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## Macroeconomic Effects of Pension Reform in Russia

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**Macroeconomic Effects of Pension Reform in Russia**

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**Abstract**

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Putting the pension system on a sustainable footing arguably remains the biggest challenge in Russia's economic policies. The debate about the policy options was hitherto constrained by the absence of general equilibrium analysis. This paper fills this gap by simulating their macroeconomic effects in a DSGE model calibrated to Russia's economy—the first of its kind to the best of our knowledge. The results suggest that a minimum benefit level in the public system should optimally be financed through lower government consumption, while higher taxation of labor and capital should be avoided. Reducing public investment spending is superior to increasing consumption taxes unless investment generates high rates of return.

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## INTRODUCTION

Russia's population will age rapidly in the coming decades. The share of the population older than the retirement age will rise from 20 to about 30 percent. Russia's aging problem is further aggravated by the fact that its population is rapidly shrinking, at an expected rate of about 0.5 percent per year until 2050. This will imply a decline in contributions to the pension system, while payouts will increase.

The existing pension system is ill-prepared for this challenge. In a no-reform scenario, the replacement rate of the public system is projected to decline to about 17 percent in 2030. This is far below the current level of about 26 percent that is already widely perceived as inadequate and implies that many state pensions are below the subsistence level. As Russia's per capita income rises, Russia's replacement rate will increasingly be out of line with international benchmarks as compared to countries of similar income level, as already 26 percent are lower than in any OECD country today. Indeed, President Putin recently called for an increase in the average replacement rate to 40 percent within five years.<sup>2</sup> At the same time, private pension provision through corporate plans or personal savings remains in its infancy and is unlikely to be able to make up for the decline in the public system, particularly during the next several decades during which much of the demographic transition will take place. Moreover, international experience suggests that *voluntary* private pension saving tends to fall short of levels required for reasonable replacement rates, thus ultimately resulting in a political contingent liability for the government to prevent old-age poverty.

This paper makes a case for putting Russia's public pension system on a sustainable footing and examines the macroeconomic effects of various policy options. It first discusses why the current system is likely to be unsustainable and ultimately lead to a need to increase either the retirement age or government pension expenditure. Emphasizing that a gradual increase in the retirement age would be the first-best policy, the paper then examines the macroeconomic effects of various options for alternatively financing a stable replacement rate of 30 percent through the budget: debt accumulation, increases in the VAT, United Social Tax (UST), or profit tax, as well as cuts in government investment or consumption. The paper concludes with a number of policy recommendations on the design and financing of the pension system.

### A. The Case for Pension Reform

The 2002 reform introduced a multi-pillar system whose design is overall in line with international best practice.<sup>3</sup> It consists of three pillars: (i) The basic pension is the

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<sup>2</sup> According to press reports on President Putin's meeting with United Russia leaders on November 17, 2007.

<sup>3</sup> See World Bank (2002) for a more detailed discussion of the system including shortcomings discussed below.

redistributive part of the system; it is independent of contributions and is intended to provide a minimum standard of living. The replacement rate provided by the basic pension has gradually declined since the discretionary increases in benefits tended to be less than average wage increases. (ii) The notional defined contribution (NDC) scheme places contributions in individual accounts that earn a return based on a discretionary average between wage and CPI growth. The benefit at retirement is an annuity based on the accumulated savings in the account at the retirement date. (iii) The mandatory funded scheme that provides for the investment of 6 percentage points of the contributions of workers who were young at the time of reform the 2002 reform in mutual funds chosen by the worker or—if no choice is specified—by the government. The initial contribution rate is 20 percent for the three pillars combined and then declines for higher income brackets.

However, the system suffers from two key shortcomings in its design, the first being that it provides low incentives to work beyond the low statutory retirement age. Unlike in a typical NDC scheme, the benefits are not adjusted in line with the changing (usually increasing) life expectancy at the time of retirement, and the retirement age has remained unchanged at 55 for women and 60 for men. Moreover, the notional rate of return is low owing to the valorization of the notional capital with a rate of return below the average growth rate of wages; the large share of the contributions allocated to the basic pension that reduces accrual in the contribution-based NDC account; and the generous recognition of notional capital for working time acquired in the old system. Finally, there are strong incentives for making use of various early retirement programs (Sinyavskaya, 2005). In particular, many occupations still benefit from early retirement although working conditions have greatly improved since these privileges were established.

The second main shortcoming is that the design of the funded pillar severely limits its contribution to replacement rates. First, the contribution rate of only up to 6 percent is relatively low in international comparison. While reducing the funding gap of the NDC during the transition period, the low contributions to the funded pillar limit the contribution it can make to benefits in the longer term. Moreover, in part due to limited trust in the financial system,<sup>4</sup> most workers (about 4/5 at end-2007) have so far chosen not specify an investment manager. By default, their funds are invested in government bonds by the Development Bank (formerly Vneshekonombank). However, real returns on these bonds have been negative for several years as the decline in public debt implied excess demand for government securities. In contrast, the real returns of the funds managed by private companies and invested in a wider range of securities have been on average highly positive, although not in 2007.

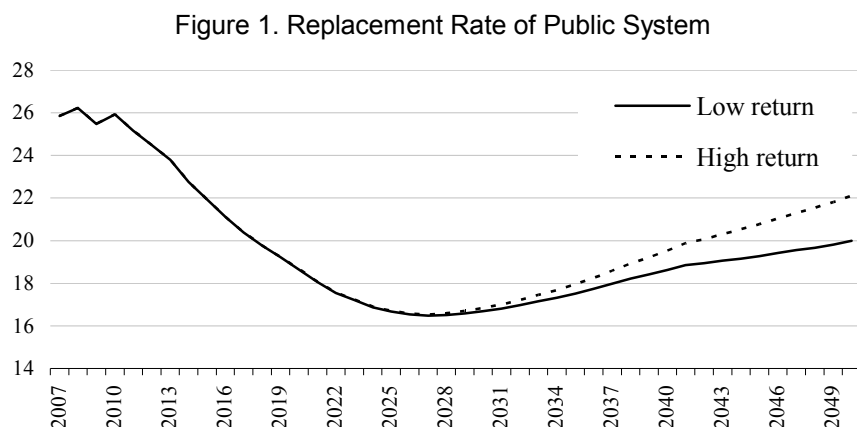
The three-pillar replacement rate is projected to decline from about 24 percent in 2007 to 17 percent in 2027, and then recover to 22 percent in 2050 (Gurvich, 2007).<sup>5</sup> Already since

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<sup>4</sup> Surveys suggest that two thirds of the population distrust banks and prefer to save money in cash.

<sup>5</sup> Labor productivity and real wages are assumed to grow at average rates of about 4 and 5 percent, respectively.

