Gianella, Christian; Tompson, William (2007) Stimulating innovation in Russia: the role of institutions and policies. *Economics Department Working Paper No 539. ECO/WKP(2006)67, Organisation for Economic Co-operation and Development*

Unclassified **ECO/WKP(2006)67**

Organisation de Coopération et de Développement Economiques
Organisation for Economic Co-operation and Development **15-Jan-2007**

English text only

ECONOMICS DEPARTMENT

ECO/WKP(2006)67
Unclassified

STIMULATING INNOVATION IN RUSSIA: THE ROLE OF INSTITUTIONS AND POLICIES

ECONOMICS DEPARTMENT WORKING PAPERS No. 539

By
Christian Gianella and William Tompson

JT03220421

English text only

ABSTRACT/RÉSUMÉ

Stimulating Innovation in Russia: The Role of Institutions and Policies

This paper examines the potential role of innovation policy in enhancing long-term productivity growth in Russia. It begins by exploring the role of framework conditions for business in encouraging innovative activities, particularly with respect to intellectual property rights and competition. Realising Russia's innovation potential will also require reform of the large public science sector. This raises issues pertaining to the organisation and financing of public research bodies and, in particular, to the incentives and opportunities they face in commercialising the results of their research. Finally, the paper looks at the potential role of direct interventions, such as special economic zones and technoparks, as well as the scope for improving the tax regime for private-sector R&D.

This paper relates to the *OECD Economic Survey of the Russian Federation 2006* (www.oecd.org/eco/surveys/russia).

JEL classification: L11, L52, O31, O34, O38

Keywords: Russia; innovation; research and development; intellectual property; patents; venture capital; competition; tax; technology transfer; productivity; technology; science; ICT; computers

****

Augmenter l'efficacité de la politique de l'innovation

Cette étude examine le rôle potentiellement joué par la politique de l'innovation pour stimuler la croissance de la productivité en Russie à long terme. Il souligne tout d'abord l'importance des conditions-cadres pour les entreprises, et notamment la protection de la propriété intellectuelle et la promotion de la concurrence, comme facteur favorable aux activités innovantes. La réalisation du potentiel de la Russie en matière d'innovation nécessitera aussi une réforme du large secteur scientifique publique. Les enjeux concernent aussi bien l'organisation que le financement des organismes publics de recherche, ainsi que les incitations et les débouchés qui s'offrent à eux pour commercialiser le résultat de leur recherche. Enfin, l'étude examine le rôle potentiel des interventions directes – zones économiques spéciales, technopôles – et les possibilités d'amélioration du régime fiscal applicable à la recherche-développement dans le secteur privé.

Ce Document de travail se rapporte à *l'Étude économique de l'OCDE de la Fédération de Russie 2006* (www.oecd.org/eco/etudes/russie).

Classification JEL: L11, L52, O31, O34, O38

Mots clés: Russie; innovation; recherche et développement; propriété intellectuelle; brevets; capital-risque; concurrence; impôts; transfert de technologie; productivité; technologie; science; TIC; ordinateurs

TABLE OF CONTENTS

Boxes

Tables

Figures

STIMULATING INNOVATION IN RUSSIA: THE ROLE OF INSTITUTIONS AND POLICIES

by

Christian Gianella and William Tompson[1]

Raising the effectiveness of innovation policy

1. A substantial body of empirical work confirms the importance of innovation for long-run economic growth (Donselaar *et al.*, 2004; Keller, 2004). Recent OECD (2001, 2003a) studies of the determinants highlight the role of investment in information and communications technology (ICT) and human capital, combined with more efficient and innovative ways of producing goods and services. Other research suggests that science infrastructure and foreign knowledge enhance productivity growth in both developed and developing economies.[1] Russia is no exception. If it is to sustain strong growth over the longer term and to diversify its production and export structure away from reliance on raw materials, it must generate higher returns from investments in human capital and ICT and in fostering knowledge creation.

