The Russian Economy and Resources Available for Military Reform and Equipment Modernization

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Abstract

The Centre for Operational Research and Analysis (CORA)'s new Defence Economic Analysis team has undertaken a project to study the Russian economy and resources available for defence in order to assess the potential of the latest Russian military reform plan to become reality. The present memorandum, the first of two on this topic, looks at the current macroeconomic environment and the impact on planned defence expenditures and procurement objectives. Conclusions drawn from this study address a broad range of issues, ranging from the capacity of the industrial base to produce modern weapons to the country's looming demographic crisis. It is hoped that the findings will contribute to provide some perspective to Canadian defence partners in the interpretation of current and future events in the Russian Federation.

Résumé

La nouvelle équipe d'analyse de l'économie de la défense du Centre de recherche opérationnelle et d'analyse a entrepris d'étudier l'économie russe et les ressources disponibles pour la défense afin de déterminer les probabilités que le plus récent plan de réforme militaire russe se concrétise. Le présent mémoire, premier de deux sur le sujet, traite du contexte macroéconomique actuel et de l'incidence sur les dépenses de défense prévues et sur les objectifs d'approvisionnement. Les conclusions tirées de cette étude portent sur un large éventail de sujets, allant de la capacité de l'infrastructure industrielle à produire des armes modernes à la crise démographique qui menace le pays. Les conclusions présentées ont pour objectif d'éclairer les partenaires de défense du Canada dans l'interprétation des événements actuels et futurs survenant dans la Fédération de Russie.

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Executive summary

The Russian Economy and Resources Available for Military Reform and Equipment Modernization

T. Yazbeck; DRDC CORA TM 2010-192; Defence R&D Canada - Centre for Operational Research and Analysis; September 2010.

Context

In December 2006, after almost a decade of strong economic growth, the Russian Federation (RF) adopted an ambitious equipment procurement plan covering the period from 2007 to 2015. The State Armament Programme (GPV) was designed to provide new and modernized equipment to all levels of the military and security forces and was part of an ongoing military reform including the reorganization of the forces into smaller and more agile units. The war with Georgia in August 2008 however exposed critical shortfalls in the Russian Forces equipment and organization. As a result the speed of the reform was accelerated and the commitment to maintain the funding of the GPV-2015 at the level originally intended was renewed, despite the ongoing financial crisis.

The Centre for Operational Research and Analysis (CORA)'s new Defence Economic Analysis team has undertaken a project to study the Russian economy and resources available for defence in order to assess the potential of the latest Russian military procurement plan to become reality. The first phase of the project is documented in this memorandum. A follow-on memorandum will look in more detail at the state of the Russian defence industry.

Macroeconomic environment

The past 10 years have seen steady growth of the Russian economy with an average yearly increase of real Gross Domestic Product (GDP) close to 7%, a level that is comparable to other emerging economies such as Brazil, India and China (BRICs) but much greater than the economic growth of other G8 economies during the same period. Per capita income is twice the average for other BRICs but half that of other G8 countries. The recent economic growth was driven by high prices and large exports in the oil and gas sector as well as by the resulting increase in wealth which has led to strong domestic demand for goods and services.

The strong economic performances of the last decade were not sufficient however to prevent Russia from being hit severely by the global financial crisis of 2007-2008. By the end of 2009, the country's GDP had decreased by 7.9% year-on-year, a sharp contrast to the pre-crisis economic forecast which anticipated continued growth at the level of 7.8% yearly. Despite the financial downturn, there have been repeated official announcements that the level of funding of GPV-2015 will be maintained. The delivery of funds to the defence companies has in fact been accelerated and GPV-2015 is now being referred to as an anti-crisis measure for the defence industry. Based on the projections of a number of different Russian and international financial institutions, three forecasts are chosen to model possible scenarios of economic growth to 2020 (Figure ES-1). The three forecasts are used in the study to assess the impact of different levels of defence spending on the economy.

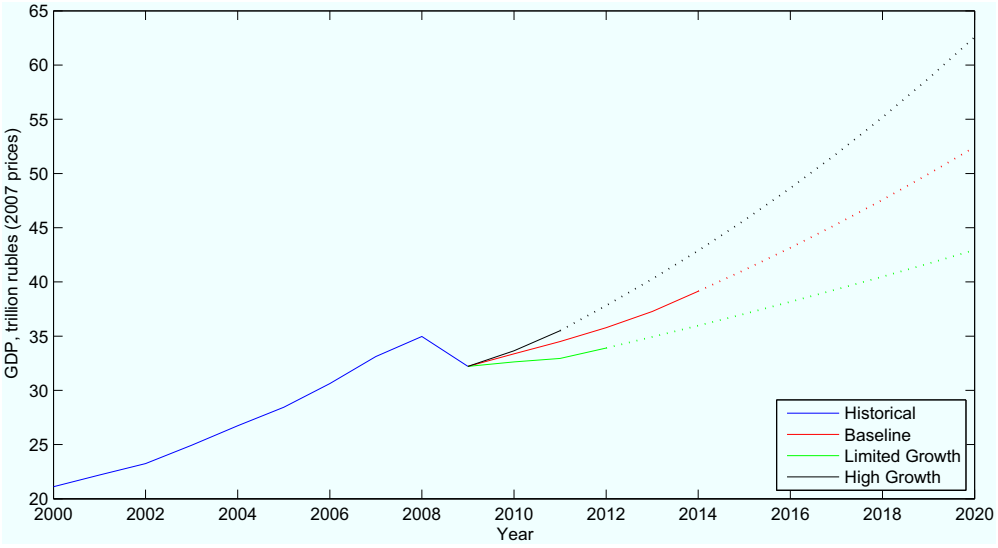

Figure ES.1: *Russian real GDP growth under three different economic scenarios*

Defence expenditures

The burden of defence in Russia stands between 2.5 and 2.7% although it appeared higher in 2009 due to lower than expected GDP. The government's intention to keep defence funding at this level has been made clear on several occasions. This level of funding represents the National Defence heading of the budget and does not include a number of other defence-related items such as military housing and pensions.

Simple calculations show that this level of defence funding combined with the allocation of approximately one third of the defence budget to procurement, as has been the case in the past, is not sufficient to achieve the objective of allocating 5 trillion rubles to procurement by 2015, even under the most optimistic economic growth forecast. The spending objective however becomes achievable under moderate economic growth and defence funding by extending the timeline to 2020. While the level of expenditure can be sustained by the economy in an extended timeframe, a high-level cost estimation of the list of equipment to procure, in particular for the Navy, does not indicate that the funds made available would be sufficient to procure the equipment required at the current production costs.

Based on announcements made for 2009 and 2010, new aircraft are entering the force at the rate of a few dozen a year and approximately 3 to 4 ships are built each year. These procurement rates are not sufficient to upgrade the Air Force and Navy equipment to the level specified in GPV-2015 and will leave the services with significantly less equipment than at any time since the Soviet Union. In the short to medium term, the Navy can expect to be without a single Russian built aircraft-carrier and next generation aircraft are not expected to enter service before 2015, or 10 years after equivalent technologies appeared in the United States.

Defence Industry

The ability of the defence industry to produce the most modern equipment is also under pressure as profitable international exports of proven technologies leave little incentive for defence industries to provide for the domestic market and to improve quality and technology standards. Much of the most technologically competitive equipment remains of Soviet design. Experts foresee that Russia will continue to produce and sell technologically competitive aircraft and air defence systems until 2020-2030 but may face challenges with the development of the next wave of technological upgrades as South Asian competition increases and current R&D funding is possibly being redirected to more pressing procurement. Among the principal challenges facing the defence industry, the aging workforce, dated infrastructure and problems in the delivery of government funding are most often cited.

Social expenditures and demographic challenges

The allocation of funds for national defence and procurement is limited by other state obligations, the most expensive of which are social programmes such as healthcare and pensions. The state's health care expenditures per capita are closer to the level of India and China although these countries have a much smaller per capita income. State pension susbstitution rates (the ratio of average pension to average wage) are comparable to the lowest levels observed in Europe. The pension substitution rate is also set to decrease in the near future as the burden of state pensions on the Russian economy increases. The yearly requirement for the funding of state pensions alone far outweighs the defence burden and currently only provides for pensions that are barely above the minimum subsistence level. Experts estimate that the increased demand for health, pensions and education could require an additional 8 to 10% of GDP by 2020.

Conclusion

Ultimately, the evolution of Russia's economic and political situation will drive the defence agenda that the country will choose and be able to pursue. The Russian government may choose to set priorities in different ways to address these challenges but with the long-term nature of the demographic changes that have occurred over the last two decades, it can be anticipated that increasing resources available for defence anytime in the foreseeable future would have severe economic, social and political impacts. In order to improve military capability and to keep ahead of technological advances, especially in the areas that will not be priorities, the military is left with the only option of increasing the efficiency of the business and production processes and to open the door to international collaborations. In fact these necessities apply to all sectors of the economy and if embraced could lead the country back on a path of economic growth, this time supported by knowledge and innovation rather than natural resources. The obstacles however are many and although the latest financial crisis may have rendered the transition inevitable, it will not be completed quickly or easily.

Sommaire

The Russian Economy and Resources Available for Military Reform and Equipment Modernization

T. Yazbeck ; DRDC CORA TM 2010-192 ; R&D pour la défense Canada - Centre d'analyse et de recherche opérationnelle ; Septembre 2010.

Contexte
En décembre 2006, après avoir enregistré une forte croissance économique pendant près d'une décennie, la Fédération de Russie a adopté un ambitieux plan d'approvisionnement en équipement pour la période allant de 2007 à 2015. Le programme d'armement de l'État (GPV) a été conçu pour fournir de nouveaux équipements modernes à tous les niveaux des forces militaires et de sécurité et s'inscrivait dans le cadre d'une réforme militaire qui comprenait la réorganisation des forces en unités plus petites et plus agiles. Toutefois, la guerre avec la Géorgie en août 2008 a mis en évidence de graves lacunes dans l'équipement et l'organisation des Forces russes. Pour faire face a ces lacunes, le rythme de la réforme a été accéléré et l'engagement de maintenir le financement du GPV-2015 au niveau prévu initialement a été renouvelé, et ce, malgré la crise financière.

La nouvelle équipe d'analyse de l'économie de la défense du Centre de recherche opérationnelle et d'analyse a entrepris d'étudier l'économie russe et les ressources disponibles pour la défense afin de déterminer les probabilités que le plus récent plan d'approvisionnement militaire russe se concrétise. La première phase du projet est décrite dans le présent mémoire. Un deuxième mémoire permettra d'examiner plus en détails l'état de l'industrie de la défense russe.

Contexte macroéconomique
Dans les dix dernières années, l'économie russe a connu une croissance régulière, à savoir une augmentation annuelle moyenne du produit intérieur brut (PIB) réel de près de 7 %, un niveau comparable à celui d'autres économies émergentes comme le Brésil, l'Inde et la Chine (groupe BRIC), mais beaucoup plus important que la croissance économique des autres économies du G8 durant la même période. Le revenu par habitant est deux fois plus élevé que la moyenne des autres pays de l'ensemble BRIC, mais il correspond à la moitié du revenu par habitant des autres pays du G8. La récente croissance économique s'explique par les prix élevés et les exportations importantes dans l'industrie pétrolière et gazière ainsi que par l'augmentation de la richesse qui en a résulté, ce qui a entraîné une forte demande intérieure de produits et services.

Néanmoins, les résultats économiques vigoureux de la dernière décennie n'ont pas été suffisants pour empêcher que la Russie ne soit durement touchée par la crise financière mondiale de 2007-2008. À la fin de 2009, le PIB du pays avait fléchi de 7,9 % en glissement annuel, un contraste frappant par rapport aux prévisions économiques produites avant la crise, lesquelles prévoyaient une croissance continue au rythme de 7,8 % par année. Malgré le ralentissement économique, le gouvernement a annoncé officiellement à maintes reprises que le niveau de financement de l'initiative GPV-2015 serait maintenu. De fait le versement

des fonds aux entreprises de défense a été accéléré et l'initiative GPV-2015 est maintenant considérée comme une "mesure anticrise" pour l'industrie de la défense. À partir des projections de plusieurs institutions financières russes et internationales, trois prévisions ont été choisies pour modéliser les scénarios de croissance économique possibles jusqu'en 2020 (Figure ES-1). Les trois prévisions sont utilisées dans l'étude pour évaluer l'incidence de différents niveaux de dépenses de défense sur l'économie.

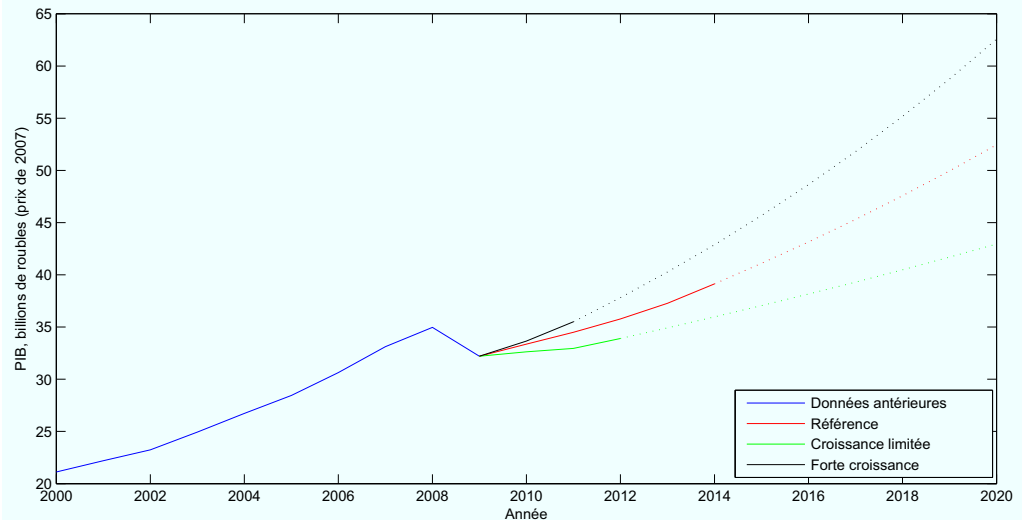

Figure S.1 : *PIB réel de la Russie selon trois scénarios économiques différents*

Dépenses de défense

Le fardeau de la défense en Russie se situe entre 2,5 et 2,7 % bien qu'il ait semblé plus élevé en 2009 en raison du PIB plus faible que prévu. Le gouvernement a clairement indiqué son intention de maintenir le financement de la défense à ce niveau à plusieurs occasions. Ce niveau de financement représente le montant inscrit à la rubrique " Défense nationale " du budget et n'inclut pas un certain nombre d'autres dépenses liées à la défense comme le logement et les pensions des militaires.

Des calculs simples indiquent que ce niveau de financement de la défense, combiné à l'affectation d'environ un tiers du budget de la défense à l'approvisionnement, comme cela a été le cas par le passé, n'est pas suffisant pour respecter l'objectif d'allouer 5 billions de roubles à l'approvisionnement d'ici 2015, même en fonction des prévisions de croissance économique les plus optimistes. Toutefois, il devient possible d'atteindre l'objectif de dépenses en présence d'un financement de défense et d'une croissance économique modérés si l'on repousse l'échéance jusqu'en 2020. L'état de l'économie permettrait ce niveau de dépenses si on prolongeait l'échéancier, mais une estimation générale des coûts des équipements à acheter, notamment pour la Marine, ne permet pas de conclure que les fonds alloués seraient suffisants pour acheter l'équipement requis aux coûts de production actuels.

D'après les annonces faites pour 2009 et 2010, les nouveaux aéronefs sont intégrés aux Forces aériennes au rythme de quelques douzaines par année, et environ 3 ou 4 navires sont construits chaque année. Ces taux d'approvisionnement ne sont pas suffisants pour moderniser l'équipement des Forces aériennes et de la Marine au niveau indiqué dans le GPV-2015 et les services se retrouveront avec beaucoup moins d'équipement qu'à tout autre moment depuis l'Union soviétique. À court ou moyen terme, la Marine peut s'attendre à n'avoir à sa disposition aucun porte-avions de construction russe et les aéronefs de la prochaine génération ne devraient pas entrer en service avant 2015 ou 10 ans après l'apparition de technologies équivalentes aux États-Unis.

Industrie de la défense

La capacité de l'industrie de la défense à produire l'équipement le plus moderne qui soit subit également des pressions étant donné que les lucratives exportations internationales de technologies éprouvées n'incitent pas les industries de la défense à répondre aux besoins du marché intérieur et à améliorer la qualité et les normes en matière de technologie. Les Russes continuent de concevoir une grande partie de l'équipement le plus concurrentiel sur le plan technologique. Les experts prévoient que la Russie continuera à produire et à vendre des aéronefs et des systèmes de défense antiaérienne concurrentiels sur le plan technologique jusqu'en 2020-2030, mais qu'elle pourrait se heurter à des difficultés dans le développement de la prochaine vague de mises à niveau technologiques étant donné l'intensification de la concurrence provenant d'Asie du Sud et la possibilité que le financement actuellement alloué à la recherche et au développement soit réaffecté à des approvisionnements plus urgents. Parmi les principaux problèmes auxquels devra faire face l'industrie de la défense, le vieillissement de la population active, l'infrastructure désuète et les problèmes dans le versement du financement gouvernemental sont les plus souvent mentionnés.

Dépenses sociales et défis démographiques

L'affectation de fonds à la défense nationale et à l'approvisionnement est limitée par d'autres obligations de l'État, dont les plus coûteuses sont les programmes sociaux comme les soins de santé et les rentes. Les dépenses de l'État par habitant pour les soins de santé sont plus près du niveau de l'Inde et de la Chine, bien que ces pays aient un revenu par habitant beaucoup plus faible. Les taux de substitution relatifs aux rentes de l'État (le ratio entre la rente moyenne et le salaire moyen) sont comparables aux niveaux les plus faibles observés en Europe. De plus, le taux de substitution des rentes devrait diminuer dans un avenir rapproché au fur et à mesure qu'augmentera le fardeau des rentes de l'État sur l'économie russe. Le financement annuel requis pour les rentes de l'État est à lui seul de beaucoup supérieur au fardeau de la défense et, à l'heure actuelle, il ne permet que le versement de rentes qui se situent à peine au-dessus du niveau minimum de subsistance. Les experts estiment que la hausse de la demande pour la santé, les rentes et l'éducation pourrait nécessiter une hausse des dépenses de l'état équivalentes à 8 à 10 % du PIB d'ici 2020.

En conclusion

En dernière analyse, le programme de défense que la Russie choisira de mettre en œuvre et qu'elle sera en mesure de poursuivre sera déterminé par l'évolution de la situation économique et politique du pays. Le gouvernement russe peut décider d'établir les priorités

de différentes façons pour s'attaquer aux difficultés, mais, compte tenu de la nature à long terme des changements démographiques observés dans les deux dernières décennies, il est à prévoir que la hausse des ressources affectées à la défense dans un avenir prévisible entraînerait de graves répercussions sur les plans économique, social et politique. Pour améliorer le potentiel militaire et rester à l'avant-garde des percées technologiques, surtout dans les secteurs qui ne seront pas jugés prioritaires, la seule solution qui s'offre à l'armée est d'accroître l'efficience de ses processus opérationnels et de ses processus de production et d'ouvrir la porte aux collaborations internationales. Ces constatations s'appliquent en réalité à tous les secteurs de l'économie et le fait d'y donner suite pourrait ramener le pays sur la voie de la croissance économique, une croissance qui serait alors stimulée par la connaissance et l'innovation plutôt que par les ressources naturelles. Toutefois, les obstacles sont nombreux et bien que la plus récente crise financière ait rendu la transition inévitable, celle-ci ne pourra être effectuée rapidement ou facilement.

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1 Introduction

1.1 Context

In December 2006, after almost a decade of strong economic growth, the Russian Federation (RF) adopted an ambitious procurement programme to provide new and modernized equipment to all levels of the military and security forces. The State Armament Programme 2007-2015 was part of an ongoing military reform to modernize the structure and equipment of the Russian Forces, including a move towards smaller and more agile units as well as an effort to shift from a fully-conscripted force towards one made of professional contract soldiers. As part of this modernization, pay and pension benefits were are also set to be reviewed and adjusted. The war with Georgia in August 2008 however exposed some critical shortcomings in the equipment and organization of the forces and led the country to enter a new stage of military reform. As a result, major changes to the structure of the forces were adopted throughout the year 2009 and the commitment to maintain the funding of the State Armament Programme at the levels originally intended was renewed despite the ongoing financial crisis. There have been several unsuccessful attempts in the past at reforming the Russian Armed Forces and none of the past State Armament Programmes have been completed. The lack of success of these past attempts can be attributed to several factors but the reliance on overly optimistic economic forecasts is often cited as a source of the problem [1].