2000, the average replacement rate has fallen by 7 percentage points. This is due to three factors: (i) the declining share of the working-age population; (ii) the valorization of the basic pension benefit and notional capital with prices that usually grow slower than wages; and (iii) the regressive UST scale, which, in the absence of price indexation, entails erosion in revenue. However, even these modest expected replacement rates require that the budget transfer to the pension fund of 1.6 percent of GDP in 2010 as envisaged in the 2008–10 budget remains in place until 2050 (Gurvich, 2007).



Source: Gurvich (2007).

In addition, even this baseline projection requires a substantial improvement in the real rate of return on the mandatory funded pillar. As discussed above, the real rate of return of the mandatory pillar has so far been negative. The “low return” baseline scenario discussed above assumes a real rate of return of 3.7 percent annually (Figure 1). Higher returns than under the baseline projection could make a substantial difference, but only after the trough in the replacement rate has already occurred. For example, a real return of 4.5 percent would raise the replacement rate to 22 percent by 2050, 2 percentage points higher than in the baseline scenario.

The current replacement rate is already far below international standards. Convention 102 of the International Labor Organization recommends 40 percent as the minimum replacement rate. Among OECD countries, the lowest replacement rates are around 40 percent, but most are well above that level. International experience also suggests that to allow a typical full-career worker to maintain a subsistence income in retirement, the overall replacement rate of public and private pension systems needs to be around 40 percent (Holzmann and others, 2004, p. 33). Russia’s current replacement rate of about 24 percent (in 2007) is well below

this level, although it is actually somewhat higher than it first appears.<sup>6</sup> However, the often-heard argument that lower replacement rates would be mitigated by wage incomes of pensioners misses the point, as these incomes do not accrue to workers whose age or health does not allow them to work and who thus depend most of all on old-age insurance.

The projected decline in the replacement rate suggests that the incomes of pensioners may erode even further. Large discretionary increases in pensions have therefore been adopted to increase the average level of pensions at least to the subsistence level, of which it had still fallen short by one third in 2000. However, given that the *average* pension is still only 100 percent of the subsistence level, a substantial number of pensioners receive less than that. Sustaining merely the absolute real value of pensions, while allowing them to decline further relative to wages is unlikely to be acceptable to the public. Indeed, the 2008–10 federal budget envisages an increase in the transfers to the pension fund by 0.7 percent of GDP from 2007 to 2010 to stabilize the replacement rate and bring the basic pension in line with the subsistence level. To stabilize the replacement rate beyond 2010, very substantial additional measures will be needed.

## **B. Encouraging Private Saving**

The government envisages that the falling replacement rate of the public system will be compensated by rising benefits from occupational and private pensions. To further encourage voluntary private saving, a subsidy will be introduced in 2008. This subsidy doubles individual contributions of between RUB 2,000 and RUB 10,000 a year, at an estimated budgetary cost of RUB 6 billion (0.02 percent of GDP) in 2008. Under the extreme assumption that all workers contribute 3 percent of their earnings to the scheme, the average fiscal cost of matching these contributions would amount to about 0.5 percent of GDP per year until 2020 on average. The funds will be managed by the Pension Fund of Russia and at least initially be invested in government bonds. Withdrawals before retirement will be prohibited, and there will be no explicit guarantee of the capital or a minimum return.

Encouraging higher private saving is in principle a welfare-enhancing policy. Higher national savings reduce the real interest rate (as long as capital is not perfectly mobile across borders), leading to greater capital accumulation and gains in output. Moreover, private pension savings can contribute to financial development by increasing the demand for stocks and corporate bonds. Providing an increasing pool of domestic capital may also facilitate privatizations by allowing for sale to domestic as opposed to foreign investors and allow the economy to benefit from efficiency gains that usually result from private ownership of

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<sup>6</sup> Russia's replacement rate is based on average salaries which are (in Russia's particular case) higher than the last pre-retirement salary used for international figures. Moreover, it does not include the sizeable non-pension benefits for pensioners. Estimates of the effect of these two factors on the replacement rate are not available.



previously state-owned enterprises. These factors have motivated the increasing reliance on funded pensions around the world, in addition to their potentially higher rates of return compared to pay-as-you-go pension systems, particularly under adverse demographics.

However, it is unlikely that voluntary private pensions will be sufficiently large to compensate for the drop in the replacement rate of Russia's public pension system. Most importantly, only up to one tenth of workers are likely to participate according to government estimates. Currently, less than 10 percent workers are covered by private pension funds. Moreover, the participants are very likely to come mostly from above-average income levels, implying that those workers that will be most at risk of old-age poverty will not benefit.<sup>7</sup> International experience, including in Chile and the United Kingdom, also suggests that voluntary pension saving tends to fall short of levels required for acceptable replacement rates. This is typically explained by a high preference for earlier consumption, myopia, lack of financial literacy, and—if the phenomenon concerns a large part of the population—moral hazard in expectation of a government bail-out. As Chile's example demonstrates, these issues are further exacerbated in countries with large informal sectors where workers do not save for pensions. In Russia, there is also limited trust in the financial system, as underscored by the above-noted observation that 4/5 of the workforce prefer holding government bonds despite their negative real return to allowing their funds to be managed by the private sector.

Current limitations on the asset allocation of private pension funds also harm their performance. More than half of the funds are invested in bank deposits and government bonds that yield negative real returns, which on a compounded basis implies a large loss in future benefits compared to a situation free of such limitations. This allocation is primarily due to limited free-floating capitalization of the domestic equity market, estimated at about 30 percent of GDP, and the very small size of the corporate bond market (about 5 percent of GDP). This underscores the need to speed up the development of the equity market, mainly through improved corporate governance.

While a voluntary pillar can be a useful supplement to the mandatory system, timing implies that it can help little during the most difficult demographic transition. Even assuming that all workers contribute 3 percent of their earnings (matched by the state and compounded at a real rate of 4.5 percent), the benefits from the voluntary pillar will not be sufficient to increase the average replacement rate to 25 percent until 2040, and only in 2050 the average replacement rate would reach 30 percent (Gurvich, 2007). If just a fifth of workers were to contribute to the scheme—double the amount the government expects to participate—the resulting replacement rate would only be 24 percent in 2050.

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<sup>7</sup> From a distributional perspective, it also means that the subsidy is likely to be highly regressive.

Given that a steep decline in the replacement rate of the public system is unlikely to be sustainable, and private pensions can only make a small contribution, the funding of a reasonable replacement rate should be considered a contingent fiscal liability. Experience suggests that governments, as long as they are expected to remain solvent, cannot credibly shift the burden of the pension system to the private sector if this implies a decline in replacement rates to socially unacceptable levels: for example, in Chile and the United Kingdom insufficient private saving required ultimately new social benefits that were fiscally expensive. The only realistic alternative to increased pension funding from the federal budget is an increase in the retirement age. These two options will be discussed in the next section. Other policies that have been suggested by some, including improvements in taxpayer compliance with social contribution payments, immigration, or a higher fertility rate will at this stage not be able to make more than marginal contributions to the solution of Russia's pension problem, particularly given the already advanced stage of the problem.