2. Russia's innovation potential is probably greater than that of most other countries at comparable levels of GDP per capita. The country benefits from a substantial science base and a well developed education system in science and technology. Yet indicators of actual innovation activity remain disappointing. There is a striking imbalance between the public resources devoted to knowledge creation and the observed outputs in terms of innovation. Closing this gap constitutes one of the major challenges for Russian innovation policy. The other is to stimulate greater private-sector involvement in R&D, which remains limited.[2] The Russian authorities are acutely aware of these challenges and have recently taken a number of steps to reinvigorate innovation policy. A strategy for the development of science and innovation to 2015 has been adopted, and work has begun on a range of initiatives to spur innovation. The information asymmetries involved in innovation and the positive spillovers generated by R&D activities provide a theoretical rationale for active public support. It is, however, widely recognised that such spillovers are hard to measure, that many targeted interventions have an uncertain impact and that the success of an innovation policy depends crucially on good framework conditions. A healthy business environment may be considered a precondition for boosting innovative activities. Russian innovation policy should therefore be carefully designed, with a balance between general and targeted measures.

---

1. The authors work in the Country Studies Branch of the OECD Economics Department. This paper draws on material originally prepared for the *OECD Economic Survey of the Russian Federation*, which was discussed in the OECD's Economic and Development Review Committee on 25 September 2006 and published in November 2006. The authors are grateful to the many Russian and western officials, experts and businessmen, too numerous to list here by name, who discussed innovation issues with the *Survey* team. The authors are also indebted to colleagues in the Economics Department, in particular Val Koromzay, Andrew Dean, and Andreas Woergoetter, for useful discussions, comments, and drafting suggestions. Special thanks go to Corinne Chanteloup for technical assistance, as well as Susan Gascard, Sylvie Ricordeau and Sheila McNally for secretarial assistance.

3. This paper begins with an examination of innovation activity in Russia today. It then considers the role of framework conditions in fostering innovation. It would be difficult to exaggerate the importance of improvements in the overall business environment when it comes to stimulating innovation. The discussion then turns to innovation policy *per se*. Here the paper identifies two measures that should be considered as first priorities for the government: the reform of the state science sector and the strengthening of the intellectual property rights (IPR) regime. It argues that the authorities should proceed with caution when it comes to targeted initiatives like the creation of special zones and technoparks. Careful monitoring and evaluation of measures are emphasised throughout, as is the need to maintain *ex ante* neutrality between sectors. Interventions should be targeted at specific innovation bottlenecks, arising from market failures, and they should preserve risk-sharing with private investors and incentives for entrepreneurs to focus on wealth-creation rather than rent-seeking.

Innovation activity and performance: the Russian paradox

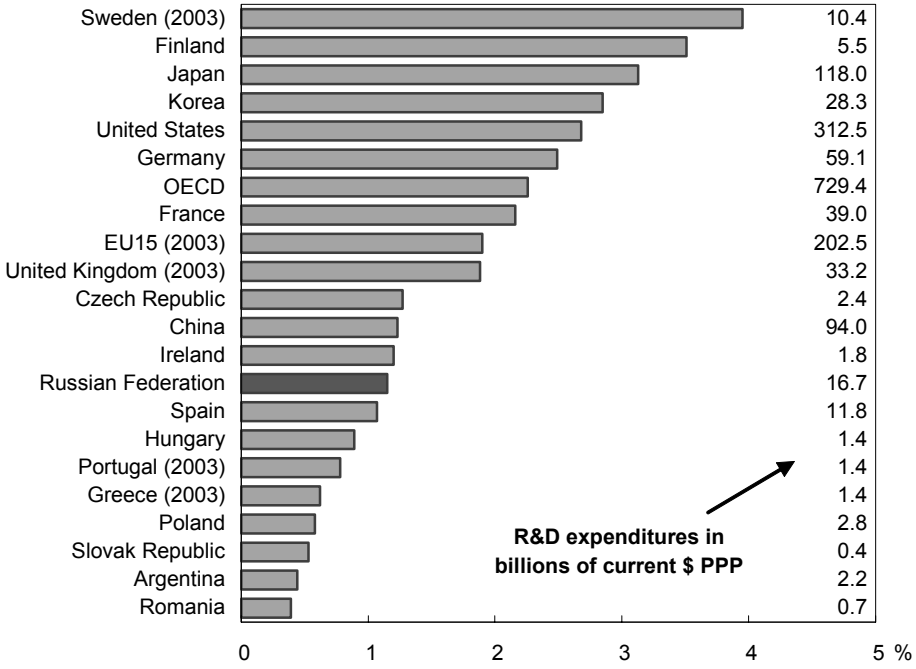
Russia invests heavily in public research and development…