The Centre for Operational Research and Analysis (CORA)'s new Defence Economic Analysis team has undertaken a project to study the Russian economy and resources available for defence in order to assess the potential of the latest Russian military procurement plan to become reality. The project is part of CORA's Applied Research Programme (ARP) "Defence Economics Country Surveys", and is intended for all partners within the Canadian Department of National Defence as well as the defence analysis community.

The analysis will be completed in two stages. The first stage is documented in this report and addresses the current macroeconomic environment and the impact on planned defence expenditures and procurement objectives. The second phase will focus on the state of the Russian defence industry including the current condition of the infrastructure, the demographics of the workforce, labour productivity and levels of technological developments. The second phase of the study will take a more sector-specific approach and will be documented in a separate report.

1.2 Methodology

The methodology chosen for this study consists of a critical assessment of open Russian and international sources, drawing as much as possible on official Russian statistics as well as data from international organizations such as The World Bank (WB), the International Monetary Fund (IMF) and United Nations (UN) agencies. While a number of economic

[1] See Cooper, J. (2009). Military expenditure in the Russian Federation, 2007-2009: a research note. Centre for Russian and East European Studies, University of Birmingham. http://www.sipri.org.

models have been developed to study the impact of competing demands on a country's financial resources for defence, these were found to be too specific to be applied to the case of Russia. In order to address the large scope of this study and the general lack of transparency regarding Russian economic and political direction, it was decided to take a more global approach and provide an overview of the social and economic factors that play a key role in determining the financial resources available for defence. It is hoped that conclusions drawn this way will address a broader range of issues and provide some perspective for the interpretation of current and future events.

1.3 Structure of the report

This report first provides an overview of the current macroeconomic conditions in Russia (chapter 2) and follows with a closer look at the impact of the financial crisis on the Russian economy (chapter 3). Based on economic outlooks published by international and Russian financial institutions, three scenarios are presented for future economic growth (chapter 4).

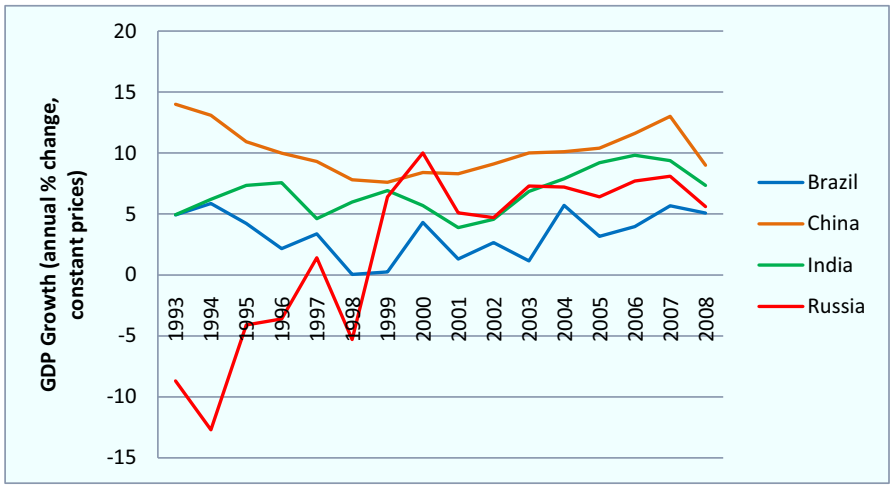
The following chapter looks at the latest federal budgets and the current level of defence funding as well as procurement plans (chapter 5). Defence expenditures to 2020 are estimated based on the different economic growth scenarios presented earlier and for different levels of defence allocations (chapter 6). This provides the framework for describing the economic conditions and the defence funding level that are required to achieve the spending objectives stated in the State Armament Programme 2007-2015.

After assessing whether the spending objective for 2015 is realistic, the question of determining the military capability that could be acquired with these funds is addressed. There is no easy answer to this question however as military expenditures do not directly translate into military capability. A partial answer is provided by looking at recent procurement rates (chapter 7) and by projecting them in the near future. An overview of the challenges facing the military industry, especially with respect to domestic procurement, is provided next (chapter 8) although the question will be examined in more detail in the second phase of the analysis.

Finally, as is the case in most developed countries, the changing demographic profile of the population will bring a new set of economic challenges in Russia in the coming decade. The country's current and future social expenditures are estimated in order to determine to what extent they might compete with resources available for defence (chapter 9). A high-level assessment of the potential for the realization of the latest objectives is provided as a conclusion as well as a summary of the main macroeconomic factors that could affect the delivery of the defence programme (chapter 10).

2 Macroeconomic profile

The fall of the Soviet Union in 1991 was followed by a period of economic decline and a major financial crisis in 1998, when the value of the ruble collapsed. The situation left room for improvement however as the depreciated ruble and rising oil prices after 1999, combined with prudent financial management from the state, served to push the economy back into a period of sustained growth [2,3]. The past 10 years have seen steady growth of the Russian economy with an average yearly increase of real Gross Domestic Product (GDP) close to 7% [4], a level that is comparable to that of other emerging economies such as Brazil, India and China (Figure 1) but much greater than the economic growth of other G8 economies during the same period (Figure 2).



Source: IMF WEO, October 2009

Figure 1: *Annual real GDP growth for Brazil, Russia, India and China (the "BRICs") between 1993 and 2008*

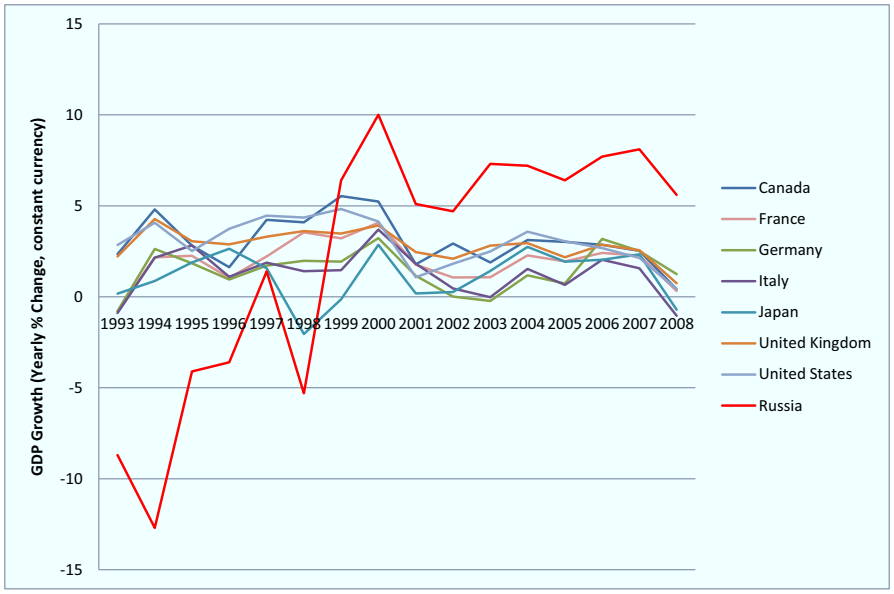
In absolute terms, the size of the Russian economy in 2008 was equivalent to 1,677 billion United States (US) dollars, making it the 9th largest in the world. In Purchasing Power Parity (PPP) terms [5], the 2008 GDP is equivalent to 2,265 billion international dollars, or the 6th largest in the world. GDP per capita in 2008 stood at $15,948 which is more

[2]Hanson, P. (November 2009). Russia to 2020. FINMECCANICA Research Department. Occasional Paper

[3]Wolf, C. & Lang, T. (2006). *Russia's Economy. Signs of Progress and Retreat on the Transitional Road.* RAND Corporation. http://www.rand.org

[4]GDP figures are from the International Monetary Fund (IMF), World Economic Outlook (WEO) Database October 2009. Available at http://www.imf.org. Data after 2008 are IMF estimates.

[5]Purchasing Power Parity (PPP) is often used instead of market exchange rates when doing country comparisons. PPP accounts for the varying price of goods in different countries and is based on the value of a standard basket of goods. PPP is not the best way to compare military expenditures however and the market exchange rate is used in the remainder of this document, unless specified otherwise.



Source: IMF WEO, October 2009

Figure 2: *Annual real GDP growth for G8 countries between 1993 and 2008*

than double the average for other BRICs ($6,405) but still less than half that of other G8 countries (average $36,770) [6].

Several factors have contributed to the recent growth of the Russian economy. While it is difficult to separate the contribution of each factor to total growth, oil and gas played a key role in the economic gains of the last decade. The significant revenues generated by the export of oil and gas over the years were a result of increasing oil prices as well as the larger volume of exports. In 2007, oil and gas represented 61% of export revenues, up from 37% in 1998 [7] and taxes on oil and gas made up 50% of government revenues. The share of oil and gas in total GDP however was 18.9% in 2007 and expected to decrease to 15% by 2010 [8], a proportion that is smaller than could be expected. One of the reasons for this sector not contributing a greater portion of GDP is the redirection of part of the oil revenues to a Reserve Fund and a National Welfare Fund, a measure put in place to weather a possible drop in commodity prices. In mid-2008, these two reserve funds amounted to 130 and 33 billion (bln) dollars respectively [9] (Figure 3).

[6] All GDP per capita values are in PPP terms and in international current dollars. Values for Japan and Brazil used in averages are based on IMF staff estimates.

[7] Oliker, O., Crane, K., Schwartz, L. H., & Yusupov, C. (2009). *Russian Foreign Policy - Sources and Implications*. RAND Corporation. http://www.rand.org

[8] In Oliker and al. Ibid.

[9] Russian Ministry of Finance, http://www.minfin.ru. Accessed April 14 2010.

Source: Russian Ministry of Finance, http://www.minfin.ru

Figure 3: *Reserve Fund and National Wealth Fund*

Between 2000 and 2007, the increase in oil and gas revenues had the indirect effect of increasing substantially the standard of living of the population with real incomes more than doubling and the size of the middle class growing to represent 56% of the population, up from the share of 20% seen in previous years [10]. As a result, personal consumption increased to represent 53% of GDP in 2007 from 41% in 2000, a level that is comparable to other G8 nations [11]. Figure 4 illustrates the variation in the shares of GDP taken by the different sectors of the economy over the same period. Like personal consumption, gross investments have increased during the same period from 17% to 24% of GDP. On the other hand, government spending has decreased from 24% to 18% of GDP [12] and the trade balance decreased almost three-fold, indicating an increased reliance on imported goods and reflecting the lack of competitiveness of Russian goods on the international markets [13].

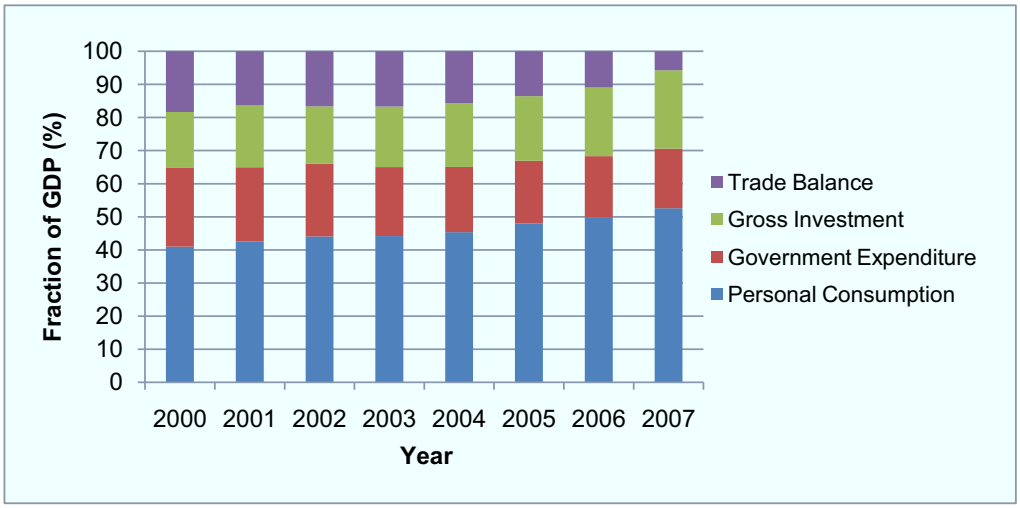
Increased wealth, the main driver of recent growth, can also partly be attributed to the demographic crisis affecting Russia. With a decreasing birth rate and life expectancy, the

[10] Bogetic, Z. & team (June 2009). Russian economic report no. 19. The World Bank in Russia. http://www.worldbank.gov.ru. Middle class is measured in terms of household incomes and includes people with incomes at least 2.5 times greater than the cost of living.

[11] Centre for International Comparisons of Production, Income and Prices at the University of Pennsylvania. Penn World Table. http://www.pwt.econ.upenn.edu Accessed January 14, 2010.

[12] As will be discussed later, post-financial crisis expenditures have brought government spending back to the level of 25% of GDP in 2009.

[13] While it may be tempting to project these trends into the future, macroeconomic variables for Russia have not followed predictable trends in the past and the changes observed in the past three years alone would make these projections of little value.



Source: Penn World Tables

Figure 4: *Composition of Russian GDP between 2000 and 2007*

size of the population has decreased from 147.5 million in 1999 to 142 million in 2008 [14], effectively increasing per capita wealth. As will be discussed in chapter 9, the particular demographic conditions have led to a historically low dependency ratio, with more workers supporting a smaller population of pensioners and children.

In light of the strong economic performances, an ambitious set of social programmes was put in place as well as plans for the partial rearmament of the military by 2015. In 2008 however economic prospects changed significantly after Russia was hit by three major events. First, the fall in the price of crude oil, from a high of over $120/barrel in July 2008 down to $40/barrel in January 2009 [15], decreased state revenues. Secondly the war with Georgia in August 2008 not only cost the country some military losses but also highlighted a number of shortfalls with the current equipment that have become a priority for rearmament. Finally the global financial crisis that hit the world in 2007 and 2008 also affected the Russian economy. All these events have the potential to significantly affect the course of the current defence reform and procurement plan. So far however, the government priorities established before 2008 do not appear to have changed [16] and the pace of military reform was accelerated with significant organizational changes conducted in 2009. It was also announced on several occasions that despite the new economic outlook, funding for the military procurement plan was to remain unchanged as well as funding of some social ob-

[14] IMF WEO 2009. Ibid.

[15] International Energy Agency (IEA) (March 2010). End-use petroleum product prices and average crude oil import costs. http://www.iea.org/stats/surveys/mps.pdf. Accessed April 14, 2010.

[16] In President Medvedev's Address to the Federal Assembly, November 12, 2009 despite the increased pace of military reform. Available at http://eng.kremlin.ru/speeches/2009/11/12/1321_type70029type82912_22702.shtml. Accessed 18 January 2010.

jectives such as state pensions [17]. The effects of the financial crisis on the Russian economy are examined in more detail in the following chapter.

[17] Moscow ITAR-TASS (Feb 26, 2009), No cuts in state weapons procurement - Official; Moscow Interfax-AVN Online (Mar 4, 2009), Russian deputy defence minister outlines 2009-2011 budget allocations; Moscow ITAR-TASS (Mar 21, 2009), Russian Government reworks budget, draws up anti-crisis plan.

3 Impact of the financial crisis on the Russian economy

The recent economic performance of the Russian economy, including the accumulation of the world's third largest foreign reserve fund and a relatively small debt to GDP ratio [18], led many to believe that the country was in a solid posture to weather the financial storm of 2008. By the third quarter of 2008 however it appeared that the impact of the crisis was severe. The combination of the fall in oil prices and the flight of foreign investors highlighted two of the country's main economic vulnerabilities.

By the fall of 2009, unemployment had climbed to 8.1% from 6.4% in 2008 and average wages were expected to have dropped by almost 20% from the previous year's average [19]. The decrease in real GDP in 2009 is now officially 7.9% [20]. This is a sharp contrast to the Russian Ministry of Finance's pre-crisis economic forecasts for 2009 which saw continued budget surpluses and yearly GDP growth of about 7.8% yearly [21]. The budget in 2009 showed a deficit for the first time in a decade and is expected to do so until 2012 [22].

In the November 2009 issue of their *Russian Economic Report*, the World Bank forecasts that Russian output levels will be back to the levels seen in the second quarter of 2008 by the second quarter to 2012 [23] (Figure 5), effectively adding a 4-year delay to the pre-2008 economic growth forecasts used in the development of key policies outlining the Government's strategies to 2020.

The financial crisis has in fact hit the Russian economy harder than other emerging economies (Figure 6) and compared to other G8 countries, Russia is likely the country that has ended 2009 the farthest from its expectations (Figure 7).

According to some analysts, the particularly sharp setback observed in Russia despite the strong pre-crisis posture can be attributed to a general lack of confidence in the government [24]. While foreign companies are interested in taking their business to the RF during the more prosperous times, they are quick to remove their assets at the first sign of a downturn for fear of having their hands tied by some government decree. Some companies for instance have been forced in the past to increase profitability without letting go of employees [25]. This lack of confidence was also apparent in the local population who quickly

[18] IMF (November 2009). The state of public finances cross-country fiscal monitor: November 2009. Staff Position Note.

[19] Bogetic, Z. & team (November 2009). Russian economic report no. 20. The World Bank in Russia. http://www.worldbank.gov.ru.

[20] Rosstat, http://www.gks.ru/wps/portal/OSI-NS

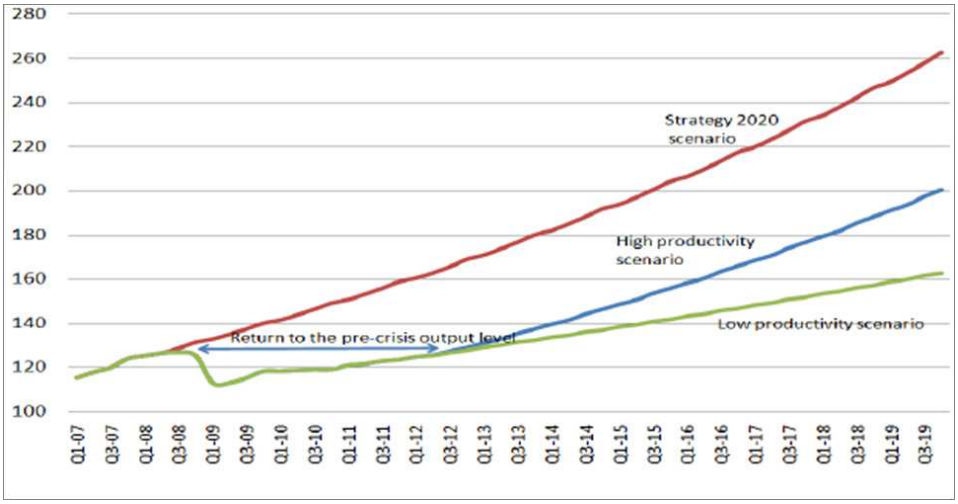
[21] Cooper(2009). Ibid. p.1

[22] Business News Europe (Apr 7, 2010). Kudrin says budget deficit to last for four years. http://www.businessnewseurope.eu.

[23] Bogetic (November 2009), Ibid.

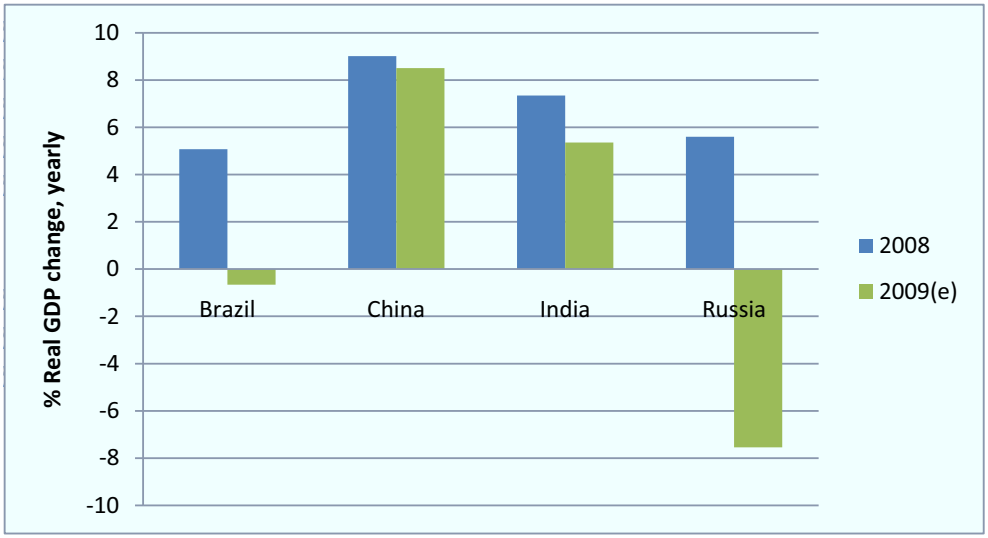
[24] Prof. Philip Hanson is one of them, in *Russia to 2020* (page 29), he cites the particular case of Renault. By order of the Russian Prime Minister, the company was forced to invest more in loss-making production plants or see their shares reduced in the Russian carmaker AvtoVAZ.