### **C. Stabilizing the Replacement Rate of the Public System**

The optimal policy for stabilizing the replacement rate of the public system would be a gradual increase in the retirement age. Russia's current retirement age of 60 for men and 55 for women is relatively low in the international context. Life expectancy at the official retirement age is currently 14 years for men and 23 years for women, leaving room for raising the retirement age. This would also help buffer the negative output effects of the decline in the labor force. It is thus clearly the best policy from a macroeconomic point of view. Many transition economies with similarly low life expectancy have adopted a gradual rise in the retirement age over the last ten years (Holzmann and others, 2004, p. 85).

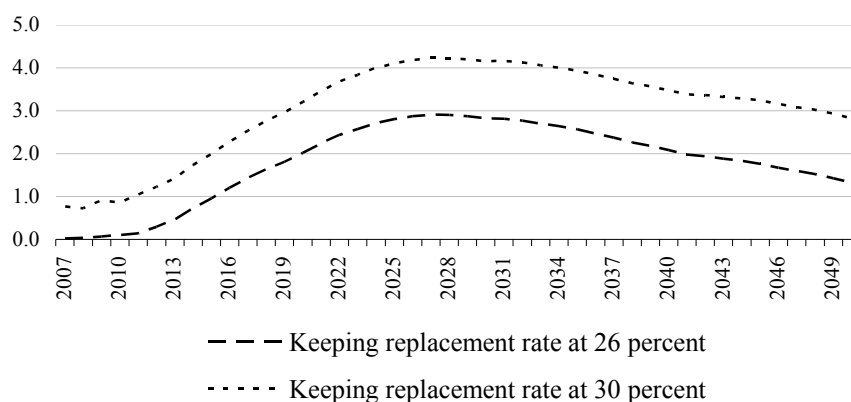
Raising the retirement age would substantially increase the replacement rate. Gradually raising the retirement age of women to 60 in 2020 (by 5 months per year) would increase the average replacement rate by 5 percentage points. Gradually raising the retirement age of both genders to 65 in 2040 (by 2 months per year for men and 4 months per year for women) would increase the average replacement rate by 10 percentage points (World Bank, 2002).<sup>8</sup>

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<sup>8</sup> The calculations in World Bank (2002) did not account for the subsequent reduction in the contribution rate that reduces the replacement rate. The figures given here are adjusted downward to account for this effect.

Alternatively, the replacement rate could be stabilized by increasing the federal transfer to the pension fund *by* up to 3 percent of GDP until approximately 2030 (Figure 2). After that, the transfer could gradually decline to about 1.5 percent of GDP in 2050. This would allow stabilizing the average replacement rate at its 2006 level of 26 percent. Stabilizing the average replacement rate at its 2003 level of 30 percent—still 10 percentage points below the minimum in OECD countries—would require an increase in transfers *by* up to more than 4 percent of GDP until approximately 2030, then declining to still 3 percent of GDP in 2050. These projections are based on the pension model used in Gurvich (2007). While long-term projections are of course subject to substantial uncertainties, projections in other recent studies reach similar figures: for example, IET (2007) finds that additional transfers of 3.2 percent of GDP would result in a replacement rate of 27.2 percent in 2025.

Figure 2. Additional Funding Need under Two Scenarios, Percent of GDP



Source: Gurvich (2007).

Under the current outlook for oil prices, Russia's oil wealth will be insufficient to sustain the present replacement rate. As Figure 3 shows, the legislated annual withdrawal from the oil<sup>9</sup> funds of 3.7 percent of GDP implies that, even at oil prices of \$80 (in 2007 prices), the combined oil funds would be depleted by 2030.<sup>10</sup> This is because the consumption of the oil wealth is fixed in percent of GDP, which is growing much faster than oil revenues.<sup>11</sup> Additional withdrawals to finance a replacement rate of 30 percent would deplete the funds by 2020, already a decade before the peak of the financing need around 2030. Even at real oil prices of \$100, this strategy would deplete the funds by 2025. Moreover, larger government

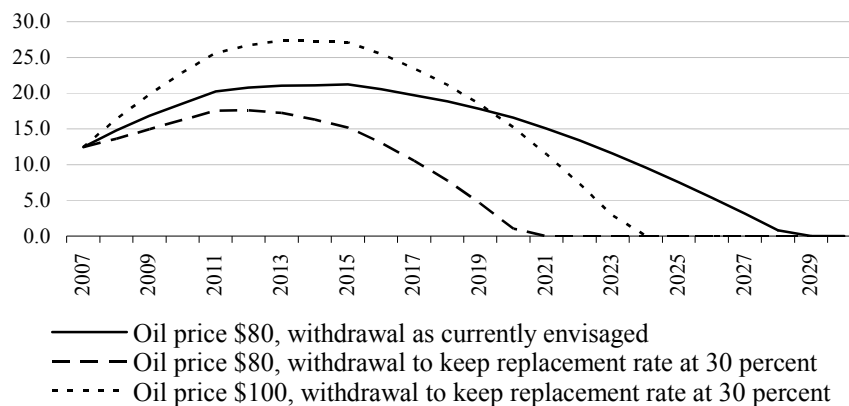
<sup>9</sup> Throughout this paper, oil is always understood to include natural gas and oil products.

<sup>10</sup> Figures 3 and 4 are based the assumptions of annual growth of real GDP and the GDP deflator by 4 percent and a nominal interest rate of 8 percent. The return on the oil wealth is assumed to be 7 percent in US dollars.

<sup>11</sup> IMF (2006) determined that an annual withdrawal even higher than 3.7 percent of GDP would imply a balance in the oil funds of about 40 percent of GDP in 2025. However, these projections assumed substantially higher oil sector growth and lower real appreciation than suggested by the developments of the past two years.

deficits would lead to appreciation in the real exchange rate and change the intergenerational distribution that is implicit in the new budget framework.

Figure 3. Oil Stabilization and National Welfare Funds in Percent of GDP



Source: Fund staff calculations.

Privatizations would be an attractive way to fund these transfers, but it is unclear whether the proceeds could be sufficient. Privatizations would avoid the adverse macroeconomic consequences of funding the pension gap through higher taxes or lower public investment (see next section), although using them for the financing of pensions gives rise to the same equity concerns as using the oil wealth or debt financing by leaving future generations with lower net assets. To the extent that it is preferred to privatize to domestic investors than to foreigners, there is a synergy with the desired increase in voluntary saving, because it would in the long run provide the basis for privatizations to small domestic shareholders through mutual funds. However, even if all state-owned companies were privatized, their estimated value of 20 percent of GDP (Gaidar, 2007) would cover only about half of the present value of the funding gap relative to the 2006 replacement rate (Gurvich, 2007). Of course, however, such estimates are subject to great uncertainty.