4. The primary weakness of Russia's innovation performance is the striking imbalance between inputs and outputs. Russia spends rather more on inputs into knowledge creation processes than most countries at similar levels of GDP per capita: it has an exceptionally large science base inherited from the Soviet Union and, despite the cutbacks of the 1990s, it continues to spend more on R&D than most emerging economies. Yet its performance on most generally accepted indicators of innovation performance is mediocre. In general, Russia performs best on international comparative innovation indices when they are weighted towards inputs into R&D; it performs less well on indices that emphasise revealed technical achievement; and it ranks worst of all on indices emphasising economic incentives.[3]

5. For cross-country comparisons of inputs to innovation, R&D intensity remains the most widely used indicator, although its limitations are well known.[4] Total R&D spending in Russia amounted to approximately 1.2% of GDP in 2004. While far below the OECD average, this compares favourably with R&D spending in most emerging economies (Figure 1). Moreover, R&D intensity has increased markedly in recent years, recovering from a post-Soviet low of just over 0.8% of GDP. In any case, part of the gap between Russia and the OECD average reflects the country's industrial structure. R&D activity tends to be lower in resourced-based economies, while countries with a large share of production in sectors like pharmaceuticals and telecommunications tend to have higher R&D spending (Sheenan and Wykoff, 2003; OECD, 2006a). Since R&D-intensive sectors are relatively small in Russia, the gap between Russian and OECD levels of R&D spending is actually smaller than one might expect.

6. In contrast to what is observed in OECD countries, most Russian R&D is financed by the state (Figure 2A). Roughly 60% of R&D is publicly financed, and this ratio has proved fairly stable over time. Yet the bulk of R&D would appear, at first glance, to be conducted by the business sector (Figure 2B). This apparent paradox reflects the fact that state owned-companies and branches of research institutes are classified as business entities, and they conduct a large share of publicly financed innovation activities. Broadening the definition of the public sphere to include not only state institutes and state unitary enterprises,[5] but also joint stock companies that are majority state-owned, IET (2006) estimates that the state science sector consumes up to 98% of budgetary funding for science and represents about 86% of the fixed assets of the science sector.