[25] Ibid.



Source: Chart taken from The World Bank, Russian Economic Report No 20, Nov 2009

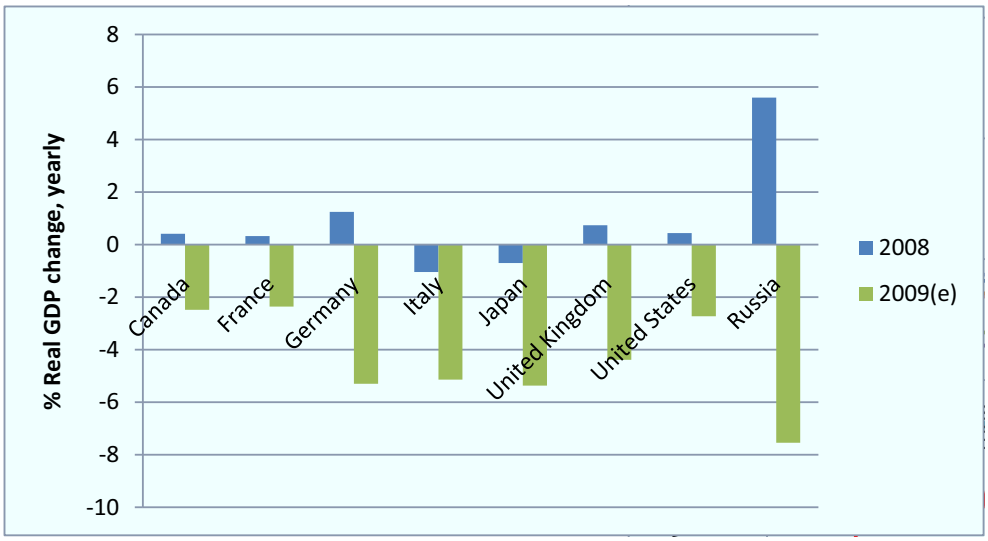
Figure 5: *World Bank forecast of the longer term impact of the global financial crisis on Russia's GDP*



Source: IMF WEO Database, October 2009. 2009 data are IMF estimates.

Figure 6: *Annual GDP growth in 2008 and 2009 in the BRICs*

exchanged their rubles for dollars and euros in 2008. The World Bank confirms this analysis in their 2009 edition of the annual *Assessment of the Ease of Doing Business in the*



Source: IMF WEO Database, October 2009. 2009 data are IMF estimates.

***Figure 7:** Annual GDP growth in 2008 and 2009 in G8 countries*

World [26] in which the Russian Federation ranks 118th out of 183 economies for the ease of doing business. In particular the country ranks 182nd of 183 for the category "dealing with construction permits".

Nevertheless, the Russian government was quick to put in place a number of "anti-crisis measures" to deal with the effects of the financial crisis. In order to reflect the new economic situation, the budget for 2009 was revised several times during the year and budget expenditures were increased from 18% of GDP to 25% [27]. Most budget items were also cut back but pensions and housing remain top priorities and have not been cut as much as other programmes. Funding for anti-crisis measures was drawn in large part from the Federal Reserve and a significant part of the funding has been in the form of subsidies to industries on the brink of bankruptcy. One of the main objectives of these subsidies so far has been to limit unemployment [28].

Although the defence budget was cut back by approximately 10%, the delivery of federal funds to defence companies was accelerated and the level of funding for the State Programme of Armament to 2015 is remaining unchanged and is in fact now being referred

[26]The World Bank (2010), Ease of Doing Business in 2010. Available at http://www.doingbusiness.org/

[27]Fomina, E. (February 2010). The state budget. In: *Russian Economy: Trends and Perspectives 02 2010*, pages 32–36. Institute for the Economy in Transition. http://www.iet.ru.

[28]Oxenstierna, S. (December 2009). The Russian economy in 2009: Steep decline despite crisis management. FOI, Swedish Defence Research Agency.

to as an anti-crisis measure geared towards the Russian defence companies [29] . Although arms exports remain strong for now, reflecting the fact that foreign contracts for the deliveries made in 2009 have been signed and financed years in advance, secondary effects may still be felt later as stocks get depleted and supply chains break down because of small suppliers having gone out of business [30].

While the magnitude of the crisis may have come as a surprise to some, the vulnerabilities of the Russian economy were well known and the nature of the ensuing economic effects was to be expected. Even before the crisis, President Medvedev repeatedly promoted the necessary move away from the dependence on a single commodity and towards an economy based on knowledge and innovation. The financial downturn has not changed the government's stance but made the transition even more critical. As will be discussed later, it is questionable whether the injection of funds alone is sufficient to modernize the industry.

There are several possible outcomes for the coming decade(s). If the government effectively transitions to competitive, transparent and efficient management and provides the necessary funding to renew infrastructure and develop technologies, Russia could be on a new path of continued economic growth. This could lead to long and sustained growth as there is a significant productivity gap to be filled [31]. However, if the price of oil is such that large profits continue to be generated, efforts to develop a new form of economy may be overshadowed. As has been widely documented, resource-rich countries can tend to lag in other spheres of development as the profits generated provide opportunities for corruption to thrive [32]. In such a context, high oil prices could lead to strong growth for the coming years but will only delay the need for a true systemic reform.

[29] Rossiyskaya Gazeta (Feb 26, 2009), Russia: S. Ivanov Details Benefits of Government Defense Procurement.

[30] Cooper (2009). Ibid.

[31] Hanson (2009). Ibid.

[32] The concept is often referred to as the "Dutch disease" in reference to work by economists Corden and Neary (1982) who modeled the impact of a resource boom on a country's economy.

4 Projections of economic growth to 2020

Several international financial institutions regularly provide economic growth forecasts for the world and for individual countries. During the last quarter of 2009 and the beginning of 2010, these forecasts have been revised several times as the world economy appeared to be recovering faster than expected from the financial crisis. At the present time, it is difficult to know whether this recovery will be sustained or short-lived. Forecasts should therefore be interpreted with caution as they may be revised again as the situation evolves.

The latest forecasts from major financial institutions see positive growth in Russia in 2010 and onwards although not at the level seen in the past decade. The outlooks for Russian real GDP growth in 2010 are between 2.5% and 5.0% with higher numbers coming from private firms. Most forecasts see a reduced but positive growth in 2011 followed by sustained growth starting in 2012. The few forecasts that look beyond 2012 predict growth to reach 5% in 2014 and the IMF forecasts a sustained growth of 5% after 2014. Figure 8 illustrates the GDP growth forecasts made by these financial institutions as well as three forecasts prepared by the Russian Ministry of Economic Development (Minecon) and used for government planning purposes [33]. The details of the different outlooks as well as the underlying assumptions related to inflation, exchange rates and oil prices are provided in Annex A.

In order to analyze the impact of the economic environment on resources available for defence, we choose three economic growth scenarios based on the forecasts above. The objective is not to try to guess what the future holds but rather to fix guidelines for the interpretation of current events and to put in perspective different defence spending scenarios. These economic outlooks, ranging from conservative with limited growth to optimistic with high growth, will be referred to in the remainder of this report.

Scenario 1 - Baseline growth

As a baseline GDP growth scenario, we choose the IMF projection since it represents a good compromise between the highest and lowest projections. In this forecast, real GDP

[33] Historical data from IMF WEO October 2009 database with the exception of the GDP for 2009 which is from Rosstat (RF Statistics Agency, http://www.gks.ru) and published in Ria Novosti (Feb 1 2009), Russia's 7.9% GDP decline in 2009 less profound that expected. http://en.rian.ru/business/20100201/157737508.html; Forecasts are from: IMF (Jan 26, 2010), World Economic Outlook Update - A policy-driven multispeed recovery, p.2, http://www.imf.org/external/pubs/ft/weo/2010/update/01/index.htm; The World Bank (Jan 21, 2010) , Global Prospects 2010: Europe and Central Asia, p.2., http://go.worldbank.org/HA6TKBYPN0; OECD (Nov 19, 2009), OECD Economic Outlook No.86 - Russian Federation, http://www.oecd.org/oecdeconomicoutlook; Goldman Sachs Global Economic Outlook, Commodities and Strategy (Dec 2, 2009), Global Economics Weekly Issue No: 09/43, http://www2.goldmansachs.com/ideas/global-economic-outlook/2010-forecast/global-weekly.pdf; Ria Novosti (Jan 22, 2010), Crédit Suisse: Russian GDP could grow 60% within decade, www.cbonds.info/all/eng/news/index.phtml/params/id/453061; The three projections from the Russian Ministry of Economic Development (Minecon) are detailed in Minecon (December 2009), Updated forecast of the socioeconomic development for 2010 and the planning period of 2011-2012: Basic parameters (in Russia), available from the Ministry's website http://www.economy.gov.ru. The moderately optimistic version is considered by Minecon to be the most likely.

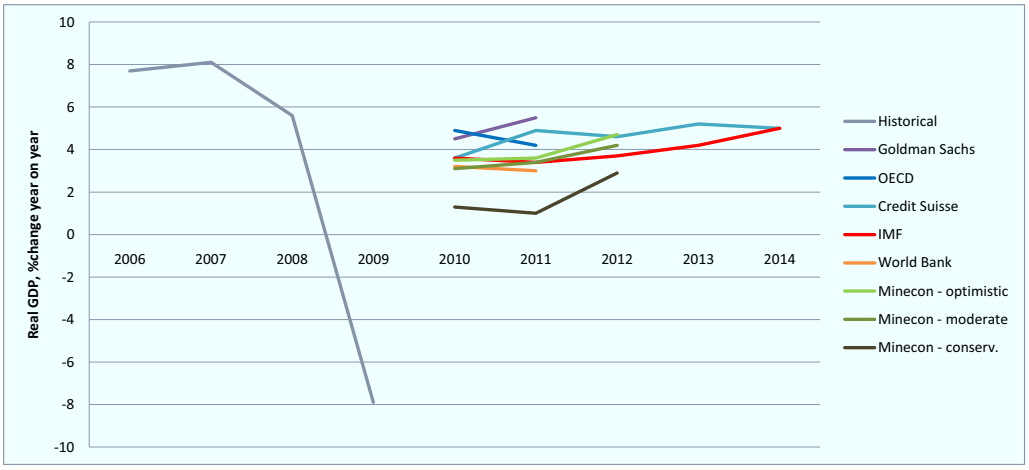


Figure 8: *Russian GDP growth projections from major financial institutions*

growth is 3.6% in 2010, 3.4% in 2011, 3.7% in 2012 and 4.2% in 2013. In preparing this outlook, IMF staff assumed that the price of oil would average at $72 per barrel (bbl) in 2010 and $82/bbl in 2011. The inflation was taken to be 6.25%, the average rate for emerging economies, and the exchange rate was kept constant at the November-December 2009 level. In other words, this scenario represents a slow but steady exit from the recession based in large part on rising oil prices and a relatively controlled inflation. In the IMF projection, GDP growth is stable at 5% after 2013 and so we carry this average to 2020 to provide a longer outlook.

Scenario 2 - Limited growth

The most conservative forecast from the Russian Ministry of Economic Development (based on the latest revision of January 2010) is based on a continuation of the 2009 oil prices. The oil price per barrel averages between $58 and $60 during the three years of the forecast, leading to GDP growth of 1.3% in 2010, 1% in 2011 and 2.9% in 2012. Since oil prices in early 2010 were already back at the $80/bbl mark, this scenario could represent a second drop in oil prices, leading to a slower than expected growth. This scenario can also represent a second wave of the recession or a longer recovery. The inflation rate is taken to be between 6.5% and 7% in 2010 and between 6% and 7% in 2011, which is similar to the baseline forecast. The exchange rate puts the ruble back at its 2008 value in real terms in 2012 (30.5 rubles to the US dollar) [34]. In order to extend this forecast to 2020, we assume continued yearly real growth of 3.0% on average between 2013 and 2020.

Scenario 3 - High growth

As detailed in Annex A, several private firms forecast a faster recovery with GDP growth between 4.5% and 5.5% in 2010. Goldman Sachs in particular lists Russian equity in

[34] Minecon. Ibid.

their top trading picks for 2010 [35]. Their outlook for the short-term growth of the Russian economy is 4.5% in 2010 and 5.5% in 2011. We take this outlook as the basis for the "high growth" scenario. Inflation is assumed at 5.3% and 6.6% in 2010 and 2011 respectively, a rate that is slightly more optimistic than the baseline scenario in the short term. Past 2012 we assume real GDP growth to be constant at 6.5% which is close to the average rate observed during the inter-crisis period. This scenario represents a situation where oil prices continue to rise (average $90/bbl in 2010) and the economy thrives from commodity-driven profits. While this scenario is optimistic in terms of GDP growth (especially when extended to 2020), it is probable that such economic circumstances would not lead to improved rule of law and decreased corruption.

GDP growth under the three different scenarios is illustrated in Figure 9, with GDP in trillion rubles in constant 2007 prices [36]. The dotted section of the lines represents the projections past the short-term forecasts of the financial institutions chosen as references.

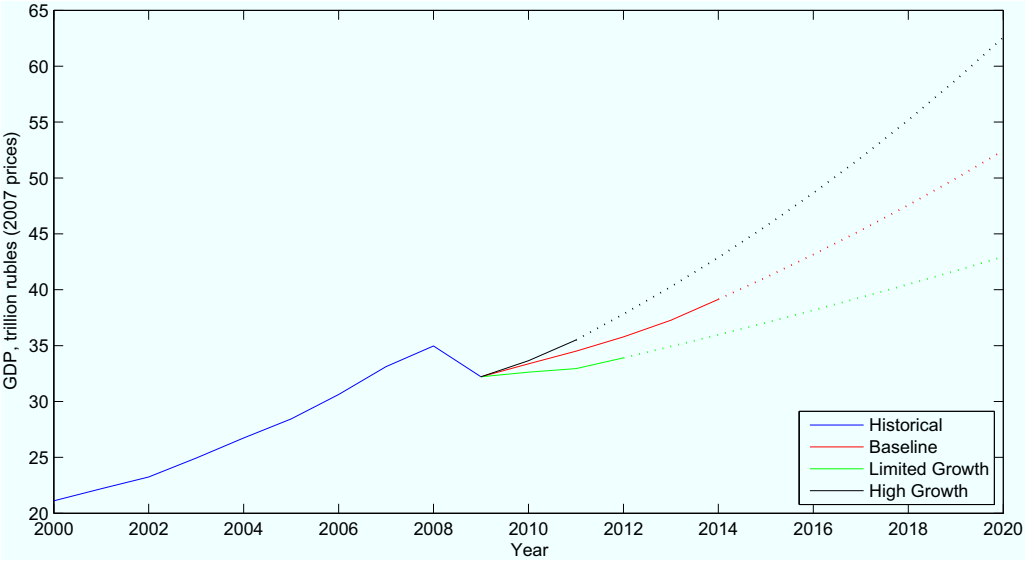


Figure 9: *Forecasted Russian real GDP growth under three different economic scenarios*

The next chapter looks at the level and nature of past and current defence expenditures. The relationship between defence allocations and GDP will then be applied in the context of the three growth scenarios in order to characterize defence expenditures to 2020.

[35] Goldman Sachs. Ibid.

[36] We adopt the commonly used terminology, i.e. 1 trillion = 1000 billion and 1 billion = 1000 million.

5 Federal Budget and defence allocations

5.1 Federal Budget 2009

During the year 2007, important changes were made to the budget process. First it was decided to move to a rolling three-year budget, and so the 2008 budget also provided spending intentions for the years 2009 and 2010. As usual, this budget was based on the economic forecasts produced by the Russian Ministry of Economic Development. With the rapidly changing economic outlook, especially the increased rate of inflation, the initial 3-year budget had to be amended several times and it was decided to revert back to 1-year budgets for 2008 and 2009. The budget format was also amended during the course of the preparation of the original 3-year budget and as a result a large part of the budget became classified including almost half of the defence budget and a number of non-defence related items [37]. While estimating Russian defence expenditures was never straightforward, these new changes make the task even more difficult.

Julian Cooper, Professor of Russian Economic Studies at the University of Birmingham, has been studying Russian defence expenditures for many years and went through the exercise of comparing the earlier unclassified draft of the 2008-2010 budget with the later versions [38]. His estimates of the amount and nature of defence expenditures in the 2009 budget are used as a reference hereafter.

The Federal Budget for 2010 was adopted in draft form by the State Duma in October 2009 however little information has been released and the economic projections for 2010 have considerably changed in the third quarter of 2009. For this reason, we focus on the 2009 budget, also revised several times but approved in final form in April 2009. Although it is now known that the execution of the 2009 budget has also differed from the latest draft [39], analyzing the draft budget is still worthwhile because it represents the government's intentions. The shortfalls in the execution of the budget are merely a reflection of the misalignment of the intentions and the economic reality.

The main chapter headings in the April 2009 version of the 2009 budget are shown in Table 1 [40].

5.2 Defence allocations in the 2009 budget

Strictly speaking the National Defence (ND) chapter of the budget accounts for 2.96% of GDP, a proportion that is slightly higher than in the past 10 years when ND expenses

[37] According to the International Institute for Strategic Studies (IISS)'s *The Military Balance 2009*, out of a total defence budget of R1,278 bln for 2009, only R712 bln is not classified.

[38] Cooper (2009). Ibid.

[39] For details on the actual execution of the budget see Fomina, E. (October 2009), The State Budget. In *Russian Economy: Trends and Perspectives 10 2009*, p.44–51 and *Russian Economy: Trends and Perspectives 02 2010*, p.37–43 (Moscow: Institute of the Economic in Transition (IET))

[40] Data is from Cooper (2009).

Table 1: *Federal Budget 2009, April 2009 amended version*

Budget Chapter	Total (million rubles)	%Budget	%GDP
01 General Public Services	1 011 355	10.44	2.50
02 National Defence	1 197 015	12.35	2.96
03 Public Order and Safety	1 021 056	10.54	2.53
04 Economic Affairs	1 726 996	17.82	4.27
05 Housing, communal	112 021	1.16	0.28
06 Environment	12 870	0.13	0.03
07 Education	395 865	4.09	0.98
08 Culture, media	109 971	1.14	0.27
09 Health, sport	335 006	3.46	0.83
10 Social Protection	310 905	3.21	0.77
11 Interbudgetary transfers	3 455 706	35.67	8.55
Total	9 688 766	100	23.97

Source: Cooper, Military expenditure in the Russian Federation, 2007-2009

were on average between 2.5% and 2.8% of GDP [41]. Looking at the original and amended versions of the budget however, it is clear that this increase is a result of GDP being lower than expected in the revised budget as ND expenditures amount to only 2.61% of GDP in the November 2008 version of the budget. The original three-year budget also had ND expenditures at 2.7% of GDP and there have been official statements in the same direction, confirming that the government had no intention of increasing the defence burden for the foreseeable future [42].

In addition to the ND budget, a number of security-related expenditures are recorded in other parts of the federal budget. These include paramilitary forces and military pensions as well as a share of military expenditures included in other budget headings such as Health, Education, Social Programmes or Interbudgetary transfers. Some of these expenses can be singled out from the budget and together bring the share of GDP going to defence and security closer to 4.6% [43]. Table 2 provides an overview of these other military-related expenditures in the 2009 budget.

There are almost certainly other items included elsewhere in the budget that could be added to this total [44]. Direct and indirect benefits to the military of federal and private R&D for instance could be added to the stated level of defence expenditures. The extent to which these benefits impact the final defence budget is difficult to quantify however.

[41] While defence expenditures have risen substantially from year to year, inflation has also remained high and the actual defence budget has increased mostly at the same rate as GDP.

[42] The 15-year budget strategy published in 2008 also held National Defence constant at 2.5% of GDP throughout the entire period.