As neither voluntary savings, nor the oil funds, nor privatizations are a “magic bullet,” it is likely that taxes will have to be raised, or non-pension spending be cut. As discussed, the first-best policy from a macroeconomic perspective would be an increase in the retirement age that could stabilize the replacement rate without fiscal adjustment or higher debt and would even have added positive macroeconomic effects through greater labor supply. However, if no or only an insufficient increase in the retirement age is adopted, a package of fiscal measures will be needed to fund the shortfall in the replacement ratio. The options on the budgetary side include higher borrowing, tax increases, or cuts in non-pension expenditure. Their respective macroeconomic effects are discussed in the following section.

### D. Macroeconomic Effects of Financing Options

This section analyzes the macroeconomic effects of various options to close the pension financing gap with a multi-country dynamic general equilibrium model. The Global Integrated Monetary and Fiscal Model (GIMF) was developed at the IMF (see Kumhof and Laxton, 2007) to examine fiscal and monetary policy issues. Some of its features render agents non-Ricardian, making the model well equipped to analyze fiscal policy issues that involve permanent changes in government assets or debt. The model also includes several nominal and real rigidities, as well as an inflation-targeting central bank. See the appendix for a summary of the model and details on the calibration.

The simulations assume an increase in government transfers such that is sufficient to achieve a replacement rate of 30 percent. This assumption implies that the additional financing requirement peaks at 4 percent of GDP around 2030 (see Figure 2). It requires a sizeable short-term increase in transfers given the current replacement rate of 26 percent, which explains the large short-term response in all variables shown in the figures. All simulations are quarterly until 2050. *In the figures, HO refers to the home country (Russia), as opposed to the rest of the world. To demonstrate the relative macroeconomic effects of the different options, in each simulation only one assumes the full adjustment burden, although in reality a mix of measures is more likely. Given the uncertainties surrounding long-term simulations and the unavoidably simplifying assumptions, the policy considerations should focus on the relative more than on the absolute magnitudes.*

Debt financing of a replacement rate of 30 percent is unlikely to endanger debt sustainability, but would be inconsistent with the borrowing limit in the budget code. In this scenario, federal gross debt is projected to peak at about 60 percent of GDP<sup>12</sup> in the late 2030s (Figure 4). This debt level is likely to be sustainable considering the expected intermittent improvement in the country's wealth and institutions, although concerns could arise if it were financed mostly externally, as private sector external debt was already 32 percent of GDP at the end of 2007. Debt financing exceeding 1 percent of GDP would require an amendment of the new budget code introduced in 2007. Concerns about intergenerational distribution would of course be the same as in the case of a faster consumption of the oil wealth or privatizations.

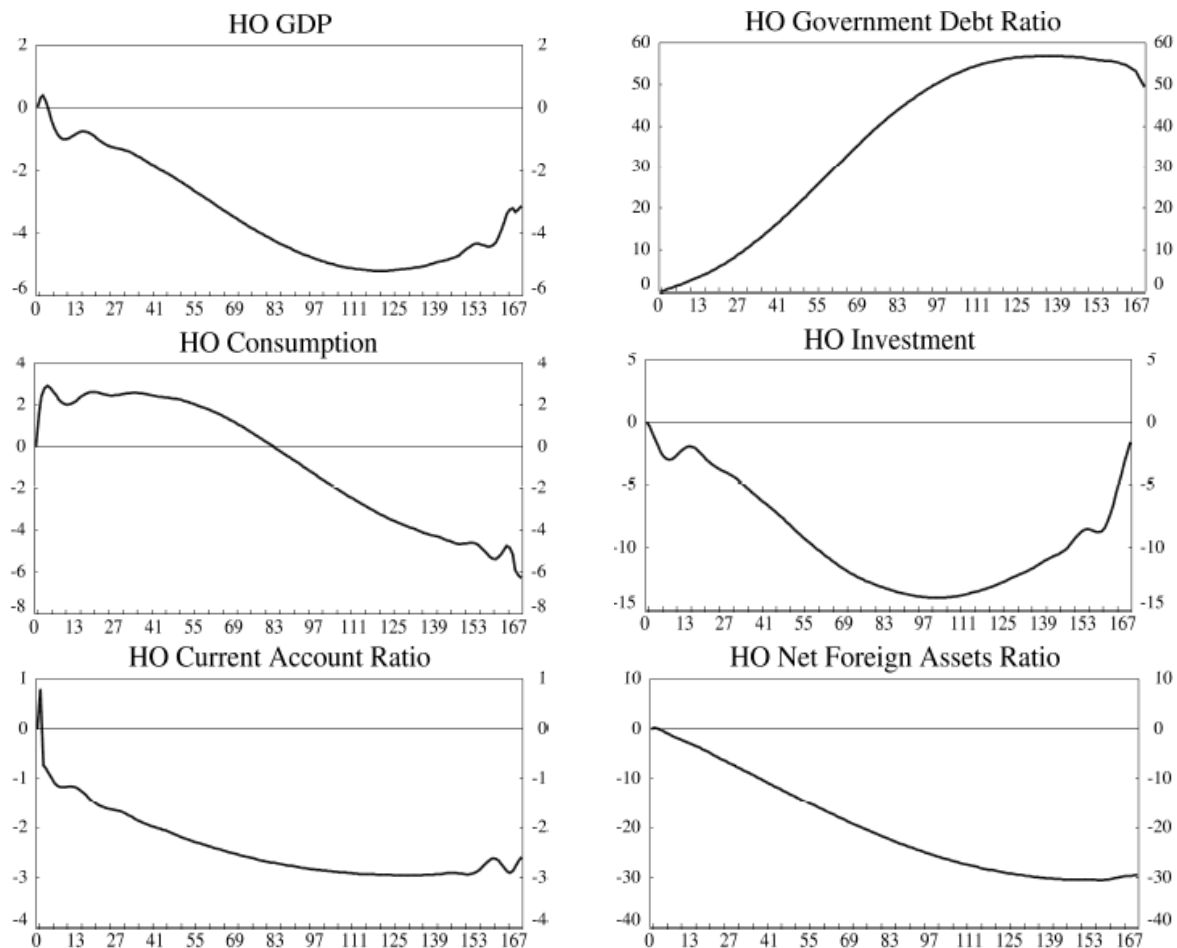
However, debt financing would have a significant negative effect on the economy. The resulting higher real interest rates (up to 1 percentage point more in 2050) substantially reduce private investment relative to the baseline scenario of only very low public debt (Figure 4). This leads to a 10 percent lower capital stock in 2050, reducing output by 3 percent and private consumption by 6 percent. The current account deteriorates, and net foreign assets are about 30 percentage points of GDP lower than under the baseline in 2050.