Figure 1. Gross domestic expenditures on R&D, 2004
As a percentage of GDP



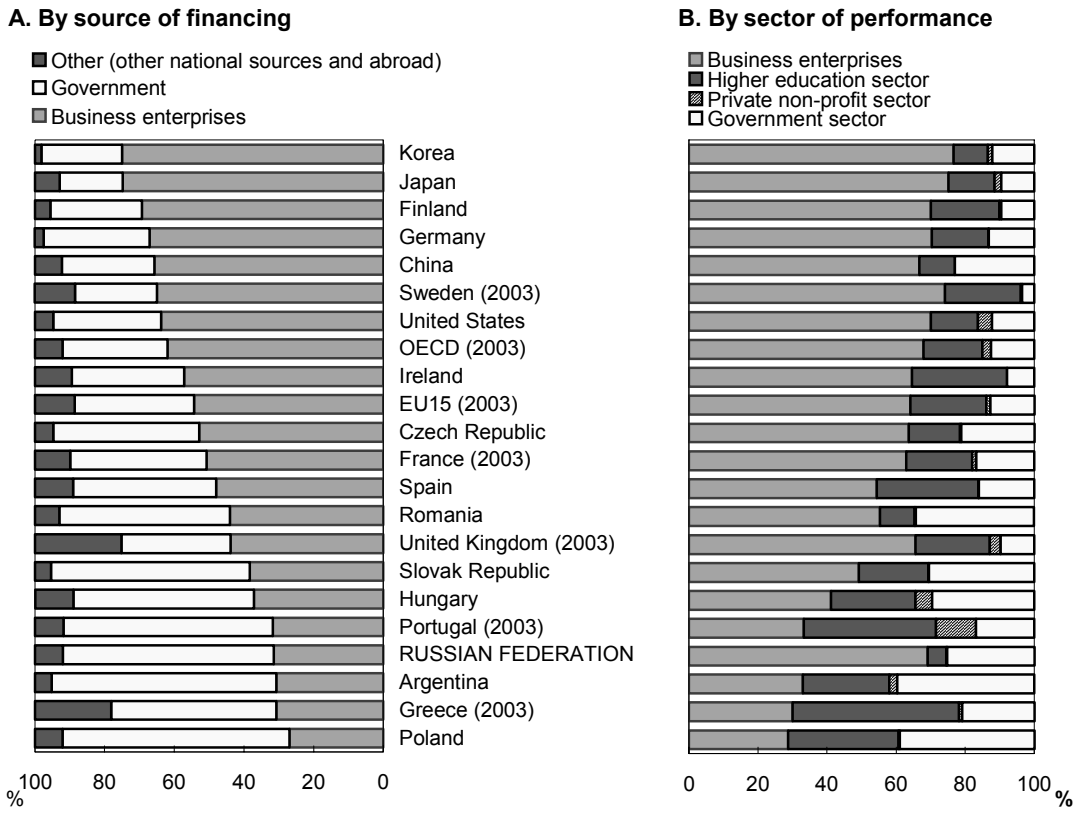
Source: OECD, Main Science and Technology Indicators database.

7. Human resources in R&D appear to be disproportionately large relative to total R&D spending (Figure 3A). The share of researchers in total employment is well above the average for the EU15, and labour costs account for about half of R&D spending. The share of support staff in total R&D personnel is also unusually high (Figure 3B) and has actually risen since 1990.[6] The overwhelming majority of R&D personnel work in the public sphere – 80% on the definition employed in IET (2006). Unusually high employment combined with lower overall spending means that, even in PPP terms, Russian R&D expenditure per researcher is only about 14–15% of the levels found in the United States or Germany (Gokhberg 2005b:4).[7]

…and the private sector is overwhelmingly oriented towards imitation rather than R&D-based innovation

