revenues in the budget.

5. Conclusion

These results have led us to a number of conclusions relevant to economic policy. Because all three scenarios considered above yield very similar and large fiscal gap values, we can conclude that the anticipated weakening of Russia's fiscal stance is a major long-term challenge that calls for a related reaction from government authorities. Considering the anticipated changes in income and expenditures in the absence of fiscal reform, Russia's public finances will gradually lose sustainability. To counter this trend, it is necessary to develop and implement a budget reform strategy, including measures to reduce government expenditures and to find additional sources of revenue in the future. High-quality health care and a decent standard of living for Russia's elderly population, combined with a lesser burden on the budget, are possible solely through considerable improvement in government expenditure efficiency, and through institutional reforms in these branches. The objective to replace oil and gas revenues with other revenues should become an important part of Russia's economic policy.

The current state of Russia's public finances allows expenditures to be reduced and revenues to be increased gradually and in advance, without exposing the economy to painful shocks. However, we believe that the absence of a direct budget destabilization threat may justify the postponement of unpopular budget reforms. In this case, the problem of budget imbalances must be tackled by future generations, although public finances will weaken.

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