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<sup>12</sup> Figure shows deviation (55 percent) from baseline (5 percent), adding up to 60 percent.

If transfers are fully tax-financed, the costs are highest for the profit tax and lowest for the VAT, with the UST in the middle (Figure 5a).<sup>13</sup> The profit tax reduces capital accumulation, and the UST reduces labor supply, while the VAT is less distortionary than payroll taxes because its base is broader (it also taxes accumulated savings). The profit tax is more distortionary than the UST because its effects are cumulative (the capital stock is permanently lower).

Figure 4. Debt-Financed Increase in Transfers  
(Deviations from Initial Steady State in Percent of GDP, quarterly periods until 2050)

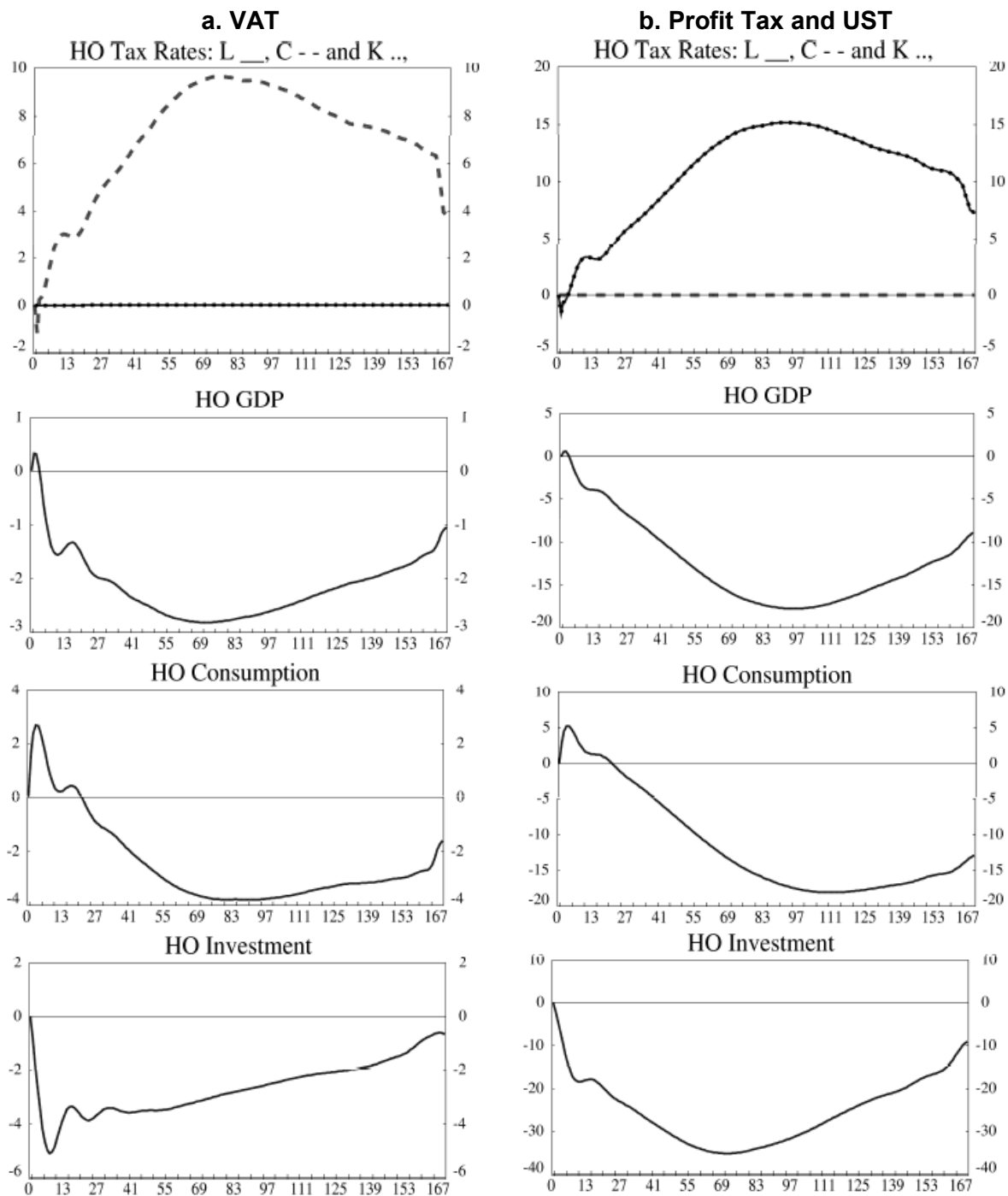


Source: Fund staff estimates.

Notes: Simulations of effects of gradual increase in government transfers in line with pattern shown in Figure 2 with the Global Fiscal and Monetary Model. "HO" is the model's "home country," the Russian Federation.

<sup>13</sup> The taxes are here referred to as applicable for Russia, but their definitions in the model are generic.

Figure 5. Tax-Financed Increase in Transfers  
(Deviations from Initial Steady State in Percent of GDP, quarterly periods until 2050)



Source: Fund staff estimates.

Notes: Simulations of effects of gradual increase in government transfers in line with pattern shown in Figure 2 with the Global Fiscal and Monetary Model. "HO" is the model's "home country," the Russian Federation.

Thus, if any tax is raised, it should be the VAT, largely through base broadening (Figure 5b).<sup>14</sup> If the VAT bears the full burden, its rate at the peak in 2030 is more than 9 percentage points higher than the current effective tax rate of 12 percent.<sup>15</sup> This could be largely achieved through base broadening to bring the effective VAT rate closer in line with the (higher) statutory rate of 18 percent. The VAT is best-placed to bear the brunt of a tax hike, given its inherently broader base and relatively limited distortionary effects. If the profit tax and UST are raised in lockstep,<sup>16</sup> instead of the VAT, their larger negative effects and smaller bases imply that both rates would need to reach a peak of 15 points above the baseline around 2030. Output around 2030 would be 20 percent lower than under the baseline, while it would be only 3 percent points lower if only the VAT rose. Moreover, raising the VAT is particularly adequate in an aging society because its base can be expected to contract less than the base of direct taxes.

Raising the UST, while more consistent with the insurance character of the pension system, is economically less efficient. In principle, benefits in an insurance-based pension system should be tied to contributions. However, the exceptional circumstances of Russia's economic and demographic transition argue against strict application of this principle, as it would not allow smoothing of the transition cost across generations. It is important to strike a balance between these considerations, including regarding the question to what extent the gradual decline in the effective UST rate due to the regressive scale should be halted. No such tension exists for the basic pension that is independent of contributions and could be financed from general tax revenue (Holzmann and others, 2004, pp. 10–11).<sup>17</sup> This would make the basic pension a welfare benefit that could be means-tested to save costs.