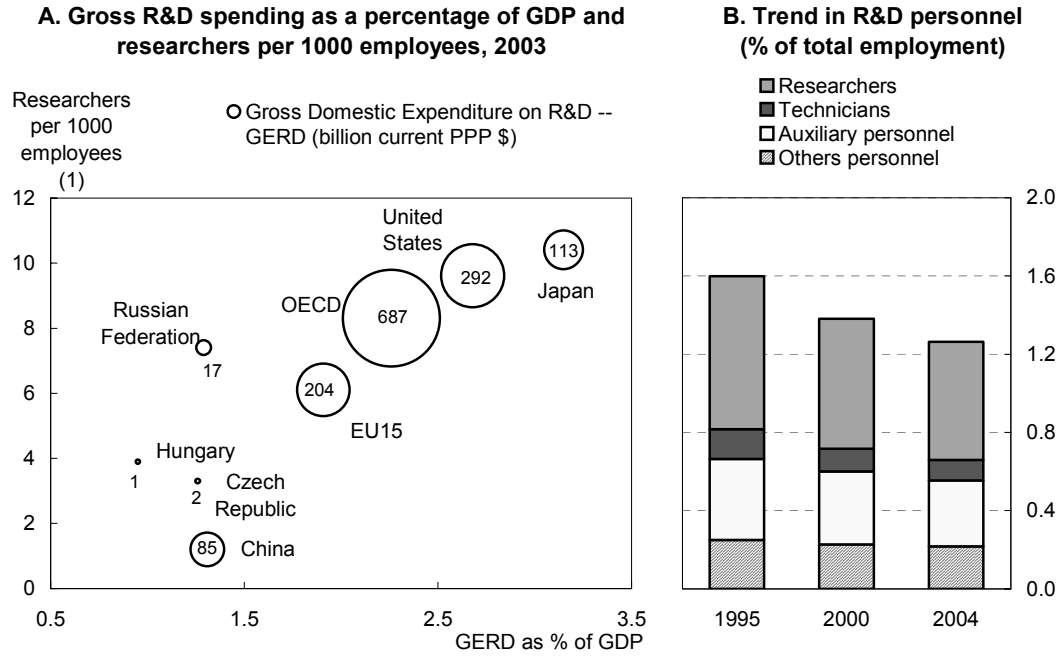
8. Despite rapid growth in recent years, business expenditure on technological innovation amounted to only 1.5% of industrial sales in 2004. For enterprises engaged in innovative activities, this share was only 3.3%. The government estimates that the corresponding figure for small businesses was about 0.4%.[8] Altogether, the number of industrial firms engaged in innovative activities[9] remains limited, at around 11%. Although this figure has doubled since the mid-1990s, there are only a handful of sectors in which the share of innovating firms is much above the average (Figure 4). Organisational innovation appears to be far more common across all sectors, although the sectoral structure of activity is much the same.[10] R&D activities in industry appear to be concentrated in a limited number of (probably large) firms (Figure 5). A similar situation is observed in services. In telecommunications, for example, only 16% of firms were engaged in the development and introduction of technological innovation in 2002, while the corresponding figure was 6.7% for the services sector as a whole.

Figure 2. R&D expenditures breakdown, 2004



Source: OECD, Main Science and Technology Indicators database.

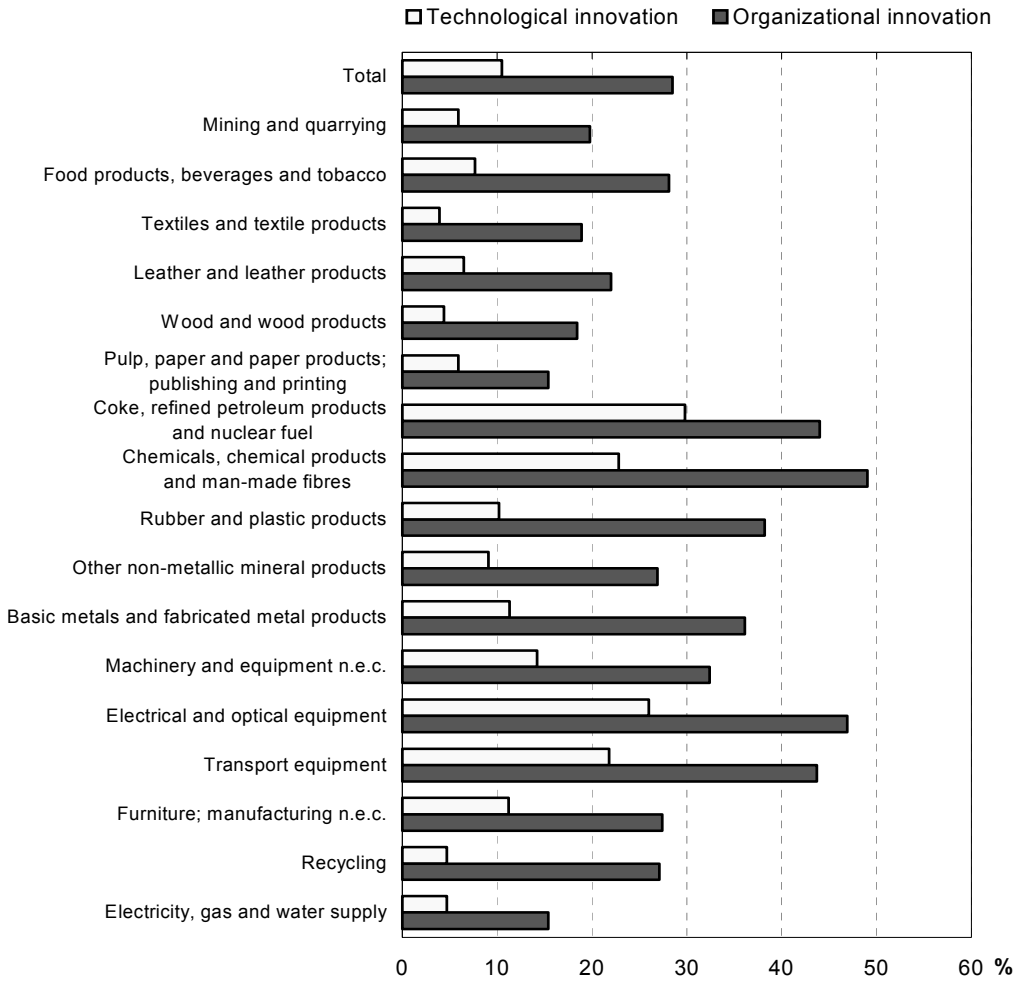
Figure 3. Gross R&D expenditures and R&D personnel