[43] Cooper (2009)

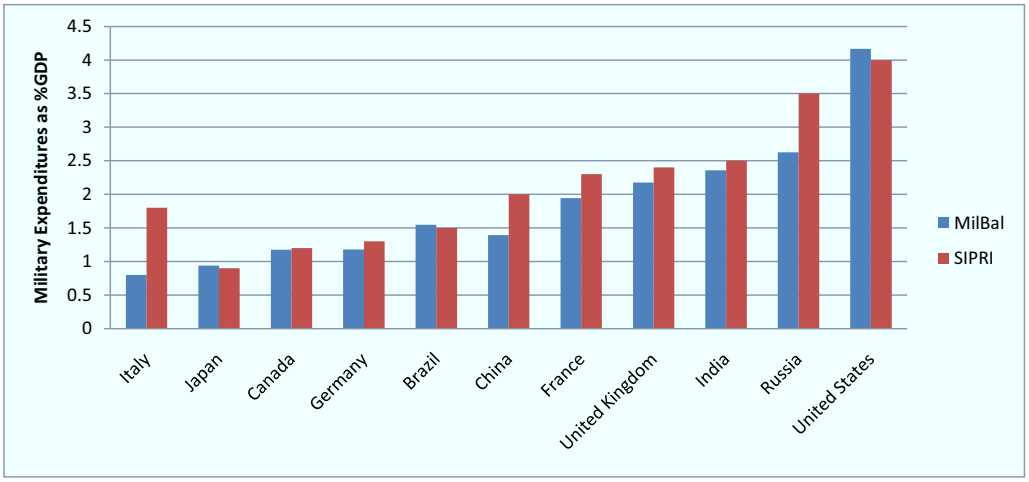
[44] In *The Military Balance 2010*, IISS estimate that accounting for the hidden costs could bring the Russian defence burden in 2008 closer to 3.76% (rather than 2.49% if counting only ND expenditures). Accounting for PPP brings the burden closer to 5%.

Table 2: *Details of National Defence and other military-related expenditures in the April 2009 version of the 2009 budget*

Budget Chapter	**Total (million rubles)**	**%Budget**	**%GDP**
National Defence	1 197 015	12.35	2.96
Armed Force of the RF	885 257		
Nuclear-weapons complex	19 081		
Mobilization and training	3 623		
Mobilization preparation of economy	3 381		
Collective security/peacekeeping	264		
Int'l obligations in mil-tech cooperation	4 455		
Applied R&D	162 896		
Other questions of ND	118 058		
Other MOD expenditures:	189 914	1.96	0.47
Housing	44 436		
Education	42 315		
Health and Sport	32 013		
Other (culture, media. . .)	3 533		
Military pensions	112 053		
Paramilitary Forces:	324 155	3.34	0.8
Interior troops - MVD	58 843		
Housing, education, health - MVD	6 173		
Border troops - FSB	80 134		
Security services (FSB, SVR, FSO)	179 005		
Other military related expenditures:	47 119	0.49	0.12
Additional military-related R&D	28 025		
Subsidies to closed towns	18 236		
Baikonur	858		
Total military expenditures	1 853 655	19.13	4.59

Source: Cooper, 2009

Looking at the ND expenditures only, the current defence burden [45] places the Russian Federation slightly above the average of other G8 countries and other BRICs but below the US level. Figure 10 illustrate the position of Russia compared to other countries in terms of defence burden. Two different data sources are included. The first set of data (shown in blue) is taken from the Military Balance 2008 and the second (shown in red) from the SIPRI [46] database of military expenditures (year 2007 [47]). Both sources define military expenditures in a similar way but are limited by the format of the data provided by the individual countries. The Military Balance figures appear closer to the ND chapter of the budget while the SIPRI data includes some other military expenditures (like pensions and housing). Despite the difference arising from the lack of a standard definition for military expenditure, the data gives an idea of the scale of military spending in comparison to other countries.



Source: The Military Balance 2008, SIPRI Military Expenditure database

Figure 10: *Military expenditures as a share of GDP for G8 and BRICs in 2007*

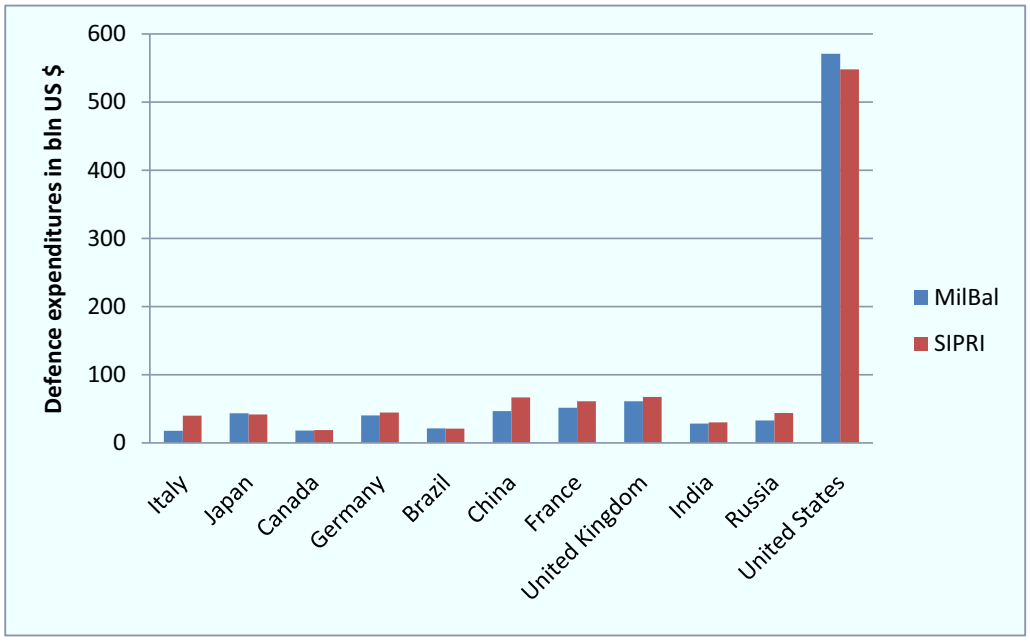
Multiplying the defence burden ratios shown in Figure 10 by the actual GDP of the different countries in 2007 [48] provides an estimate of the actual level of funds disbursed for the military for a year. Figure 11 illustrates the total defence expenditures of G8 countries and the BRICs calculated this way. As seen in the Figure, although the Russian defence burden can be considered high, the expenditures do not come close to the level of the United States and are below defence expenditures of the United Kingdom, France or China.

[45] Defined as the share of ND expenses to the country's GDP. The percentage of GDP spent on the military provides a measure of the burden of defence spending on the economy.

[46] SIPRI (Stockholm International Peace Research Institute) is an independent international research institute dedicated to the study of "conflict, armamements, arms control and disarmament". www.sipri.org

[47] At the time of writing, 2007 was the last year for which SIPRI provided defence burden statistics.

[48] GDP data from the IMF WEO database.



Source: The Military Balance 2008, SIPRI Military Expenditure database, IMF WEO (GDP)

Figure 11: *Estimated Russian military expenditures in 2007*

5.3 The State Programme of Armament and State Defence Orders

The State Programme of Armament for 2007-2015 (GPV-2015 [49]), approved in the fall of 2006, is a detailed yearly procurement programme aimed at providing the Russian Armed Forces with new and modernized equipment. Funding for GPV-2015 amounts to 5 trillion rubles (approximately 169 billion US dollars), and covers conventional and nuclear weapons requirements for both the Ministry of Defence and the state's other security organizations. The programme is executed through yearly State Defence Orders (GOZ [50]), included in the Federal Budget under different sub-chapter headings. The GOZs fund research and development as well as the repair, modernization, and procurement of new equipment.

It is difficult to reconcile the level of GOZ funding in the budget from official and media statements. Official statements are not all in agreement and the lack of a consistent vocabulary (especially in English translations) makes it difficult to assess whether expenses refer to procurement only or include modernization and repair as well. Similarly it is not always entirely clear whether the claims refer to the expenses of the Ministry of Defence alone or to all defence and security organizations. Official statements and recent historical data

[49] *Gosudarstvennyi Programm Vooruzheniya* (GPV)
[50] *Gosudarstvennyi Oboronnyi Zakaz* (GOZ)

however tend to agree on the proportion of the defence budget spent on the GOZ and on the relative proportion of R&D and procurement in the GOZ. Based on statements made by Deputy Defence Minister for Financial and Economic Matters Lyubov Kudelina [51], 36% of the Ministry of Defence expenditures are related to the "procurement, maintenance and development of arms", 32% to personnel and 8% to military pensions. This is more or less in accordance with the numbers published by Jane's and by Cooper for 2007 and 2008 [52] and would indicate that the intention is to fund the GOZ at the level of 36% of National Defence expenditures approximately.

Different official statements in 2009 have claimed that GOZs between 2009 and 2011 would amount to 1.5 trillion rubles with a third of this amount to be spent in 2009. This means that the GOZ for 2009 would amount to approximately 500 bln rubles, or 42% of National Defence expenditures. In the previous version of the 2009 budget, the GOZ amounted to only 36% of the National Defence budget indicating that GOZ expenditures have been spared from cuts to the defence budget. These numbers are in line with Cooper's analysis, where GOZ for 2009 is estimated at 524 bln rubles, and with past estimates of GOZs provided by Jane's. Another source [53] claims that the 2007 GOZ was further divided such that 48% of expenses were dedicated to the purchase of new military hardware, 20% for repairs and 32% for research and development (R&D) although these proportions may change from year to year.

To summarize, we can assume that the GOZ represented about 44% of defence expenditures in 2009 [54] and was divided into 30% for R&D and 70% for procurement, repair and modernization. This last amount is further split into 70% for new equipment and 30% for repairs [55]. Table 3 provides a summary of what these estimates amount to for the 2009 budget.

To complicate matters further, there have also been indications that the first 5 five years of GPV-2015 were focused on R&D while full-scale procurement would start in 2011. Announcements have also been made of serious cuts to R&D funding in 2009 and reportedly all R&D projects with no deliverables in 2009-2010 have been canceled in 2009 [56] . Whether this was the original plan or a result of lack of outcomes is not known however proportions may in reality be different than those presented above. Most likely some R&D funds may have been redirected to procurement.

GPV-2015 is the fourth in a series of similar programmes launched since 1996. None of the

[51] Vedomosti (Mar 5, 2009), Russia: Initial 8% cut in defense spending.

[52] Jane's Information Group (2009). Russia and the CIS, *Jane's Sentinel Security Assessment*. Available at http://sentinel.janes.com; Cooper (2009).

[53] http://www.globalsecurity.org

[54] Using Cooper's 524 billion rubles estimate. Cooper (2009).

[55] For ease of presentation, the proportions are rounded to more or less 2% which is considered sufficiently precise given the uncertainty of the data

[56] Interfax (Mar 26, 2009), Russia to cut defense R&D spending in 2009; Interfax (Apr 10, 2009) , R&D earmarks for Defense Ministry cut by 11 bln rubles in 2009 - source; Zatsepin (April 2009), Military Expenditure in the 2009 Federal Budget, In *Russian Economy Trends and Perspectives 04 2009*, p.47, Institute for the Economy in Transition. Available at http://www.iet.ru.

Table 3: *Estimated breakdown of GOZ-related expenditures in 2009*

	Value (rubles)	**Approximate proportion**
GDP (2009)	39.02 trillion	
Defence budget	1.2 trillion	3% GDP
GOZ	524 billion	44% defence budget
R&D	157 billion	30% GOZ
Repair, procurement and modernization (RPM)	367 billion	70% GOZ
New equipment	257 billion	70% RPM
Repairs	110 billion	30% RPM

Source: EEG (GDP) and Cooper (defence budget), figures rounded to 1 bln rubles

past GPVs have come to completion in part because they were based on overly optimistic economic assumptions. The economic assumptions underlying GPV-2015 are now known to be unrealistic since they were derived before the financial crisis, at a time when a trend of sustained economic growth was expected. In fact, a new armament programme covering the period 2011-2020 (GPV-2020) has been drafted and is expected to be approved in October 2010.

The objectives of GPV-2015 have also changed over time. Originally the objective was to have 100% of equipment modern by 2020 based on the assumption that 20% of the equipment was currently modern. In 2009 however, Minister of Defence Serdyukov claimed that the current level of modern arms in the forces was closer to 10% [57]. The new stated objective is to have 30% of modern equipment by 2015 and 70% by 2020 [58]. These benchmarks do not appear to have changed despite the new talk of GPV-2020 [59].

Finally it is worth noting that the ongoing reorganization of the Armed Forces may lead to a different cost breakdown under the National Defence budget heading. It is too early to attempt to estimate the potential costs of the structural changes or the resulting savings. These are simply ignored in the analysis presented here. In the future, these would be reflected in the defence burden and in the level of funding of the GOZ as a percentage of defence.

In the next chapter we attempt to shed some light on the feasibility of GPV-2015's objectives with respect to the new economic outlook.

[57] Felgenhauer, P. (March 2009). Medvedev publicly supports Serdyukov. Eurasia Daily Monitor, 6(53). http://www.jamestown.org

[58] Ria Novosti (Feb 17, 2010), Russian military to be equipped with modern weapons - Putin.

[59] Although the percentage of modern equipment is an indication of the state of modernization, it only represents one aspect of the overall capability of the force. In fact, retiring all non-modern equipment would have the effect of bringing the percentage of modern equipment in the force to 100% without providing increased capability. For this reason this statistic is not used in the following analysis.

6 Projection of defence and procurement expenditures

The total expenditures of the Russian Federation on defence over the coming years will depend on the growth of the economy but also on the level of defence spending that the country can afford. Based on comparisons with other countries, we can consider three different options for the level of defence expenditure in terms of GDP (the defence burden). Combined with the growth scenarios described earlier, these options will help describe the possible outcomes of continued defence spending at the current level under different economic conditions and the impact of changes in defence funding levels to the total funds available for procurement.

Option 1 - Baseline (moderate) defence funding

As the baseline case, we consider the continuation of the defence funding level observed in the past 10 years, i.e. between 2.5% and 2.7% of GDP [60]. This level of funding is also in line with the original three-year 2008-2010 budget and with stated government intentions.

Option 2 - Limited funding

If the social implications of the financial crisis, such as unemployment and poverty, turn out to be more severe than anticipated, it is possible that a larger share of the budget will need to be allocated to social programmes, limiting the funding left available for National Defence. In this "limited funding" option, we can assume that the defence burden would be between 1.6% and 2.0% of GDP. This level corresponds to the lowest defence burden levels observed in G8 countries. Given the size of the Russian military and the plans to increase pay and pension benefits, the consequences of such a drop in funding would be felt severely.

Option 3 - Increased funding

Finally we consider a third option in which Russian defence funding level is on par with the US level or between 3.5% and 4% of GDP [61]. Such a hike from the current and intended funding level could be the result of increased international pressures or represent a shift in government priorities.

Applying the levels of funding defined in these three options to the three scenarios for economic growth to 2020 gives an estimate of yearly defence spending to 2020. Assuming that State Defence Orders (GOZs) continue to represent approximately 36% of the defence

[60] See Cooper (2009) for a review of past defence expenditures. Table 7.

[61] Based on some analyses, such as the one presented in *The Military Balance 2010*, the Russian defence burden could already be closer to 5%. We choose to model the "increased funding" option with a burden of no more than 4% with the understanding that this burden is tied to the National Defence section of the federal budget. It is assumed that the share of the defence expenditures that is not captured in the ND heading will be distributed in a similar way in future budgets and that it will remain proportional to the ND expenditures

expenditures, we can calculate the total amount expended on GOZs between 2007 and 2015 [62]. Results are shown in Table 4.

Table 4: *Projection of RF total expenditures on GOZs between 2007 and 2015 under different scenarios of economic growth and for different defence funding levels (billion rubles, constant 2007 prices, rounded to closest bln ruble)*

GDP Growth Scenario	Defence funding as fraction of GDP					
	1.60%	2.00%	2.50%	2.70%	3.50%	4.00%
	(Limited)		(Moderate)		(Increased)	
Limited	2023	2368	2799	2972	3662	4093
Baseline	2102	2467	2923	3105	3835	4291
High	2187	2572	3055	3248	4019	4502

As can be seen in Table 4, moderate defence funding under the baseline economic growth scenario would lead to the allocation of approximately 3 trillion rubles on the GOZs between 2007 and 2015. Under the highest prospects of economic growth and National Defence funding at the level of 4% per year between 2009 and 2015, the total spent by 2015 would be close to 4.5 trillion rubles. In other words, even with increased defence funding and with the highest economic growth prospects, numbers do not add up to the 5 trillion rubles that were intended to be spent under GPV-2015 [63]. The difference is not unexpected since GPV-2015 was launched before the financial crisis hit the country and changed the economic growth prospects. The plan is not completely unrealistic however and extending the calculation to 2020 would make the spending of 5 trillion rubles achievable under a baseline growth and moderate funding scenario, as shown in Table 5.

Table 5: *Projection of RF total expenditures on GOZs between 2007 and 2020 under different scenarios of economic growth and for different defence funding levels (billion rubles, constant 2007 prices, rounded to the closest bln ruble)*

GDP Growth Scenario	Defence funding as fraction of GDP					
	1.60%	2.00%	2.50%	2.70%	3.50%	4.00%
	(Limited)		(Moderate)		(Increased)	
Limited	3190	3827	4622	4941	6214	7010
Baseline	3475	4184	5069	5423	6839	7724
High	3782	4566	5547	5939	7509	8490

It is important to note that these projections are based on plans and budgets only. The actual money outlays are not known, nor is the efficiency with which these funds are expended. While the original plan was not unrealistic in an extended timeframe, the actual expenditures may differ significantly from the funding intentions.

[62] Assuming that 2007 and 2008 GOZ amounted to 303 and 340 billion rubles respectively. See Jane's.

[63] It has been suggested (Cooper (2009)) that GPV-2015 had allocated approximately 4 trillion rubles to MOD and 1 trillion rubles to other security organizations, if this is the case the numbers in Table 4 should be compared to the 4 trillion rubles figure. Under this assumption, GPV-2015 funding becomes possible in the highest defence burden scenario.

Based on the plan only, it is still useful to determine what would be the impact of maintaining the funding of the GPV-2015 as per the original plan despite the new economic outlook, an intention that has been made public by both Putin and Medvedev on several occasions. Assuming a baseline economic growth scenario and 2.7% of GDP directed to National Defence, maintaining the GPV-2015 procurement objective would require that at least 64% of the defence budget be dedicated to the GOZ compared to the current estimate of 36%. This means that non-procurement related expenditures, including personnel costs, would need to be cut back by almost 50%. It is highly unlikely in these circumstances that the original GPV could be funded simply by cutting back on other defence expenditures. Maintaining the intended level of spending of GPV-2015 by cutting back other areas of the budget would mean reallocating almost 250 billion rubles per year (on average) which represents between 0.5% and 1% of GDP. While this reallocation would not be impossible, it still represents a substantial amount that would have some secondary effects on other sectors of the economy.

If past proportions are maintained and 70% of the GOZ is allocated to the repair, procurement and modernization of military hardware while the other 30% goes to R&D, about 2 trillion rubles could be available for repair, procurement and modernization by 2015 in the baseline growth and moderate funding scenario. Extending the projection to 2020 could increase this amount to between 3.5 and 3.8 trillion rubles under the same scenario. Under the highest growth and defence funding options, this amount could reach almost 6 trillion rubles by 2020 [64] (Table 6).

Table 6: *Projection of total RF expenditures on procurement, repair and modernization between 2007 and 2020, under different scenarios of economic growth and for different defence funding levels (billion rubles, constant 2007 prices, rounded to the closest bln ruble)*

GDP Growth Scenario	**Defence funding as fraction of GDP**					
	1.60%	**2.00%**	**2.50%**	**2.70%**	**3.50%**	**4.00%**
	(Limited)		**(Moderate)**		**(Increased)**	
Limited	2233	2679	3235	3459	4350	4907
Baseline	2433	2929	3548	3796	4787	5407
High	2647	3196	3883	4157	5257	5943

The military capability that could be bought with this level of expenditure remains to be determined, as well as the ability of the defence industry to deliver the planned State Defence Orders. The next chapter examines past and planned rates of procurement in order to address the first of the two questions.

[64] All prices in 2007 rubles.

7 Review of recent procurement rates

GPV-2015 provides some indication of the military capability that Russia plans to acquire as well as the associated funding intentions. While an analysis of the state's budget and economy provides some insight into the financial feasibility of the plan, many other factors influence the ability to acquire or develop new technologies, including the state of the industry and the efficiency of the delivery of federal funds to defence companies. It is difficult to estimate in what way the different factors would influence the rate of procurement of new equipment but it is possible to look at the recent history of development, procurement and rate of decay of equipment and project these trends in the near future to determine the likely state of affairs in 5 to 15 years [65].

In this chapter, we focus on the non-nuclear international power projection capability, and look in particular at the Air Force and the Navy.