On the expenditure side, cutting public investment has strong adverse effects on consumption and GDP in the simulations (Figure 6a). The lower capital stock reduces output by 15 percent relative to the baseline after 40 years. Moreover, as mentioned above, lower capital accumulation has, in contrast to lower labor supply, a permanent effect. The output loss is thus about equal to the case in which UST and profit tax bear the entire burden and much larger than for raising only the VAT. However, this conclusion hinges on the assumed productivity of public investment: halving this parameter also halves the output loss relative to the baseline (to 8 percent), which is much lower than in the case where the profit tax and UST bear all the adjustment burden, although not lower than for raising the VAT. Thus,

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<sup>14</sup> Studying the pension reform options for China in a DSGE model, Wang and others (2004) also suggest using the VAT to finance the transition cost.

<sup>15</sup> This magnitude is not unusual; see, for example, Botman and Iakova (2006) on Ireland. It also makes intuitive sense from a static perspective: currently, an effective rate of 12 percent generates 6 percent of GDP in revenue; raising revenue by 4.5 percent of GDP thus requires a rate increase by 9 percentage points.

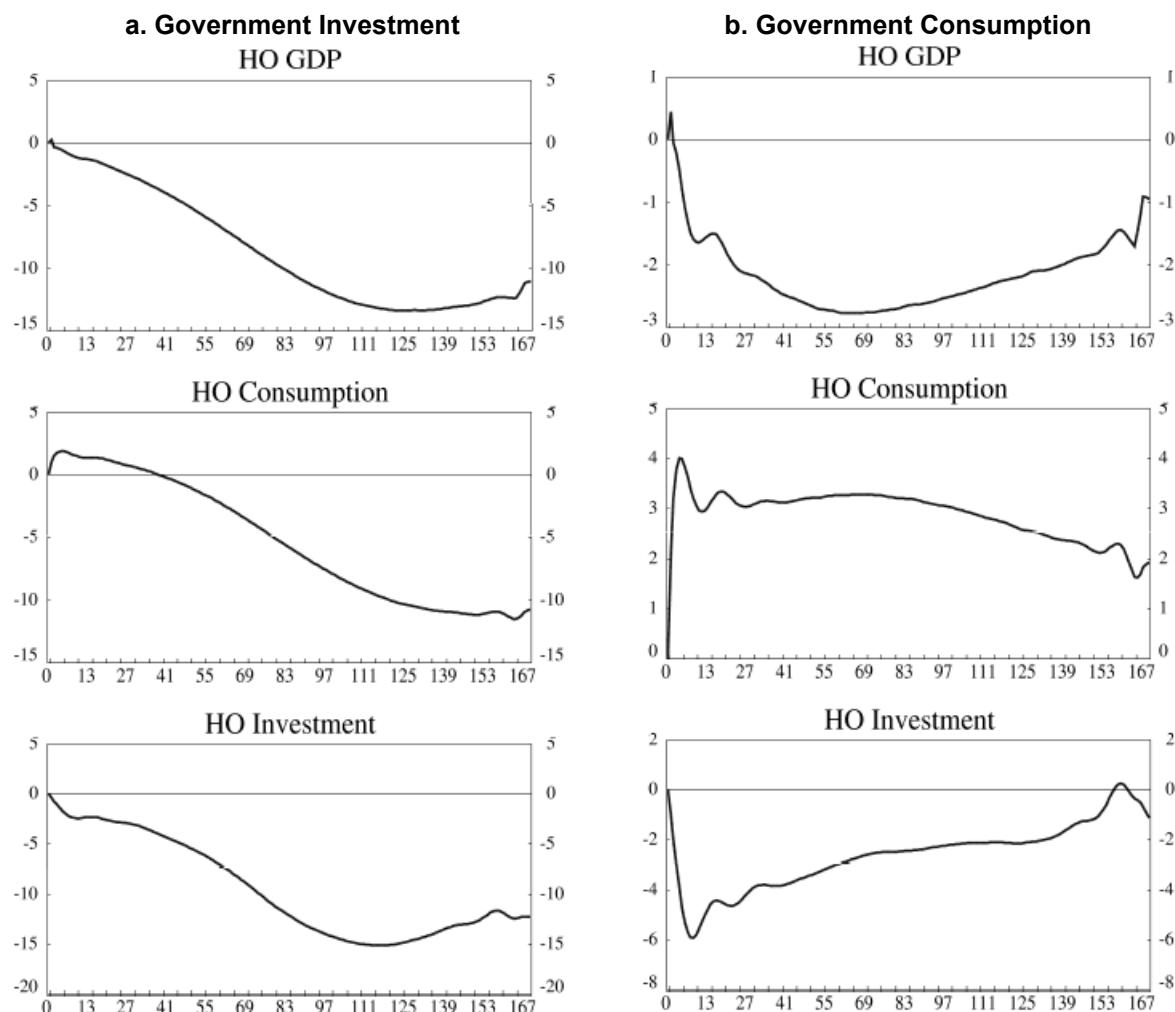
<sup>16</sup> The revenue requirement is so large that neither the profit tax nor the UST could generate it individually.

<sup>17</sup> See Willmore (2007) for detail on universal pensions and Selden and You (1997) for a case study of China.



cutting public investment would be preferable to raising the profit tax or UST unless the social rate of return on public investment (i.e., its impact on the economy) is significant.

Figure 6. Expenditure-Financed Increase in Transfers  
(Deviations from Initial Steady State in Percent of GDP, quarterly periods until 2050)



Source: Fund staff estimates.

Notes: Simulations of effects of gradual increase in government transfers in line with pattern shown in Figure 2 with the Global Fiscal and Monetary Model. "HO" is the model's "home country," the Russian Federation.

Cutting government consumption is the best financing option from a purely macroeconomic perspective according to the model simulations (Figure 6b). While associated with a small output loss similar to the loss associated with a higher VAT rate, replacing government consumption with transfers allows for even higher private consumption than under the baseline. To fully offset higher transfers, government consumption would need to decline until 2030 gradually by 4 percentage points of GDP, or about one quarter relative to the current ratio to GDP. This is feasible, given the long time horizon and the scope for

significant efficiency gains.<sup>18</sup> At the same time, however, Russia urgently needs to upgrade its public services and improve public sector wages. Moreover, the magnitude of the effect on private consumption is overstated by the (standard) assumption in the GIMF model that government consumption does not enter the private sector's production function, which is arguably not the case for education spending, for example. Gradual reduction in government consumption will thus require reinforced and continuous efficiency-enhancing reforms in the public sector.

### **E. Policy Recommendations**

The financing of a reasonable replacement rate should be considered a contingent fiscal liability as private pensions are likely to be insufficient to fill the gap. The projected decline of the replacement rate of the public pension system to 17 percent in 2030 is unlikely to be socially sustainable. Private pensions will only be able to make up for a small part of the shortfall, given the small share of the population that can be realistically expected to save in private pension funds (given income levels, low trust in the financial system, and moral hazard), as well as the timing of the financing gap. The unrealistic case of mandatory savings aside, the options are a higher retirement age and budgetary financing.

A gradual increase in the retirement age should be considered. Given Russia's shrinking labor force, this policy would be optimal from a macroeconomic point of view. A very gradual increase by 2 months per year for men and 4 months per year for women could finance much of the gap to keeping the current replacement rate stable. Of course, even such a gradual increase in the retirement age would require commensurate increases in life expectancy, particularly for men, through higher living standards and improved health care.

Incentives for working longer voluntarily should be improved. In line with the standard design of a NDC system, pension benefits should be based on the actual life expectancy at retirement. To the extent that this leads to an undesirable drop in replacement rates, the resulting gap could be temporarily funded separately. However, such a reform would greatly improve the consistency of the NDC system in the long run. Moreover, the deductions for early retirement, as well as premia for working longer, should be increased.<sup>19</sup> Finally, the lists of hazardous occupations eligible for early retirement should be revisited.

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<sup>18</sup> Staff estimates suggest that current output of public services could be produced with only 2/3 of the actual inputs when comparing Russia to other countries at similar income levels or Russia's regions among themselves (IMF, 2007; Hauner, 2008).

<sup>19</sup> Economic incentives have been shown to affect retirement decisions in similar countries (see Becker and Urzhumova, 1998).

Russia's oil wealth and revenue from privatizations can probably finance only part of the pension gap. Given the currently legislated annual oil consumption and current oil prices (in real terms), the oil wealth is projected to be exhausted around 2025. Additional withdrawals to finance a replacement rate at the current level of 26 percent would deplete the funds already in 2020, well before the peak of the gap in 2030. Moreover, such additional withdrawals would further undermine the new budget framework's stated goal to save some of the oil wealth for future generations. In any case, the oil wealth would most likely be able to finance only part of the pension gap. Similarly, even if the entire estimated value of state corporations is realized through privatizations, this would only cover half of the financing need for a stable 26 percent replacement rate. However, privatizations would also have positive side effects for the economy at large, through enhanced efficiency and a boost to financial markets.

To the extent fiscal financing is used, the model simulations suggest that it should occur through lower government consumption. This would be preferable to other financing options from a macroeconomic perspective. Under the extreme assumption that the entire possible efficiency gains relative to countries with similar income level, estimated at about 1/3, can be achieved, this would be sufficient to finance a stable replacement rate of more than 30 percent. At the same time, however, Russia urgently needs to upgrade its public services and improve public sector wages. Gradual reduction in government consumption will thus require substantially reinforced and continuous efficiency-increasing reforms in the public sector; see, for example, IMF (2007) for a discussion of some related reform priorities.

Financing through borrowing, lower public investment, or higher taxes should be avoided, according to the model simulations. While debt financing would be unlikely to lead to sustainability concerns even in the extreme case where it fully finances the gap to a 30 percent replacement rate, it would require a legislative amendment to increase the current borrowing limit of 1 percent of GDP per year. Moreover, debt financing, as well as lower public investment or tax increases, entail substantial macroeconomic costs. Through higher interest rates and price distortions, they reduce output, investment, consumption, and net foreign assets relative to the baseline.

The basic pension should be means-tested and financed from general revenue. The basic pension is independent of contributions and thus a social benefit that could be financed from taxes that are less distortionary than the UST, such as the VAT, or lower expenditure in other areas. The cost of the basic pension could be reduced by means-testing. The UST revenue could be limited to the financing of the insurance-based NDC pillar, which would allow sustaining a replacement rate of 26 percent approximately until 2013.

The returns on the mandatory funded pillar should be improved. The negative real returns on the lion's share of contributions that is managed by the public sector have been detrimental both the long-term financing of the pension system and the public's trust in financial markets. They also stand in stark contrast to the highly positive average real returns of

private pension funds. The management of these mandatory contributions should be outsourced to the private sector, possibly under a model similar to Sweden's where private managers compete for standardized investment mandates to keep administrative fees low. Given the limited depth of domestic markets, an increase in the current ceiling on investment abroad should be considered. This may allow for a better risk-return profile, particularly through diversification into high-growth and net resource-importing emerging economies.

The stock of domestic gross government debt should gradually increase. Negative real yields on government bonds have been a result of excess demand for these securities in the last few years. While a reduced debt burden has clearly fiscal advantages and—as argued above—contributes to lower interest rates, a certain amount of government debt is needed for the development of the financial sector, particularly pension funds. Somewhat greater issuance than in recent years, particularly of longer maturities, would be advisable.<sup>20</sup> Thus the borrowing of 1 percent of GDP allowed under the new budget framework should be fully used, possibly offset by a lower-than-permitted withdrawal from the National Welfare Fund. This would lead to a very gradual convergence of federal government domestic debt towards 10 percent of GDP.

Trust in financial markets should be strengthened through improved regulation and supervision. This will be crucial for the success of the new subsidized private pension savings scheme. Currently, only 1/10 of the population invests in private pension funds, and this ratio is unlikely to increase substantially in the near future. Issues of liquidity constraints, myopia, and moral hazard aside, limited trust in the financial sector is one of the determining factors of this low participation rate. Improvements in the rule of law, property rights, and corporate governance (including accounting rules, financial disclosure, minority shareholder rights) will be indispensable. Moreover, more decisive action should be taken against regulatory infringements that undermine the public's trust in the financial system.

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<sup>20</sup> IMF and World Bank (2003) discuss the role of government debt in financial market development.

## Appendix: Model and Calibration<sup>21</sup>

### The Model

GIMF is an open economy general equilibrium model developed at the IMF that is equipped for both monetary and fiscal policy analysis (Kumhof and Laxton, 2007). The model's nominal and real rigidities, monetary policy reaction function, multiple non-Ricardian features, and a fiscal policy reaction function yield plausible macroeconomic responses to changes in fiscal and monetary policy. Real rigidities embedded in the model include consumer habits that induce consumption persistence, investment adjustment costs that induce investment persistence, and import adjustment costs. Nominal rigidities include sticky inflation Phillips curves in each sector of the economy.