Air force

The Russian Air Force has seen a substantial decrease in size over the past 20 years with the number of aircraft in the air force going from over 10,000 in 1990 to approximately 2,500 [66] in 2008. Part of this decrease is to be expected since the large number of aircraft required during the Cold War is not relevant to the current threats. As older aircraft are decommissioned, they are replaced by more modern and capable aircraft and so one-to-one replacement is not necessary to maintain the previous capability. Finally the increasing use of Unmanned Aerial Vehicles (UAVs) reduces the requirement for manned aircraft, especially in the field of reconnaissance. Nevertheless, the current main air force (not counting strategic or Navy and Army aircraft) is comprised of no more than 1,700 aircraft including approximately 1,400 combat planes (822 fighters and 600 ground attack planes) [67]. A large number of aircraft will need to be acquired in the coming years in order to make up for the rate at which older aircraft are going out of service. Figure 12 illustrates the decrease in the size of the Russian Air Force over the last 25 years [68].

Reportedly no new aircraft have entered the force between 1999 and 2003 [69] and aircraft that have been acquired before 1999 will have 20 years of service by 2020 and will be ready to retire. This means that the force of 2020 will be comprised almost entirely of units bought or modernized after 2004. The details of the GOZ 2009 that have been released indicate that only about 22-26 planes were purchased in 2009 and 13 modernized of which 20-24 were actually a batch of MiG-29SMTs returned by Algeria after they failed to meet

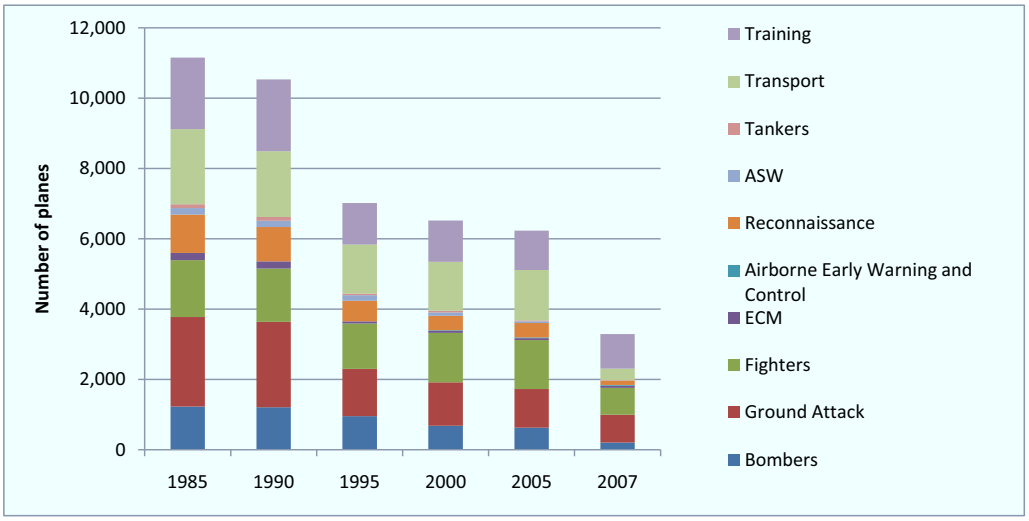
[65] There are several signs of the government's desire to increase the rate of procurement however looking at the actual output of the industry (as is done here) is an indication of the capacity to produce and possibly a better indicator of the future than stated intentions.

[66] IISS and http://www.globalsecurity.com. Note that all numbers are approximate. Different sources report different numbers but generally agree on the scale.

[67] *The Military Balance 2010* gives numbers for 2009 although there does not appear to be a significant difference with the numbers provided for 2008 in *The Military Balance 2009*.

[68] The figure includes strategic assets and air assets used by/for other services.

[69] Ivanov, H. (May 2006), Country Briefing – Russia, *Jane's Defence Weekly*, p.28. Available at http://jdw.janes.com



Source: globalsecurity.org from IISS and other data sources.

Figure 12: *Estimated size of the Russian Air Force during the last 25 years*

quality standards. In 2010, various claims have been made regarding the purchase of fighter planes with General Popovkin, deputy Ministry of Defence for Armaments, announcing the acquisition of 17 fighter planes [70] and Prime Minister Putin announcing the purchase of 27 new planes [71] .

If 10% of the current fleet is modern, as claimed by Minister of Defence Serdyukov, and new planes are entering service at the rate of roughly 30-45 new or modernized airplanes per year (an optimistic upper bound on the number of deliveries planned for 2009 and 2010), the force of 2020 would be made of between 580 and 745 aircraft. In 2006, a parliamentary defence committee had estimated the needs of the Air Force to be between 140-150 aircraft and 40-60 helicopters per year [72] or almost 5 times more than the current rate of replacement and modernization. Even if these rates of procurement were to be observed starting today, the force of 2020 would have no more than 2,000 aircraft.

It can be argued that the rates of procurement observed so far are not an indication of the future. President Medvedev and Prime Minister Putin have several times claimed that the first part of GPV-2015 was dedicated to development and full-scale procurement would start in 2011. Similar claims have been made in the past however as the previous GPV was intended to fund development and testing and GPV-2015 was meant to consist mostly of

[70] Popovkin, G. (Oct 26, 2009). Meeting on defense industry developments. Transcript available at http://www.eng.kremlin.ru/speeches/2009/10/26/2110_type82913type82917_222368.shtml

[71] Putin, V. (Mar 2, 2010). Meeting of the defense sector. Quote available at http://www.premier.gov.ru/eng/points/?count=50 Note that this may include the delivery of some planes promised (and accounted for) in the previous year's State Defence Order.

[72] Ivanov (2006). Ibid.

mass-production and deliveries. Looking at the funding on the other hand, GOZ 2009 and 2010 have been funded at a level that will be hard to maintain without making serious compromises in the budget. A reduction in spending combined with an increase in procurement is not entirely impossible, for instance if prototypes are already constructed and ready to go, but this is not the most likely scenario. According to Jane's [73], contracts between the Russian government and the domestic industries have been signed for the delivery of a total of 346 new planes by 2015 and at least 67 helicopters. Funding has also been approved for a number of modernization programs including at least 382 planes. Assuming that all aircraft not being modernized will have been decommissioned by then, this would lead to a fleet of 978 planes by 2015. In order to fulfill these contracts by 2020, at least 30 new and 35 modernized aircraft will need to be delivered every year (double for deliveries by 2015), a rate higher than has been observed so far.

The planes due to be delivered before 2015 include Su-34, Su-35, Su-27SM3, Su-30MK2 combat aircraft, An-70, Il-112 and Il-76MF transport aircraft and a number of Yak-130 jet trainers. Modernization will lead to the availability of Su-25SM/UB, MiG-31BM, MiG-29SMT [74], Su-27SM and 2 An-124. These planes, up to generation 4++ (generation 4 with generation 5 avionics), are mostly technological upgrades of existing airframes.

Major upgrades such as the T-50 (PAK FA) fifth-generation stealth fighter or the MiG-35 [75] are not scheduled to be delivered to military units before 2015 [76]. If all goes according to plan the T-50 deliveries would start 10 years after the first deliveries of the American F-22 Raptor, an equivalent level of technology [77]. Further developments of the T-50 are being conducted in collaboration with India, and China is also reportedly developing fifth-generation fighters with possible delivery in the same time frame. With the US working on another fifth-generation fighter (F-35), the T-50 fighter's technology may be state-of-the-art now but it will not be alone in its category by the time it becomes fully operational.

Based on information available from public news sources (details in Annex C), the cost of the list of new aircraft under contracts could be close to 300 bln rubles. We estimated earlier (see Table 3) that 257 bln rubles per year could go to the procurement of new equipment for the Armed Forces. Assuming that procurement is divided equally between the three services and the strategic forces (25% each), this would leave a total of approximately 578 bln rubles for Air Force procurement for the 9 years of the armament programme. This high-level estimate indicates that the sum allocated in the procurement could be sufficient to purchase the planes for which contracts have been announced but would not be sufficient

[73] Similar numbers reported in Kramnik, I. (Mar 17, 2010), The Future of the Russian Air Force: 10 years on, *Ria Novosti* and in http://warfare.ru/wiki . Information regarding helicopters is supplemented by news reports: Lenta (Oct 29, 2009) http://lenta.ru/news/2008/10/29/alligator/

[74] Originally delivered to Algeria but returned due to claims of poor quality.

[75] No plans for production before 2013-2014 and no order for Russian Air Force. Current developments are for delivery to Indian Air Force. http://en.rian.ru/military_news/20090813/155803391.html

[76] Ria Novosti (Feb 9, 2010), Russian 5th-generation fighter deliveries delayed until 2015.

[77] Initial flight tests for the F-22 were conducted in 1991, 19 years prior to the first prototype flight of the T-50. The first production model of the F-22 started testing in 1997 for deliveries in 2004, or 7 years between initial production model tests and first operational deliveries. In this context the timeframe for the delivery of the T-50 can be considered optimistic. http://www.wikipedia.org/wiki/F-22

to cover the purchase of all the planes necessary to renew the force at the rate suggested by the parliamentary committee.

Figure 13 illustrates the difference between funds estimated to be available for the procurement of new equipment in the Air Force and the value of the contracts for the production of this equipment to 2015.

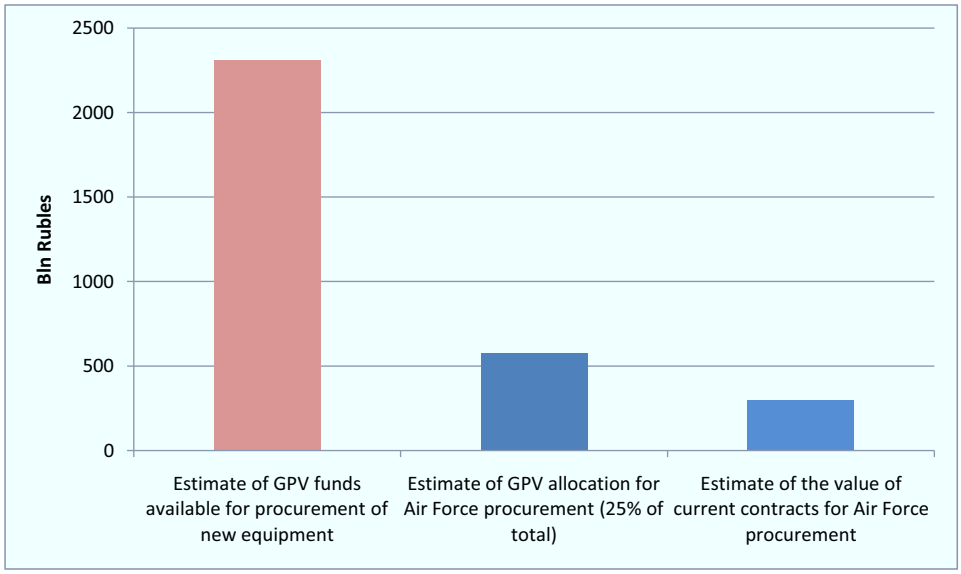


Figure 13: *Estimates of available funds for Air Force procurement and estimated value of equipment under contract for production by 2015*

Navy

The current Russian Navy's ocean-going capability is made of 1 aircraft-carrier, about 11 destroyers, 29 frigates, about 60 submarines, less than 10 missile cruisers and a number of logistic and support vessels [78]. Most of these vessels were built during the time of the Soviet Union and are arriving at a stage where it is becoming more and more difficult to maintain them simply by conducting routine repairs.

Major investments in the shipbuilding sector have been publicized with the announcement of GPV-2015. Intentions at the time were to provide 31 new vessels to the Navy including aircraft-carriers set to enter service by 2017 and to have 6 aircraft-carrier strike groups in the next 20 years. Official and media statements repeatedly announced the revival of the Russian Navy with claims that ships were being built at the same rate as during Soviet times. Recent events however can lead to believe that this is not the case, or at least that plans have gone adrift.

Among the naval projects that have not come to fruition in recent years, the move of the

[78] As reported in *The Military Balance 2010*, not counting vessels in reserve. Note that there are various media reports claiming a much smaller effective strength.

naval headquarters to St-Petersburg can be cited, the project was postponed due to cost and opposition from the military leadership. The planned development of the aircraft-carrier task groups was also postponed. The construction of the Borei-class submarines has been progressing with 1 submarine undergoing testing, 2 under construction and one more on which construction should start in 2010 (although there are reports that the project has been stopped at the end of 2009). It was originally intended to produce 7 such submarines by 2015 and one more by 2017 however the three currently in the works have been under construction for 4 and 6 years. With this schedule it is unlikely that the remaining submarines could be built and be serviceable by 2015 and 2017. More importantly this submarine's main function is to carry the Bulava missile which is years behind the original development schedule after having repeatedly failed test launches [79] .

The same delays have applied to repairs and modernization and reportedly half of the ships scheduled for repairs have become too old and are no longer worth the investment [80]. The Admiral Kuznetzov, the country's only aircraft-carrier, is scheduled to be undergoing repairs between 2012 and 2017 and the country has been working on modernizing the Admiral Gorshkov aircraft-carrier for sale to the Indian Navy for over 10 years now with the project surpassing the original cost estimate by over 1.3 billion dollars [81] . If this is any indication of the time required to conduct such upgrades, the country can expect to be without any Russian-built aircraft-carrier for several years.

The Russian authorities have started to look at foreign options for faster acquisitions and are currently negotiating with France the purchase of the Mistral-class helicopter-carrier with the option for the joint construction of 3 or 4 more ships in Russian shipyards. This opening to foreign markets may be an indication that the government has lost some faith in the domestic industry's ability to produce top of the line naval capabilities. By looking at options to purchase equipment abroad, the government is, perhaps intentionally, putting pressure on domestic industries to become more productive and competitive.

The construction of some surface combatant vessels is going ahead however with two Admiral Sergei Gorshkov-class frigates to be ready in 2011 and 2012 (20 were originally planned for 2015), and four Steregushchiy-class corvettes in construction for commission between 2010 and 2012 (first of class commissioned in 2007). These two classes of vessels are ocean-going but provide approximately 15 days of independence with a range of 4000 nautical miles (7400 km). Clearly the projects currently in the pipeline and recent procurement are not sufficient to provide the Navy with the 31 vessels of the GPV-2015 and will lead at best to improved coastal defence capabilities. The construction schedules and capabilities seen so far indicate that the idea of international power projection through multiple aircraft-carrier task groups is not for the foreseeable future unless foreign capabil-

[79] Felgenhauer, P. (July 2009), The Bulava designer resigns, *Eurasia Daily Monitor*, 6(141); Kipp, J.W. (December 2009), Bulava launch failure and the crisis of Russian defense industry, *Eurasia Daily Monitor*, (6)233.

[80] McDermott, R.N. (Jun 26, 2009), Naval overhaul slides off Russia's agenda, *The Asia Times Online*. http://www.asiatimes.com/atimes/Central_Asia/KF26Ag01.html

[81] Defense Industry Daily (Mar 11, 2010), INS Vikramaditya: Waiting for Gorshkov..., http://defenseindustrydaily.com/ins-vikramaditya-may-hit-delay-cost-increases-03283.html

ity is acquired. Even then the purchase of the French Mistral-class helicopter carrier would not provide the Russian Navy with a ship for at least 3 to 4 years after signing a contract, and it has yet to be determined whether the vessel would come equipped with any weapons and command and control (C2) systems.

A high-level costing analysis reveals that the plans for naval acquisitions are also ambitious for the level of funding available. The cost estimation can be done using similar assumptions as the ones used earlier for the Air Force, namely that GPV-2015 allocated 257 bln rubles per year for procurement with 25% dedicated to the Navy for a total of 578 bln rubles for naval procurement by 2015. Based on the reference costs for military equipment as published by Pugh [82] , the purchase of 20 frigates and 4 corvettes alone could total 386 bln rubles and the addition of 7 Borei-class submarines would bring the total close to 1 trillion rubles [83]. This is well over the total that was estimated as being available for naval purchases. Adding the purchase of the Mistral-class helicopter carrier and the construction of new aircraft-carriers adds to this price tag. Details of the cost estimations are provided in Annex C.

Figure 14 provides an illustration of the difference between the estimate of GPV-2015 funds allocated to Naval procurement and the estimated cost of Naval equipment mentioned in the context of GPV-2015.

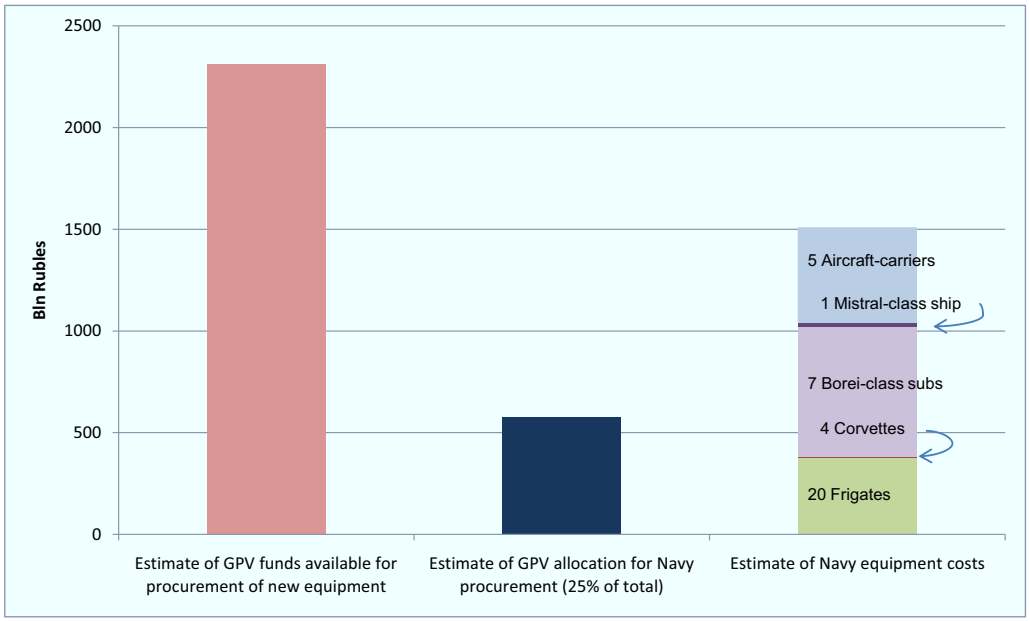


Figure 14: *Comparison of estimates of available funds in GPV-2015 and cost of equipment announcements for the Navy*

[82]Pugh, P.G. (2007), *Source book of Defence Equipment Costs*, P.G.Pugh (Ed.). Note that the cost estimates provided are for 2007, this is also the time at which the procurement plan was drafted.

[83]Figures in rubles are calculated based on current exchange rate with the British pound.

A note on inflation

For at least two decades, the Russian economy has been facing high inflation with yearly increases to the consumer price index averaging at 14% and consistently higher than or close to 10%. With an inflation rate of 10%, the nominal price of goods effectively doubles every 7.3 years and at 14% inflation costs double in 5.3 years. The long-term planning of equipment procurement is particularly difficult with such high and variable inflation and delays in deliveries are even more costly. This is particularly true for military equipment which typically increases in price at a rate superior to inflation [84] . Hence the delays currently observed in the procurement of military equipment can significantly increase the final price of the original equipment list to be procured and put the GPV off-target. This has no doubt been a factor in previous unsuccessful efforts to complete armament programmes.

Figure 15 illustrates the effect of delays on the final cost of a project initially worth 100 dollars (or rubles) for different levels of inflation.

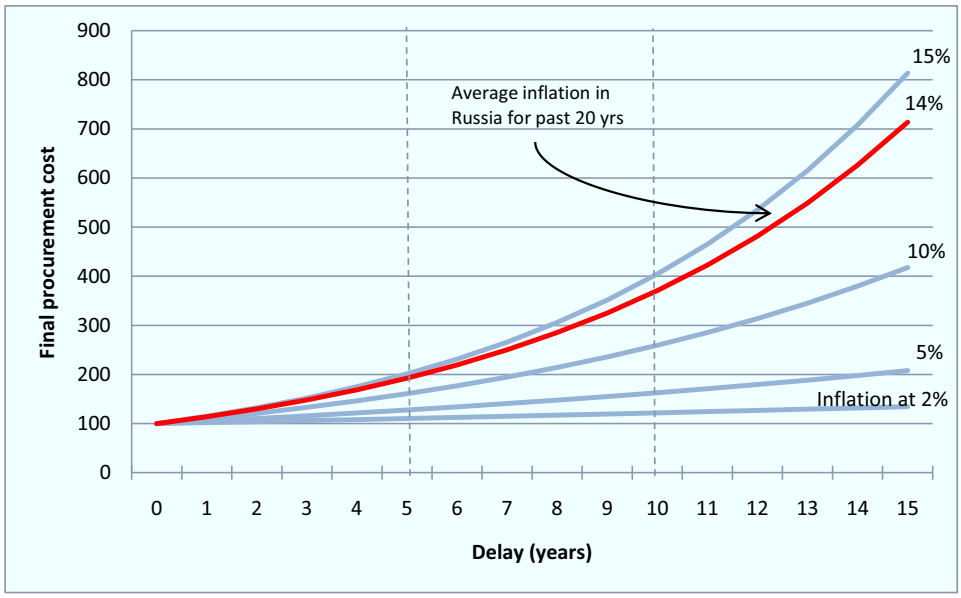


Figure 15: *Illustration of the effect of delays on procurement costs for different levels of inflation*

[84] Kirkpatrick, D. (October 2008), Is defence inflation really as high as claimed?, *Royal United Services Institute (RUSI) Defence Systems*

8 Defence industry overview

This chapter provides an overview of the main challenges facing Russian defence industries today. A follow-on study is intended to provide a more detailed analysis including the level of technological developments in different sectors of the industry as well as workforce and infrastructure considerations.