Ricardian equivalence is assumed not to hold for four reasons:

- The model features overlapping generations agents with finite lifetimes as in Blanchard (1995). These agents are myopic in the sense that they perceive debt-financed tax cuts as an increase in their wealth, and attach a low probability to having to pay for them in the future.
- Workers have a life-cycle labor productivity pattern that implies a declining rate of productivity as workers age. This means that workers discount the effects of future payroll tax increases as the latter are likely to occur when they are less productive.
- The model contains liquidity-constrained consumers who do not have access to financial markets and change their consumption one-for-one with after-tax income.
- The model includes payroll and capital income taxes that are distortionary because labor effort and private investment respond to variations in relative tax rates.

GIMF relaxes the conventional assumption that all government spending is wasteful. Instead, GIMF allows for productive public infrastructure spending that adds to the public capital stock, and enhances the productivity of private factors of production.

The government determines how the fiscal surplus-to-GDP ratio responds to business cycle fluctuations using a simple fiscal policy rule of the following form:

$$\frac{fs_t}{gdp_t} = \phi^* + d \left( \frac{\tau_t - \tau_t^*}{gdp_t} \right) \quad (1)$$

where  $\frac{fs_t}{gdp_t}$  is the fiscal surplus-to-GDP ratio. If the response parameter  $d = 0$ , the fiscal surplus is kept equal to  $\phi^*$  at all times, regardless of the economy's cyclical position. For

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<sup>21</sup> This appendix draws on Leigh (2007).

example, if  $d = 0$  and the economy experiences a cyclical upswing with actual tax revenue  $\tau_t$  exceeding steady-state tax revenue  $\tau_t^*$ , the fiscal surplus remains unchanged, and the cyclical excess revenue is spent. Such a response corresponds to a “balanced budget” rule and is procyclical. A response of  $d < 0$  would qualify as countercyclical. As the response parameter  $d$  increases, a greater share of the cyclical excess revenue is saved.

The central bank targets inflation by manipulating the nominal interest rate following a standard inflation forecast-based rule of the following form:

$$i_t = i_{t-1}^{\mu_i} (r_t^* \bar{\pi}_{t+4})^{1-\mu_i} \left( E_t \frac{\bar{\pi}_{t+4}}{\pi_{t+4}^*} \right)^{(1-\mu_i)\mu_\pi} \quad (2)$$

where the gross policy interest rate is  $i_t$ , the inflation forecasting horizon is 4 quarters, the inflation target  $\pi^*$  is for total 4-quarter gross inflation,  $\bar{\pi}_{t+4} = \pi_{t+1}\pi_{t+2}\pi_{t+3}\pi_{t+4}$ , and  $E_t$  denotes expectations based on information available at time  $t$ .<sup>22</sup> Coefficient  $\mu_i \in [0,1)$  denotes the degree of nominal interest rate inertia. If  $\mu_i = 0$ , Equation (2) implies that when the inflation forecast exceeds the target by 1 percentage point, the nominal interest rate increases by  $1 + \mu_\pi$ . The equilibrium real interest rate  $r_t^*$  is endogenous, and is determined by the global market for loanable funds, as well as a country-specific risk premium.

The model includes an endogenous country-specific risk premium. In particular, the risk premium on the interest paid on domestic government debt is denoted  $\rho_t$  and enters the model via an augmented uncovered interest parity (UIP) equation:

$$i_t = i_t^{RW} E_t \varepsilon_{t+1} (1 + \rho_t) \quad (3)$$

where  $i_t^{RW}$  is the (gross) nominal interest rate in the rest of the world, and  $\varepsilon_{t+1}$  denotes future (gross) nominal exchange rate depreciation. The domestic risk premium  $\rho_t$  is assumed to have the following non-linear form:

$$\rho_t = \delta_1 + \frac{\delta_2}{((debt / gdp)^{\max} - (debt_t / gdp_t))^{\delta_3}}. \quad (4)$$

If  $\delta_2 = 0$ , then the risk premium always equals the exogenous level  $\delta_1$ , regardless of the level of the debt-to-GDP ratio  $(debt_t / gdp_t)$ . If  $\delta_2 > 0$ , a decline in government debt reduces the risk premium. As the debt-to-GDP ratio rises towards a threshold level  $(debt / gdp)^{\max}$ , the risk premium rises at an increasing rate. The assumption that the risk premium responds

<sup>22</sup> The actual rate equals the gross rate minus one.

more strongly to changes in government indebtedness as the debt-to-GDP ratio increases is broadly consistent with empirical studies that estimate the relationship between the *logarithm* of the risk premium and the debt-to-GDP ratio. The estimates of such studies imply that the *level* of the risk premium, in basis points, increases more at high levels of the debt-to-GDP ratio than at low levels of the debt-to-GDP ratio. The parameter  $\delta_3 > 0$  determines the curvature of the risk premium function.

### Calibration

The model is calibrated to contain two countries, Russia and the rest of the world. Russia is assumed to comprise 2.5 percent of world GDP, and to have a steady state inflation rate of 4 percent per year, while the inflation rate for the rest of the world is 3 percent per year. In the steady state, the rate of technological progress is assumed to be 2 percent per year, population is assumed to grow at 1 percent per year, and the real interest in the rest of the world is assumed to be 3 percent per year. The structural parameters regarding household preferences and firm technology are set following Kumhof and Laxton (2003). In particular, the parameters that govern the degree of household myopia, a key non-Ricardian feature of the model, are calibrated as follows: households both in Russia and the rest of the world are assumed to have a planning horizon of 15 years, and a decline in lifecycle productivity of 5 percent per year. 40 percent of Russian households are assumed to be liquidity constrained.

Fiscal parameters are calibrated based on 2006 data. The productivity of public capital is calibrated so that a 10 percent real increase in public investment is associated with a long-run increase in real GDP net of depreciation of 1.4 percent. The depreciation of public capital is set at 5 percent per year. The parameter that governs the fiscal policy response to the business cycle,  $d$ , is set to equal zero, in line with Russia's non-oil deficit ceiling.

The fiscal surplus is assumed to equal the value that stabilizes the debt-to-GDP ratio at the level of 5 percent (except in the simulation of debt financing). In particular, in the steady state, there is a one-to-one correspondence between the fiscal deficit-to-GDP ratio and the government debt-to-GDP ratio that depends on the rate of nominal GDP growth, that is,

$$\left( \frac{fdef}{gdp} \right)^* = \frac{NG^*}{1 + NG^*} \left( \frac{debt}{gdp} \right)^*, \quad (5)$$

where  $NG^*$  denotes the steady state nominal growth rate, and  $fdef$  denotes the fiscal deficit.

The monetary policy reaction function is calibrated in line with empirical evidence for a number of countries. The nominal interest rate inertia parameter is  $\mu_i = 0.5$ , and the baseline calibration of the inflation response parameter is  $\mu_\pi = 1.5$ . While particular uncertainty surrounds the validity of these parameters, the results are not sensitive to them.

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