Foreign arms sales constitute a large part of Russia's revenues and have continued to grow despite the ongoing financial crisis. Revenues from arms sales are expected to increase again in 2010, in part due to the fact that foreign orders were placed years ago.

In addition to producing for the foreign markets, the Russian defence industries are now under pressure to increase production for domestic requirements. With the large number of foreign contracts already signed for the coming years, the defence industry has little incentive to produce for the domestic market or to make the investments necessary to improve quality and develop the next generation of technologies. This lack of incentive is made worse by the inability of the government and industry to agree on prices and the lack of efficiency in the government's delivery of funds.

Among the many challenges facing the Russian defence industry today, the most often cited by analysts are the lack of skilled personnel and the outdated production facilities [85]. Management inefficiencies and the misalignment of the science sector with the rest of the industry also constitute serious challenges.

Lack of skilled personnel The demographic decline that is affecting the country is leading to the aging of the current workforce and the lack of new recruits to make up for the retirements. There is also a misalignment between the skills and demand. This is especially true in the field of machine building, which is critical for the update of the defence infrastructure [86], with labour productivity as low as 6% of the US in the same industry [87].

Outdated production facilities The defence industries' production plants and machines are

[85] Leijonhielm, J., Hedenskog, J., Knoph, J. T., Larsson, R. L., Oldberg, I., Roffey, R., Tisell, M., & Westerlund, F. (February 2009). Russian military capability in a ten-year perspective: Ambitions and challenges in 2008. FOI, Swedish Defence Research Agency.; Belousov, D., Sal'nikov, V., Apokin, A., & Frolov, I. (2008). Technological modernization trends of leading branches of Russian industry. *Studies on Russian Economic Development*, 19(6):563–573. Original Russian Text; Belousov, D., Solntsev, O., & Khromov, M. (2008). Using the foresight technique to build a long-term scientific and technological forecast for Russia. *Studies on Russian Economic Development*, 19(1):10–19. Original Russian Text.; Cooper, J. (2005). Developments in the Russian arms industry - Appendix 9C. In: *SIPRI Yearbook 2006 – Armaments, Disarmament and International Security*, pages 431–448. Stockholm International Peace Research Institute. http://www.sipri.org.

[86] Sal'nikov, V. & Galimov, D. (2006). The competitiveness of Russian industries: Current state and outlook. *Studies on Russian Economic Development*, 17(2):149–168. Original Russian Text.

[87] Russian labour productivity stands at about 26% of US productivity on average according to a recent study from the McKinsey Global Institute released in 2009. This means that producing the same amount of goods requires between 3 and 4 more workers in Russia then in the US. The latest figures are an improvement however to the agency's previous assessment of 18% ten years earlier. See Bush, J. (May 8, 2009), Why is Russia's Productivity so Low?, *Bloomberg BusinessWeek*. http://www.businessweek.com/globalbiz/content/may2009/gb2009058_530398.htm

reportedly largely outdated due to the lack of financing throughout the 1990's and their upgrade is critical to the design of a new generation of military hardware. Recent investments in the field have not led to the desired outcomes, in part due to corruption and inefficiencies in the management of funds. The production facilities, largely constructed during Soviet times, are capable of delivering modern equipment for foreign sales but significant capital investments are required to modernize the facilities in order to improve production efficiency and to build new designs.

Inefficient business processes and lack of government transparency Vasily Zatsepin, analyst from the Moscow-based Institute for the Economy in Transition (IET) explains in several reports [88] how inefficient government processes and financing are affecting the modernization of the industries. Among other factors Zatsepin reports that the delivery of promised fund is often delayed to the last quarter of the fiscal year and often not in the amount originally anticipated, leaving companies with only a few months to complete infrastructure investments that would normally need to be planned over several months if not years. Companies either take out loans in anticipation of the delivery of funds, a process that has become more difficult with the financial crisis, or simply do not spend the funds on the required machinery leading to further waste of financial resources.

Similar inefficiencies are found at all levels of the defence industry. A study published in 2009 [89] by the McKinsey Global Institute (MGI), the research branch of the global management consulting firm McKinsey and Company, outlines the substantial productivity gains that can be achieved in Russian industries in general, simply by reorganizing and simplifying the business processes. MGI estimates that between 30% and 80% productivity gains can be achieved through the improved management of business processes. While most industrial countries have achieved those gains over decades, there is potential for Russia to benefit from foreign know-how in this field and achieve the same results much faster given the already developed industrial and knowledge bases.

Integration of science to the industry Another impediment for the development of future technologies is the lack of integration of the science sector to the industry. Currently much of the scientific research is conducted in government-funded research centres and is not tied to the requirements of the industry. According to Ivanter and Komkov [90], from the Institute of Economic Forecasting of the Russian Academy of Sciences, the science sector remains structured as it was under the Soviet centralized economy. As a result, scientific research plays a supporting role rather than being a driver of innovation. Ivanter and Komkov argue that the transition to an economy based on innovation could not be achieved in the next 25 to 30 years if the "current relations between science, business and government" are

[88] In various reports from Vasily Zatsepin available at http://www.iet.ru/en/personalia/zatsepin-vasily-b.html. See in particular, Zatsepin (2006), Russian military expenditures: What's behind the curtain?, presented at the *10th Annual International Conference on Economics and Security*, 23-24 June 2006, Thessaloniki, Greece.

[89] McKinsey Global Institute (2009), Lean Russia: Sustaining economic growth through improved productivity

[90] Ivanter, V. & Komkov, N. (2007). Innovation-technological development of the Russian economy: Prospects and conditions. *Studies on Russian Economic Development*, 18(3):239–249. Original Russian Text.

maintained.

At present, the level of technology observed in the aircraft, helicopters and air-defence industries is as modern as western counterparts however there may be an increasing gap in the underlying research and development aimed at new equipment designs. Recent cuts in the R&D funding, the focus on immediate procurement and the lack of outcome from past R&D programmes may affect the ability to produce weapons beyond the current generation. In a study of the technological trends of leading branches of the Russian economy published in the journal *Studies on Russian Economic Development* [91], Belousov and al. foresee that innovative technologies will start to challenge the Russian military aircraft industry during the 2020-2030 time frame. Without improving quality standards and developing new technologies through immediate research and development, the country runs the risk of finding itself in competition with developing economies that will be able to produce the technologies available today at a lower cost and will capture the market shares owned by Russian industries today.

The commitment of the authorities to address the conditions of the military industrial sector has been demonstrated in part through the creation of vertical defence holdings. Whether the primary purpose of these defence holdings is to provide the state with greater control of the defence industry can be argued, however the stated objective of providing an oversight of the development of the arms industry and the balance of foreign and domestic orders appears in line with the challenges that the industry currently faces. The adoption of a strategy to 2015 for the development of science and innovation is also a sign that the problems are being addressed. The government's openness to international industrial and scientific collaborations is also clear, at least officially [92]. The behaviour of investors during the last financial crisis is a reminder however that more government transparency is necessary to maintain a climate that is appealing to foreign partners as well as to provide domestic industries with the confidence needed to make longer-term investments.

Addressing the modernization of the defence industry may well prove to be the cornerstone of the country's economic transition to an economy based on knowledge and innovation. Ivanter and Komkov see 'the development of the defence establishment' and 'science and technology' as being two of the five sectors of the Russian economy with the most economic growth potential [93]. It remains to be seen whether the transition can be fast and efficient enough to keep Russia competitive with the rising technological competition, especially from South Asian countries targeting the same export markets.

[91] Belousov, Sal'nikov et al. Ibid.

[92] In his November 12 2009 address to the Federal Assembly, President Medvedev mentions on several occasions the need for international collaboration on scientific projects and the need to attract world-leading foreign scientists to work in Russia. More specific to the military industries, Putin announced that "Russia is prepared to cooperate with the West in producing joint weapons systems based upon NATO standards. And if such cooperation takes place, Russia is prepared to purchase these weapons". See quote in Wallace, LtCol A. (2009), Russia's military industrial complex struggles to modernize. *The ISCIP Analyst (Russian Federation)*, 16(3).

[93] Ivanter and Komkov. Ibid.

9 Social expenditures and demographic challenges

In all developed economies, social programmes make up a significant and increasingly important share of government expenditures as the populations are aging and the cost and standards of health and social services are increasing. The increase in social costs has a direct impact on the government funds available for other budget items such as defence and security. With the trends of increased mortality and decreased fertility observed in Russia throughout the 1990's, irreversible demographic pressure will be felt that may lead to significant increases to the social expenditures or a decrease in the average standard of living. We examine in this chapter how the level of social expenditure in Russia and the level of socio-economic development compare to other developed countries to shed some light on the possible requirements for increased social spending in the coming decades.

As with defence expenditures, estimating social spending from the state budget is not straightforward as expenditures on social programmes are compiled under several chapter headings, including the large share of interbudgetary transfers. Analysts from the Russian Institute of the Economy in Transition (IET) provide a breakdown of the interbudgetary transfers and estimate actual government expenditures for 2008 and 2009 based on the RF Treasury data [94]. The IET's breakdown of social expenditures in terms of share of GDP for 2008 and 2009 is shown in Table 7 [95].

Table 7: *Social expenditures in the Consolidated Budget in 2008-2009, in % of GDP*

Social Expenditures	**% GDP**	
	2008	**2009**
Housing and utilities	2.8	2.6
Education	4.0	4.6
Culture and media	0.8	0.8
Public health and sport	3.8	4.2
Social policy	8.7	11.7
Total	20.1	23.9

Source: IET estimates from RF Treasury

Overall social expenditures in Russia increased between 2008 and 2009, especially for education, health and social programmes, and the figure of 23.9% of GDP is lower but approaching the European average of 27.3% (in 2005) [96]. Pension payments are made from the Pension Fund and are not directly recorded in the budget however the budget includes a

[94] Nazarov, V. (October 2009). On the draft federal budget for the year 2009 and the period until 2011 in the part of allocation of interbudgetary transfers. In: *Russian Economy: Trends and Perspectives 10 2009*, pages 58–63. Institute for the Economy in Transition. http://www.iet.ru.

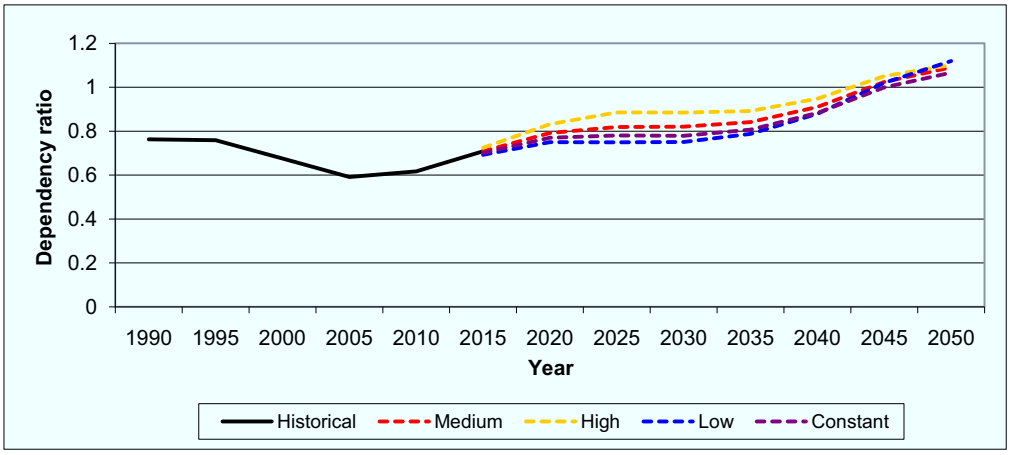
[95] Note that the shares of GDP in the table are taken from the Consolidated Budget which includes the expenditures of the sub-national levels of government. These percentages should not be compared directly to the Federal Budget figures presented earlier.

[96] United Nations Development Programme (UNDP) Russia (2009). *National Human Development Report Russian Federation 2008. Russia Facing Demographic Challenges.*, http://www.undp.ru.

transfer to the Pension Fund every year that is most likely captured under the "Social Policy" heading. While the current expenditures are approaching European levels, the demographic outlook for Russia poses particular challenges and significant socio-economic gains are still required to reach standards that are comparable to European countries.

Demographic outlook

Since 1992 the number of births in the Russian Federation is lower than the number of deaths each year resulting in a steady decline of the population. This trend has had the beneficial short term effect of reducing the number of dependents relative to the size of the working population. Between 2001 and 2006, 100 workers were supporting between 60-70 dependents, including pensioners and children (Figure 16). The demographic balance of the last decade has contributed to increased personal wealth and an increase in the demand for services which played a part in the strong growth of the economy. The long-term effects of this trend are not as positive since the lower birth rates imply that there will be a smaller workforce supporting a larger population of pensioners (i.e. the current workers). This phenomenon is already apparent and since 2007, the size of the workforce has started to shrink while the number of people aged over 60 is increasing [97].



Source: UN Population Division, http://esa.un.org/unpp/p2k0data.asp

***Figure 16:** Russian dependency ratio under different fertility scenarios*

As can be seen in Figure 16, the ratio of dependents to workers [98] is anticipated to be much higher in the future than what has been observed during the past decade. The ratio is actually expected to become greater than 1 around the year 2045 if fertility rates remain constant. This means that there will be more dependents than workers in the population, leaving workers with the triple burden of increased education costs, increased contributions to pensions for retired citizens and contributions to their own pension funds.

[97] Rosstat, http://www.gks.ru

[98] The dependency ratio is defined as the size of the population under 15 years of age or over 65 for men and over 60 for women divided by the size of the working age population.

The most recent demographic data show positive signs of increased fertility and increased life expectancy [99] however these trends will not be economically beneficial before the children born today start entering the workforce after 2025, until then the same smaller workforce can expect to have to support more children and more pensioners as people are living to be older.

Pensions

Pensions constitute the largest share of government social spending and are set to become increasingly important over the next two decades given the demographic trends. The current federal pension system, set up in 2002, is at this time unable to provide all pensioners with pensions that are above the minimum subsistence level. Increasing the standard of living of pensioners is a government priority and measures have been taken to increase the pension payouts over the last few years in order to reach the minimum subsistence level for all by the end of 2010. This priority put forth by the government is already criticized as being unsustainable by the Minister of Finance however [100] . Even if the goal of having pensions match minimum subsistence level in 2010 is achieved, the net substitution rate (ratio of average pension to average wage, after taxes) will remain well below the level of European countries (Figure 17). In 2008, the average pension was 4,199 rubles or 24.4% of the average monthly wage and 92.1% of the minimum subsistence level. The average worker's pension is set to increase to 8,000 rubles in 2010 with 4,500 rubles for the social pension, a level that remains close to the subsistence level. The latest increment would bring the net pension substitution rate close to 40%, a level that is comparable to the lowest levels observed in countries of the Organisation for Economic Cooperation and Development (OECD).

Measures to increase the standard of living will come at the expense of a large deficit. The Pension Fund is expected to run a budgetary deficit [101] starting in 2008 that will reach 56 billion euros by 2020, or 2.2 trillion rubles at today's exchange rate [102]. According to the same analysis, this deficit is set to double to 112 billion euros by 2030 (over 4.4 trillion rubles) and to reach 181 billion euros by 2050 (over 7 trillion rubles). To put things in perspective, the size of the anticipated pension fund budgetary deficit in 2020 is approximately double the entire defence budget in 2009. The cumulated deficit [103] by 2030 is expected to reach 38 trillion rubles [104], more or less the equivalent of the entire GDP in 2009.

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[99] World Health Organisation Information System (WHOIS). Available at http://www.who.int/whois/eng.Fertilityrateupfrom1.2%in2000to1.3%in2006andlifeexpectancyuponeyearduringthesameperiodforbothmen(59to60)andwomen(72to73).

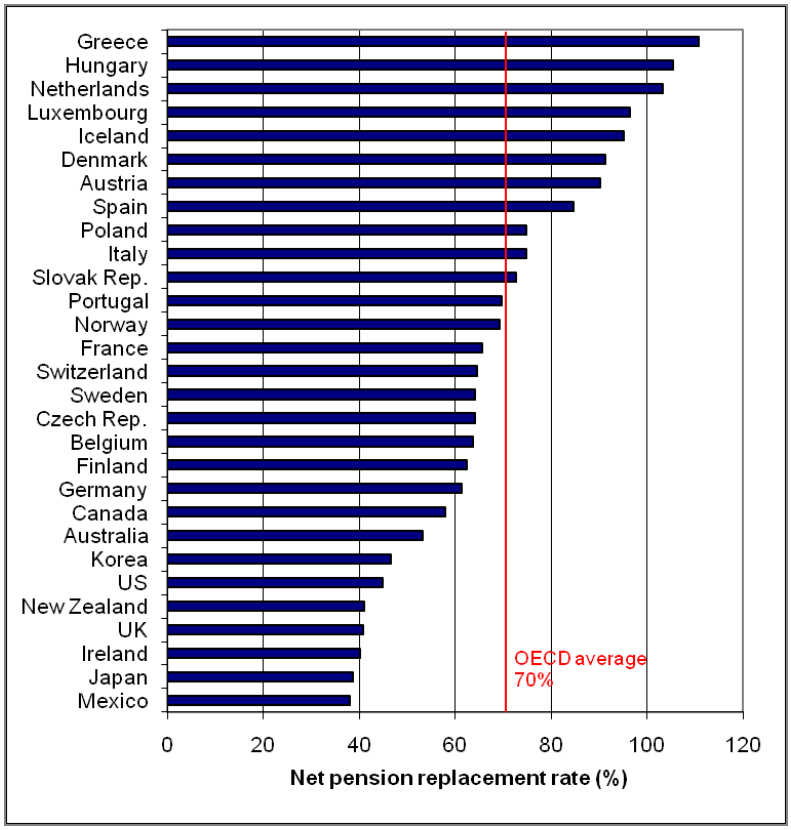
[100] Ria Novosti (Mar 8, 2010), Russia plans 6.3% pension increase, despite warnings from Finance Minister.

[101] By budgetary deficit we mean that expenses will surpass revenues for a given year. The Pension Fund will show an actual deficit once the reserves are expended.

[102] Kurtin, A. (2008). Financing of pension schemes. actuarial analysis of optimal financing of mandatory pension insurance scheme in Russia. Presented at the *Technical Seminar for Social Security Actuaries and Statisticians*, Limassol, Cyprus, 30-31 October 2008. International Social Security Association. http://www.ilo.org

[103] The sum of yearly budgetary deficit from 2008 to 2030.

[104] UNDP. Ibid.



Source: OECD, http://stats.oecd.org

Figure 17: *Pension substitution rates in OECD countries in 2006*

Pension payouts currently consist of a base amount funded by a federal tax and an insurance portion, funded by employee contributions throughout their careers. The current 6% tax however is insufficient to cover the base amounts and extra funds have to be provided from the budget. Yearly transfers to the Pension Fund were planned at the level of 1.6% of GDP in the 2008-2010 budget but the latest measures have already brought this amount up to 5.6% of GDP in 2010 [105]. By the mid 2030's, employees retiring should have made enough contributions to fund the insurance portion of their pensions however by then the Pension Fund will be in a deep deficit.

Whatever measures are put in place to finance this deficit will have long-term impacts on the economy. Financing the deficit through increased federal budget expenditures could result in increased inflation, with numerous negative consequences including the lower yield of the pension fund itself. Increasing taxes could also render Russian enterprises less competitive on the world markets at a time when it is most critical and increase the size of the shadow economy. It is conceivable that the retirement age will be increased, especially

[105] IET. Ibid.

as the life expectancy continues to improve, and that incentives will be put in place to encourage private savings. According to the United Nations' (UN) Human Development Report for the Russian Federation, published in 2008 and based on background analysis from Russian economists [106], none of these measures, in the limits in which they can be applied without having destructive effects on the economy, will be sufficient to prevent the pension substitution rate to fall. In fact the study found that reaching the 40% target substitution rate by 2025 was not achievable under any scenario.

Based on the analysis of Evsey Gurvich, head of the Economic Expert Group [107] in 2007, the transfer of 1.6% of GDP to the Pension Fund, as planned in the 2008-2010 budget, if maintained every year until 2050 would lead to a decrease of the substitution rate from the 26% level current at the time to a low of 17% by 2025 to climb back to about 20% in 2050 [108] . This is significantly behind the current OECD average of 70% and is an indication that the achievement of pension objectives is a long-term goal that is not anticipated before 2050.

Finally, the issue of increasing pension payments is also political at this stage since almost 30% of the voters in the next election will be pensioners [109] . This may sway the current government towards economic measures with short-term benefits. For the foreseeable future, state pensions and military modernization will represent competing demands for public funds.

Education

Based on the latest statistics available from the UN Statistics Division [110] (2005/2006), expenditures on education are lower in the Russian Federation's than in other G8 countries (Figure 18) but the difference does not put the country in a separate category as is the case when comparing pensions and health care (discussed below).

Education indicators show that the country fares well and often better than the average of the OECD countries in terms of the number of researchers per 1000 jobs, the number of science graduates and the fraction of 25-64 year olds with higher education degrees [111]. Education outcomes however are not reflective of the human potential with a relatively small number of scientific articles and patents and a small fraction of enterprises based on

[106] UNDP. Ibid.

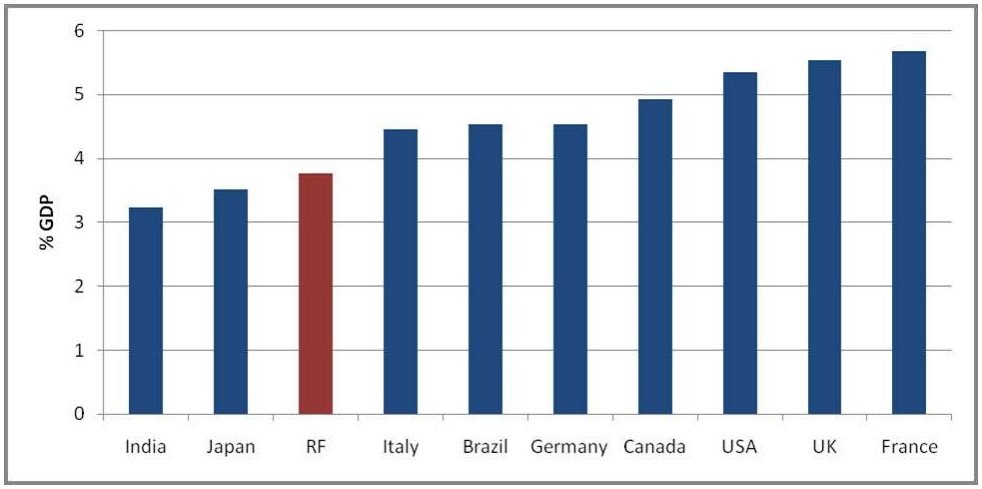
[107] Gurvich, E. (Nov 28, 2007), Petroleum and Pensions - Long-term Problems of Russia's Fiscal System, *Standard and Poor's CreditWeek*, Guest Opinion. p.49. The Economic Expert Group (EEG) is an independent consulting company providing analytical support to the Russian Ministries of Finance and Economic Development.

[108] These numbers have changed with the increased funding of pensions planned for 2010 however the decrease of the substitution rate remains a real problem.

[109] Calculated from UN Population Division data based on medium-fertility variant and assuming that population ages are equally divided within 5-year groupings. Assuming voters to be all adults 18 years and over and pensioners all males over 60 and females over 55. Proportions give ratios of pensioners to voters of 27% in 2010 and 30% in 2015.

[110] http://unstats.un.org

[111] For education statistics see Organisation for Economic Cooperation and Development (OECD)(2008), OECD Science, Technology and Industry Outlook 2008, p.172. Available at http://www.oecd.org



Source: UNStats, Note no data available for China, data for India, Canada and UK are for 2005

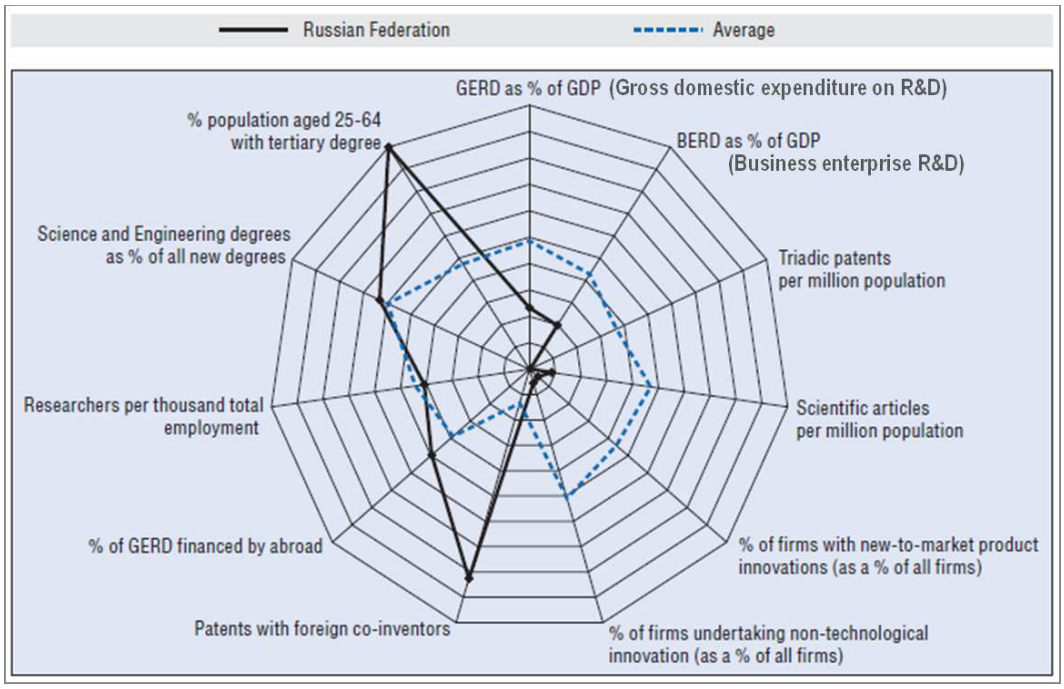
Figure 18: *Public expenditure on education as % of GDP in 2006 in BRIC and G8 countries*

scientific innovation. This suggests that the potential for improvement is large and that gains could be made without significantly increasing the current level of education funding (in terms of fraction of GDP). Figure 19 illustrates this dichotomy between scientific potential and outcomes.

The size of the population aged less than 20 (and requiring education services), is not set to increase significantly in the foreseeable future if the fertility rate remains constant or increases slightly [112]. Education costs would increase starting in 2015 if the fertility rate was to continue to rise to reach 2.35 children per woman however the most recent data indicate that this would represent a sharp reversal in the historical trend [113]. In any eventuality (based on UN population projections), the population aged less than 20 is not expected to surpass the level seen in 2005 in the next 30 years. In other words, the social costs of education are not expected to increase significantly in comparison to pensions, health care and other social programmes targeting poverty or senior citizens.

[112] Based on scenarios used in UNDP report. In the increased fertility scenario, the fertility rate reaches 1.85 child per woman in 2050.

[113] The ratio was up to 1.4 in 2009 from 1.3 in 2008, after significant financial incentives were put in place by the Russian government.



Source: Chart taken from OECD, Science, Technology and Industry Outlook 2008, p 173

Figure 19: *Science and innovation in the Russian Federation compared to the average for OECD countries - Resources and outcomes*

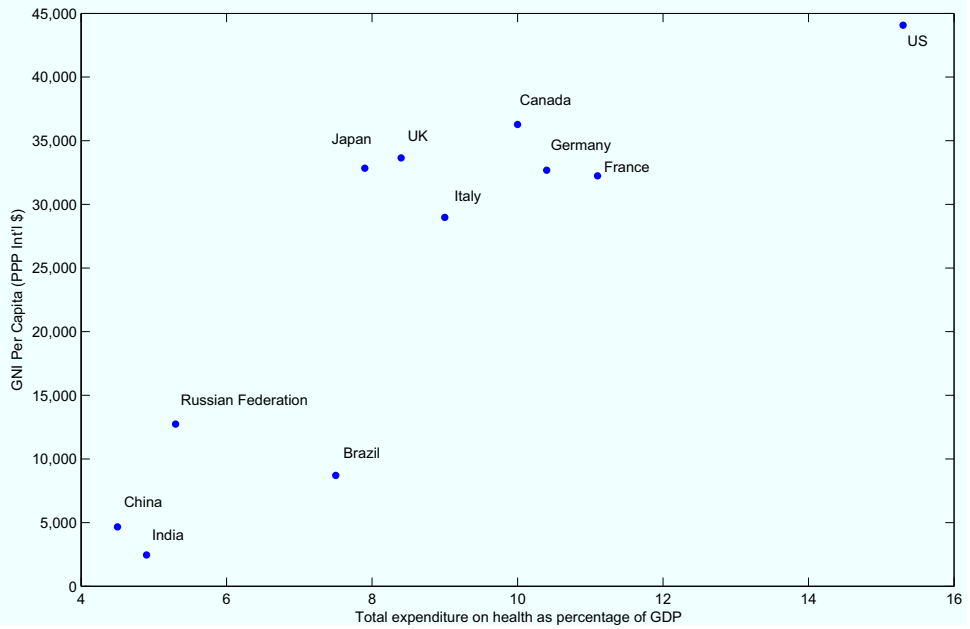
Health

Public health care spending as a fraction of GDP has increased substantially in Russia between 2008 and 2009 (from 3.6% to 4.2%) and has doubled from the funding level observed in 2000 (2.1% of GDP). Private health care is estimated to be of the order of 0.7% of GDP [114] which would bring total health care spending to approximately 4.9% of GDP in Russia in 2009. As illustrated in Figure 20, this level of funding is much lower than for other G8 countries. Russian health expenditures are closer to the health funding level seen in China and India, even though these countries have a much lower per capita income.

The public health situation in Russia can be considered critical with the recent increase in mortality, including high mortality due to injury and violence as well as the spread of epidemics, alcoholism and drug use[115]. The combination of these factors with the aging of the population and the resulting reduction to the size of the number of working age and tax-paying adults will no doubt increase the pressure on the public health network. According

[114] UNDP. Ibid.

[115] WHO Regional Office for Europe (2005). Highlights on health in the Russian Federation. http://www.euro.who.int/highlights



Source: Data from World Health Organization Information System. Data is for 2006.

Figure 20: *Health expenditure relative to per capita GNI for G8 and BRIC countries*

to experts [116], health reforms so far have not led to significant actions and outcomes are minimal and insufficient to address the demographic challenges. As a result, large-scale efficiencies and additional funding will be required to maintain and improve on the current level of health services. Based on the economic growth scenarios introduced earlier and the UN's population projections, Russian GDP per capita could be in the range of $20,000 to $25,000 by 2020 [117] . Increasing health care expenditures to reach a level comparable to this per capita income based on today's standards (Figure 20) could bring Russian health care expenditures in the range of 6-8% of GDP, an increase in GDP share of between 1.1-3.1% compared to today's level. This represents an amount that could be as large as the current defence burden and doesn't account for the increases in health care expenditures that all countries with an aging population are facing. It is estimated that the increase in the cost of health care services due to the aging of the population will be of the order of 10 to 30% (depending on the type of health care service) by 2025 [118].

Forecasts of social spending

The current level of social spending in Russia is not far behind European levels [119] however the socio-economic challenges in Russia are enormous. Both the pension substitution

[116] UNDP. Ibid.
[117] Assuming that PPP rates remain unchanged.
[118] UNDP. Ibid
[119] UNDP. Ibid. European average in 2005: 27.3% of GDP.

rate and the health care expenditures per capita are well below European standards and demographic trends will further increase the need for critical social spending.

In a scenario of increased fertility and reduced mortality, all categories of social costs are set to increase and a reduction in the cost of education cannot be relied on to counter the increased costs of pensions. Economists [120] estimate that in this scenario, state expenditures on pension, health and education could increase by 8-10% of GDP by 2020, a level that cannot be supported by the economy.

While almost all developed countries face a rising debt to GDP ratio due to increased health and pension spending [121], Russia's situation is made worse by the fact that some of the state's most important sources of revenue, such as arms exports, oil and gas revenues and personal taxes, are also threatened by economic and demographic conditions during the same period. This leaves the country with less options for dealing with the tightening of its economy than are available to other developed countries.

In these circumstances, increasing defence spending [122] would result not only in the further delaying of the achievement of health and pension objectives but also in social unrest as the number of pensioners, and in particular the number of pensioners living below the subsistence level, will increase.

[120] Russian economists quoted in UNDP report are from the Centre for Strategic Developments and the Institute for the Economy in Transition (IET) in Moscow.

[121] IMF staff project that public debt in the most advanced economic will reach an average of 110% by 2014.

[122] Including both military expenditures and subsidies to defence industries.

10 Conclusion

In 2006, the Russian Federation adopted an ambitious procurement program to provide troops with modern military equipment. The State Programme of Armament constitutes part of a larger ongoing military reform which includes a structural reorganization of the forces into smaller and more agile units and the review of pay and pension schemes. Since the war with Georgia in August 2008, the reform has been progressing at a fast pace and the equipment procurement plan is seeing some outcomes as new equipment is entering service for the first time in decades. The international financial crisis has however brought forward a number of challenges for the continued growth of the economy and the completion of the military reform already started.

Based on a baseline forecast of moderate economic growth, the announced plan to commit 2.7% of GDP towards defence and 36% of the defence budget towards procurement would not be sufficient to allocate 5 trillion rubles to defence procurement, as was expected in the formulation of the State Armament Programme (GPV) 2015. Extending the timeline to 2020 however makes the spending objective achievable.

While the level of expenditure can be sustained by the economy, it is far from certain that it would be sufficient to update 70% of the military hardware by 2020, as was announced with the publication of GPV-2015. A high-level cost estimation of the list of equipment to procure, in particular for the Navy, does not indicate that the funds made available would be sufficient to procure the equipment required at the current production costs.

If procurement rates observed over the last decade are maintained, the Armed Forces of the Russian Federation in 2020 will have significantly less equipment than at any time since the Soviet Union. In fact failure to purchase new equipment would leave the Russian Navy and Air Force with virtually no serviceable equipment within 10 years. New aircraft are entering the force at the rate of a few dozen a year and approximately 3 to 4 ships are built each year. In the short to medium term, the Navy can expect to be without a single Russian built aircraft-carrier and next generation aircraft are not expected to enter service before 2015, or 10 years after equivalent technologies appeared in the United States.

The ability of the defence industry to produce the most modern equipment is also under pressure as profitable international exports of proven technologies leave little incentive for defence industries to provide for the domestic market and to improve quality and technology standards. Much of the most technologically competitive equipment remains of Soviet design. Experts foresee that Russia will continue to produce and sell technologically competitive aircraft and air defence systems until 2020-2030 but may face challenges with the development of the next wave of technological upgrades as South Asian competition increases and current R&D funding is possibly being redirected to more pressing procurement. Among the principal challenges facing the defence industry, the aging workforce, dated infrastructure and problems in the delivery of government funding are most often cited.

The allocation of funds for National Defence and procurement is limited by other state

obligations, the most expensive of which are social programmes such as healthcare and pensions. Experts estimate that the increased demand for health, pensions and education could require an additional 8 to 10% of GDP by 2020. The yearly requirement for the funding of state pensions alone far outweighs the defence burden and only provides for pensions that are barely above the minimum subsistence level.

Ultimately, the evolution of Russia's economic and political situation will drive the defence agenda that the country will choose and be able to pursue. Only the future will tell how the Russian government decides to set priorities in addressing these challenges but with the long-term nature of the demographic changes that have occurred over the last two decades, it can be anticipated that increasing resources available for defence anytime in the foreseeable future would have severe economic, social and political impacts. With regards to recent events in Russia, it could be anticipated that the priority will remain on strategic weapons and on the equipment of permanent-readiness units along the country's borders. In order to improve military capability and to keep ahead of technological advances, especially in the areas that will not be priorities, the military is left with the only option of increasing the efficiency of the business and production processes and to open the door to international collaborations. In fact these necessities apply to all sectors of the economy and if embraced could lead the country back on a path of economic growth, this time supported by knowledge and innovation rather than natural resources. The obstacles however are many and although the latest financial crisis may have rendered the transition inevitable, it will not be completed quickly or easily.

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Annex A
Economic outlooks and underlying assumptions

International Monetary Fund (IMF):

Table A.1: *Russian real GDP growth forecast - IMF*

	2010	2011	2012	2013	2014
Real GDP annual change	3.6%	3.4%	3.7%	4.2%	5%

Date: Projections published January 26 2010 [123]
Assumptions:
Oil price: $72/bbl in 2010 and $82/bbl 2011
Inflation: 6.25% or the same as for emerging economies
Exchange rate: constant at November -December 2009 level

The World Bank:

Table A.2: *Russian real GDP growth forecast - The World Bank*

	2010	2011
Real GDP annual change	3.2%	3.0%

Date: Projections published November 2009 [124]
Assumptions:
Oil price: $75.29/bbl in 2010 and $76.02/bbl 2011
Inflation: 9-10% by the end of 2009 and higher in 2010

Organisation for Economic Cooperation and Development (OECD):

Table A.3: *Russian real GDP growth forecast - OECD*

	2010	2011
Real GDP annual change	4.9%	4.2%

Date: Projections published November 29 2009 [125]
Assumptions:
Inflation: 11.7% in 2009, 6.9% in 2010, 7.0% in 2011.

[123] IMF (Jan 26, 2010). World economic outlook update - a policy-driven multispeed recovery. http://www.imf.org/external/pubs/ft/weo/2010/update/01/index.htm.

[124] The World Bank (Jan 21, 2010). Global prospects 2010: Europe and Central Asia. http://go.worldbank.org/HA6TKBYPN0

[125] OECD (Nov 19, 2009). OECD economic outlook no. 86 - Russian Federation. http://www.oecd.org/oecdeconomicoutlook.

Expecting the trend of high imports to continue causing GDP growth to slow in 2011 after the bulk of the fiscal stimulus package has been expended.

Crédit Suisse:

Table A.4: *Russian real GDP growth forecast - Crédit Suisse*

	2010	2011	2012	2013	2014
Real GDP annual change	3.9%	4.9%	4.6%	5.2%	5%

Date: Projections published January 22 2010 [126]
Assumptions:
Forecast is based on assumptions of continued high oil prices. Growth of 5% is expected be sustained at least until 2019.

Goldman Sachs:

Table A.5: *Russian real GDP growth forecast - Goldman Sachs*

	2010	2011
Real GDP annual change	4.5%	5.5%

Date: Projections published November 2009 [127]
Assumptions:
Oil price: Based on OECD assumptions.
Inflation: 9.2% in 2009, 5.3% in 2010 and 6.6% in 2011.

Russian Ministry of Economic Development (Minecon):

Table A.6: *Russian real GDP growth forecast - Minecon*

	2010	2011	2012
Optimistic scenario	3.5%	3.6%	4.7%
Moderately optimistic scenario	3.1%	3.4%	4.2%
Conservative scenario	1.3%	1.0%	2.0%

Date: Projections published December 29 2009 [128]

Ministry of Finance (and Economic Experts Group):

As of December 16 2009, the Ministry of Finance used a forecast of 1.6% growth in 2010 based on an average price for the barrel of oil of $58-60 for the next three years. Inflation

[126] RIA Novosti (Jan 22, 2010). Crédit suisse: Russian GDP could grow 60% within decade
[127] Goldman Sachs. Ibid.
[128] Minecon. Ibid.

Table A.7: *Assumptions for Minecon forecast*

	Oil prices	Inflation (avg annual change in CPI)	Exchange rate (rubles per US dollar)
Optimistic	$69/bbl in 2010 $74/bbl in 2011 $81/bbl in 2012	6.1% in 2010 7.4% in 2011 6.9% in 2012	28 in 2010 27.2 in 2011 26.5 in 2012
Moderately optimistic	$65/bbl in 2010 $70-71/bbl in 2011-2012	(same)	28.3 in 2010 27.8 in 2011 27.5 in 2012
Conservative	$58-60/bbl in 2010-2012	(same)	29.5 in 2010 30.0 in 2011 30.5 in 2012

was reviewed in January 2010 to 8.8-9% in 2009 and 6.5 to 7.5% in 2010. The forecast is used for government budgeting purposes and is intentionally kept conservative. This forecast is from Minister of Finance Kudrin, different quotes are provided by different government officials [129].

Export Development Canada (EDC) Country Profile:

In a publication released in January 2010, EDC forecasted 2.9% growth for 2010, based on assumptions of oil trading at $65/bbl for 2010, inflation steady at 9% and the exchange rate at 32.9 rubles to the US dollar. This forecast is based on assessments by Economist Intelligence Unit (EIU), Institute of International Finance (IIF), IMF, Bloomberg and EDC estimates [130].

Merrill Lynch:

Merrill Lynch has raised the GDP growth forecast for Russia three times since the fall, from 3.9% to 5% to 7% in April 2010. Growth is expected to continue to be driven by oil prices [131].

Fitch:

The Fitch credit rating agency forecasts 4.5% growth in 2010 with the assumption that inflation will be easing to 7.5% in 2010 [132].

[129] Ria Novosti (Dec 16, 2009). Kudrin declares recession over in Russia

[130] Canada, Export Development Canada (EDC) (January 2010). Russia country overview. http://www.edc.ca

[131] Bloomberg BusinessWeek (Apr 8, 2010). Russian economy may get biggest bounce in world (update1). www.businessweek.com

[132] Bloomberg BusinessWeek (Jan 22, 2010). Russia credit outlook raised to stable at Fitch (update1). www.businessweek.com

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Annex B
Detailed projections of defence and procurement expenditures

The present annex details the assumptions and calculations made in order to estimate the defence budget and defence procurement expenditures under different scenarios of economic growth and defence burdens.

The real GDP growth rates for the three scenarios of economic growth defined in chapter 4 are shown in Table B.1.

Table B.1: *Real GDP growth rates in three economic scenarios*

Year	Real GDP growth (%)		
	Scenario 1 Baseline	**Scenario 2 Limited growth**	**Scenario 3 High growth**
2009	-	-	-
2010	3.6	1.3	4.5
2011	3.4	1.0	5.5
2012	3.7	2.9	6.5
2013	4.2	3.0	6.5
2014	5.0	3.0	6.5
2015	5.0	3.0	6.5
2016	5.0	3.0	6.5
2017	5.0	3.0	6.5
2018	5.0	3.0	6.5
2019	5.0	3.0	6.5
2020	5.0	3.0	6.5

In Table B.2, GDP values for each year are obtained by applying the growth rates (Table B.1) to the previous year's real GDP, starting with the official figure of 32.20 trillion rubles for the Russian GDP in 2009 [133]. All values are given in constant 2007 prices.

National Defence expenditures are then estimated up to the year 2020 by applying the three defence burden options defined in chapter 6 to the GDP figures of Table B.2. The levels of defence allocations are shown in the first column of Table B.3 and corresponding ND expenditures for each year appear in the remaining columns. The table is divided into three sections to illustrate the three different economic growth scenarios. As in the previous table, figures are in constant 2007 rubles.

[133] Based on estimated provided in April 2010 version of the IMF WEO database and converted to constant 2007 rubles using the IMF's GDP deflator

Table B.2: *Forecasted GDP in three economic growth scenarios. In trillion rubles at constant 2007 prices.*

Year	GDP (trillion rubles)		
	Scenario 1 Baseline	**Scenario 2 Limited growth**	**Scenario 3 High growth**
2009	32.20	32.20	32.20
2010	33.36	32.62	33.65
2011	34.50	32.95	35.50
2012	35.77	33.90	37.81
2013	37.28	34.92	40.27
2014	39.14	35.97	42.89
2015	41.10	37.05	45.67
2016	43.16	38.16	48.64
2017	45.31	39.30	51.80
2018	47.58	40.48	55.17
2019	49.95	41.70	58.76
2020	52.45	42.95	62.58

Table B.3: *Forecasted National Defence expenditures in three economic growth scenarios and for different levels of defence funding. In billion rubles at constant 2007 prices.*

Defence share of GDP	**Yearly ND expenditures (billion rubles)**											
Scenario 1 - Baseline economic growth												
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
1.60%	515	534	552	572	596	626	658	690	725	761	799	839
2.00%	644	667	690	715	746	783	822	863	906	951	999	1049
2.50%	805	834	862	894	932	978	1027	1079	1133	1189	1249	1311
2.70%	869	901	931	966	1006	1057	1110	1165	1223	1285	1349	1416
3.50%	1127	1168	1207	1252	1305	1370	1438	1510	1586	1665	1748	1836
4.00%	1288	1335	1380	1431	1491	1566	1644	1726	1812	1903	1998	2098
Scenario 2 - Limited economic growth												
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
1.60%	515	522	527	542	559	575	593	611	629	648	667	687
2.00%	644	652	659	678	698	719	741	763	786	810	834	859
2.50%	805	816	824	848	873	899	926	954	983	1012	1042	1074
2.70%	869	881	890	915	943	971	1000	1030	1061	1093	1126	1160
3.50%	1127	1142	1153	1187	1222	1259	1297	1336	1376	1417	1459	1503
4.00%	1288	1305	1318	1356	1397	1439	1482	1526	1572	1619	1668	1718
Scenario 3 - High economic growth												
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
1.60%	515	538	568	605	644	686	731	778	829	883	940	1001
2.00%	644	673	710	756	805	858	913	973	1036	1103	1175	1252
2.50%	805	841	888	945	1007	1072	1142	1216	1295	1379	1469	1564
2.70%	869	909	959	1021	1087	1158	1233	1313	1399	1490	1586	1690
3.50%	1127	1178	1243	1323	1409	1501	1599	1702	1813	1931	2057	2190
4.00%	1288	1346	1420	1512	1611	1715	1827	1946	2072	2207	2350	2503

Using the assumption that State Defence Orders (GOZs) continue to represent 36% of ND expenditures, forecasted yearly expenditures on GOZs are obtained by multiplying ND expenditures values (Table B.3) by 0.36. Results are shown in Table B.4, in constant 2007 rubles.

Table B.4: *Forecasted yearly value of State Defence Order (GOZ) if funded at 36% of ND for three economic growth scenarios and different levels of defence funding. In billion rubles at constant 2007 prices.*

Defence share of GDP	**Yearly GOZ expenditures (billion rubles)**											
Scenario 1 - Baseline economic growth												
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
1.60%	185	192	199	206	215	225	237	249	261	274	288	302
2.00%	232	240	248	258	268	282	296	311	326	343	360	378
2.50%	290	300	310	322	335	352	370	388	408	428	450	472
2.70%	313	324	335	348	362	380	399	419	440	462	486	510
3.50%	406	420	435	451	470	493	518	544	571	599	629	661
4.00%	464	480	497	515	537	564	592	621	652	685	719	755
Scenario 2 - Limited economic growth												
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
1.60%	185	188	190	195	201	207	213	220	226	233	240	247
2.00%	232	240	248	258	268	282	296	311	326	343	369	378
2.50%	290	294	297	305	314	324	333	343	354	364	375	387
2.70%	313	317	320	330	339	350	360	371	382	393	405	417
3.50%	406	411	415	427	440	453	467	481	495	510	525	541
4.00%	464	470	474	488	503	518	533	549	566	583	600	618
Scenario 3 - High economic growth												
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
1.60%	185	194	204	218	232	247	263	280	298	318	338	360
2.00%	232	242	256	272	290	309	329	350	373	397	423	451
2.50%	290	303	320	340	362	386	411	438	466	497	529	563
2.70%	313	327	345	368	391	417	444	473	504	536	571	608
3.50%	406	424	447	476	507	540	575	613	653	695	740	788
4.00%	464	485	511	544	580	618	658	700	746	794	846	901

The GOZ values of Table B.4 are added to determine the total amount that would be expended on the armament programme between 2007 and 2015 and between 2007 and 2020 under each combination of economic growth scenario and defence burden option. The assumption is made that GOZs for 2007 and 2008 amounted to 303 and 340 billion rubles respectively, as reported by Jane's [134]. Resulting expenditures are shown in Table B.5.

[134] Jane's Sentinel Security Assessment. Ibid.

Table B.5: *Sum of GOZ expenditures between 2007 and 2015 and between 2007 and 2020 for three economic scenarios and different levels of defence funding. In billion rubles at constant 2007 prices.*

Defence share of GDP	**Sum of GOZ expenditures (billion rubles)**	
Scenario 1 - Baseline economic growth		
	2015	**2020**
1.60%	2102	3475
2.00%	2467	4184
2.50%	2923	5069
2.70%	3105	5423
3.50%	3835	6839
4.00%	4291	7724
Scenario 2 - Limited economic growth		
	2015	**2020**
1.60%	2023	3190
2.00%	2368	3827
2.50%	2799	4622
2.70%	2972	4941
3.50%	3662	6214
4.00%	4093	7010
Scenario 3 - High economic growth		
	2015	**2020**
1.60%	2187	3782
2.00%	2572	4566
2.50%	3055	5547
2.70%	3248	5939
3.50%	4019	7509
4.00%	4502	8490

Table B.6 shows the average yearly GOZ allocation that would be required to meet the defence programme objective by 2015 and 2020. Both the objective of spending 4 trillion and 5 trillion rubles are presented to illustrate the different possible allocations of GOZ funding between the defence and security organizations. The average is simply calculated by dividing the total objective by the number of years of the programme and does not account for the funds already spent before 2010.

Table B.6: *Required average yearly GOZ allocation to reach GPV-2015 objectives, 2007 rubles*

GPV objective (rubles)	**Required yearly GOZ (billion rubles)**
4 trillion by 2015	444
5 trillion by 2015	556
4 trillion by 2020	286
5 trillion by 2020	357

The total GOZ values shown in Table B.6 are divided by the number of years of the program to provide an indication of the yearly average GOZ that would result from the different economic growth and defence burden options. The results, shown in Table B.7, can be compared to the requirements shown in Table B.6.

The GOZ allocations required to meet the 4 trillion rubles objective are adjusted for inflation (from constant to current prices) using the GDP deflator forecast published by the IMF. GDP deflator values past 2014 are not provided by the IMF but are estimated here using a linear regression on the previous years' values. Table B.8 shows the GOZ allocation that would be required each year to meet the objective by 2015 and by 2020, in current prices. The last column of the table provides the known expenditures so far.

Table B.7: *Average yearly GOZ spending for three economic scenarios and different levels of defence funding, assuming that 36% of ND expenditures are assigned to GOZ. In billion rubles at 2007 prices.*

Defence share of GDP	**Average yearly GOZ (billion rubles)**	
Scenario 1 - Baseline economic growth		
	2015	**2020**
1.60%	234	248
2.00%	274	299
2.50%	325	362
2.70%	345	387
3.50%	426	488
4.00%	477	552
Scenario 2 - Limited economic growth		
	2015	**2020**
1.60%	225	228
2.00%	263	273
2.50%	311	330
2.70%	330	353
3.50%	407	444
4.00%	455	501
Scenario 3 - High economic growth		
	2015	**2020**
1.60%	243	270
2.00%	286	326
2.50%	339	396
2.70%	361	424
3.50%	447	536
4.00%	500	606

Table B.8: *Comparison of GOZ spending observed to date with minimum required to meet GPV-2015 objective by 2015 and by 2020. In billion rubles at 2007 prices.*

Year	Yearly GOZ (billion rubles)		
	Mininum to reach GPV-2015 objective by 2015	**Mininum to reach GPV-2015 objective by 2020**	**Actual (estimated)**
2007	444	286	303
2008	530	341	340
2009	565	363	518
2010	640	411	543
2011	699	450	581
2012	754	485	
2013	808	519	
2014	868	558	
2015	931	598	
2016		636	
2017		675	
2018		713	
2019		751	
2020		789	

Table B.9: *Fraction (%) of ND expenditures that must be dedicated to GOZ in order to achieve the current GPV objective of 5 trillion rubles by 2015, for three economic growth scenarios and different levels of defence funding*

Defence share of GDP	GOZ as % of ND		
	Scenario 1 Baseline	Scenario 2 Limited growth	Scenario 3 High growth
1.60%	107	114	103
2.00%	87	91	82
2.50%	69	73	66
2.70%	64	67	61
3.50%	49	52	47
4.00%	43	46	41

Table B.9 shows the proportion of the forecasted ND budget (Table B.3) that would need to be dedicated to the GOZ each year in order to allocate 5 trillion rubles to the State Armament Programme by 2015. The assumption is made that 303 and 340 billion rubles have already been expended in 2007 and 2008 respectively.

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Annex C
Detailed cost estimations

Air Force

The list of aircraft to be procured by 2015, according to Jane's and The Military Balance as well as news sources [135], is provided in Table C.1.

The total cost for planes and helicopters is $7.57-8.43 billion with missing information for 22 transport plane and about 93 planes to add-up to the number of contracts signed according to Jane's. Assuming that the 115 planes (22+93) for which there is no information are worth an average of $15 million each, the total estimate for the cost of procuring 346 aircraft and between 67-79 helicopters by 2015 is between $9.29 billion and $10.15 billion. This is equivalent to between 270.43 billion and 295.56 billion rubles at the current exchange rate. If divided equally over the 9 years of the program, the list adds up to approximately between 30 and 33 billion rubles per year, which fits under the 64 billion rubles per year that was estimated as being available for Air Force procurement.

Navy

Based on various sources, including Jane's, The Military Balance and news sources [136], GPV-2015 is thought to include the purchase of 20 frigates, 4 Steregushchiy-class corvettes, 5-6 aircraft carriers and 7 Borei-class submarines. It is not clear whether the Mistral-class helicopter carrier was intended to be funded from the original procurement plan.

In order to find cost estimates for naval equipment, we rely on the *Source book of Defence Equipment Costs* [137] , which provides an estimate of the cost per ton of different classes of ships, categorized by their function and tonnage. The list of naval equipment and associated cost estimates is provided in Table C.2 [138,139]. Prices are in 2007 British pounds (GBP).

Adding costs for the suggested fleet, at today's exchange rate, brings the total to between 1.47 trillion and 1.66 trillion rubles [140, 141]. Dividing this total equally over the 9 years of the procurement programme means that procurements of the order of 163-184 billion rubles per year would be required to achieve the programme's objectives for the Navy. This is far superior to the 64 billion rubles per year that was estimated as the yearly procurement

[135] See Kramnik, I. (Mar 17, 2010). The future of the Russian Air Force: 10 years on. *RIA Novosti*.

[136] Khramchikhin, A. (Jul 3, 2009). RF Navy ships in foreign. *Nezavisimaya Gazeta*. Original in Russian, translation through Google language tools. http://nvo.ng.ru/realty/2009-07-03/1_umf.html

[137] Pugh (2007). Ibid.

[138] Tonnage is based on Wikipedia and on news sources and official statements.

[139] Pugh (2007) provides a low, median and high variant of the cost per ton to reflect variability in the costs of different vessels. For simplicity we use the median variant here.

[140] Pugh (2007) provides the general estimate of 1.9 billion GBP for a "nuclear-powered submarine equipped for the sole or primary role of carrying and launching nuclear-tipped ballistic missiles for strategic purposes". The price per ton gives the higher bound estimate.

[141] As reported in news sources. Calculations of cost per ton gives a slightly higher estimate of $730 - 886 million.

budget for the Navy. Note that the purchase of the Mistral-class helicopter carrier is not the reason for the high cost estimate as it only accounts for approximately 2 billion rubles per year. The Borei-class submarines and the aircraft-carriers account for the major portion of the final bill for the Navy.

Table C.1: *Estimate of air procurement costs based on public sources*

Air Assets	Unit Cost	Total Cost
Fixed-wing		
32-56 Su-34	$864 million for 24 or approximately $36 mln/each	$1152-2016 million
10 Tu-204/214	$35 million each in 2005	$350 million
60 Yak-130	$15 million each in 2008 (Based on export price.)	$900 million
4 Il-76 MF	Unknown	
18 Il-112V	Unknown	
24-48 Su-35 12 Su-27SM 4 Su-30M2	$2.5 billion for 48 Su-35, 12 Su-27SM and 4 SU-30SM2	$2500 million
12 Su-25UBM	$12 million each in 2004	$144 million
29 MiG-29K	$46 million each	$1330 million
Helicopters		
67 Mi-28N	$15 million each	$1005 million
12 Ka-50	$15 million each (Based on purchase price of 484M rubles.)	$180 million

Table C.2: *Estimate of naval procurement costs based on public sources and standard cost per ton approximations*

Naval assets	Tonnage	Cost per ton	Cost per vessel
20 Gorshkov-class Frigates	4500 tons	93000	418.5 mln GBP
4 Steregushchiy-class corvettes	1900 tons	30000	57 mln GBP
5-6 aircraft-carriers	40000 tons	52000	2.08 bln GBP
7 Borei-class submarines	24000 tons	93000	1.9-2.2 bln GBP
1 Mistral-class helicopter carrier	23700 tons		$600-750 mln

List of abbreviations

AF	Armed Forces
An	Antonov
ARP	Applied Research Programme
ASW	Anti-submarine warfare
bbl	barrel
bln	billion
BRIC	Brazil, Russia, India, China
C2	Command and Control
CIS	Commonwealth of Independent States
CORA	Centre for Operational Research and Analysis
DND	Department of National Defence
e	estimated
EDC	Export Development Canada
EEG	Economic Expert Group (Moscow)
EIU	Economist Intelligence Unit
FSB	Russian Federal Security Service
FSO	Federal Protective Service of Russia
G8	"Group of eight" (France, Germany, Italy, Japan, UK, US, Canada, Russia)
GBP	Great Britain Pound
GDP	Gross Domestic Product
GNI	Gross National Income
GPV	State Armament Programme
GOZ	State Defence Order
IET	Institute for the Economy in Transition (Moscow)
IIF	The Institute of International Finance Inc.
IISS	International Institute of Strategic Studies
Il	Ilyushin
IMF	International Monetary Fund
Ka	Kamov Design Bureau
km	kilometer
m	meter
MGI	McKinsey Global Institute
Mi	Mil Moscow Helicopter Plant
MiG	Mikoyan
MilBal	The Military Balance (IISS)
Minecon	Russian Ministry of Economic Development
Minfin	Russian Ministry of Finance
mln	million
MOD	Russian Ministry of Defence
MVD	Russian Ministry of Internal Affairs
ND	National Defence

OECD	Organisation for Economic Cooperation and Development
PAK FA	*Perspectivny Aviatsionny Kompleks Frontovoy Aviatsii* (Future Frontline Aircraft System)
PPP	Purchasing Power Parity
Rub	Russian ruble
R&D	Research and Development
RF	Russian Federation
Rosstat	Russian Federal Service of State Statistics
RPM	Repair, Procurement and Modernization
UAV	Unmanned Aerial Vehicle
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
US	United States of America
SIPRI	Stockholm International Peace Research Institute
Su	Sukhoi
SVR	Russian Foreign Intelligence Services
Tu	Tupolev
tr	trillion
WB	The World Bank
WEO	World Economic Outlook database (IMF)
WHO	World Health Organisation
WHOIS	WHO Information System
Yak	Yakovlev

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The Centre for Operational Research and Analysis (CORA)'s new Defence Economic Analysis team has undertaken a project to study the Russian economy and resources available for defence in order to assess the potential of the latest Russian military reform plan to become reality. The present memorandum, the first of two on this topic, looks at the current macroeconomic environment and the impact on planned defence expenditures and procurement objectives. Conclusions drawn from this study address a broad range of issues, ranging from the capacity of the industrial base to produce modern weapons to the country's looming demographic crisis. It is hoped that the findings will contribute to provide some perspective to Canadian defence partners in the interpretation of current and future events in the Russian Federation.

La nouvelle équipe d'analyse de l'économie de la défense du Centre de recherche opérationnelle et d'analyse a entrepris d'étudier l'économie russe et les ressources disponibles pour la défense afin de déterminer les probabilités que le plus récent plan de réforme militaire russe se concrétise. Le présent mémoire, premier de deux sur le sujet, traite du contexte macroéconomique actuel et de l'incidence sur les dépenses de défense prévues et sur les objectifs d'approvisionnement. Les conclusions tirées de cette étude portent sur un large éventail de sujets, allant de la capacité de l'infrastructure industrielle à produire des armes modernes à la crise démographique qui menace le pays. Les conclusions présentées ont pour objectif d'éclairer les partenaires de défense du Canada dans l'interprétation des événements actuels et futurs survenant dans la Fédération de Russie.

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