1. OECD and United States, 2002.
Source: OECD, Main Science and Technology Indicators database and Federal Service for State Statistics.

Figure 4. Innovating enterprises as a percentage of all industrial enterprises

Technological and organisational innovation, 2004



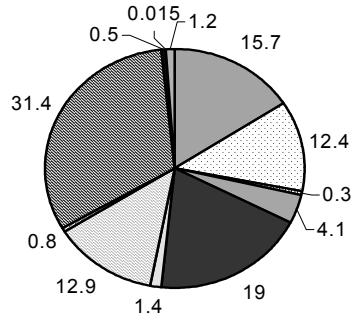
Source: Federal Service for State Statistics.

9. Over half of business expenditure on technological innovation is aimed at improving production processes rather than creating new products. This accounts for the large share of spending on purchases of new machinery and equipment, often imported (Figure 6).[11] A large and growing volume of these purchases are focused on ICT, which highlights the linkages between technical and organisational innovation that arise when firms adopt more sophisticated ICT (Box 1). The acquisition of patent rights and patent licenses remains, on the other hand, marginal, and R&D accounts for only 16% of business spending on technological innovation, down from 27% in 1995.[12] The share of spending on production design fell from 19 to 7% over the same period.[13] An imitation strategy, for a country still relatively far from the technology frontier, is likely to provide room for fast productivity gains, but Russia needs to develop its innovative capacities in areas where it is already closer to the frontier and also to create an innovation system capable of ensuring that fast productivity gains can be sustained.

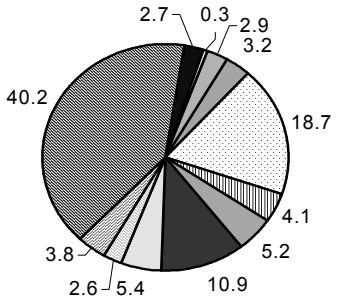
Figure 5. Innovating enterprises and expenditures on technological innovation by economic activity in industry

Per cent, 2002

A. Expenditure on technological innovation



B. Distribution of innovating enterprises



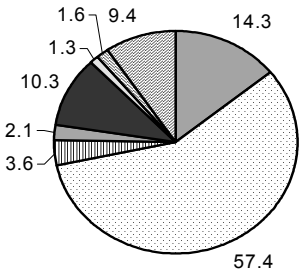
- Mining
- Food products
- Textiles and leather
- Wood, paper ; publishing and printing
- Coke, refined petroleum products, nuclear fuel; chemicals, chemical products; rubber and plastic products
- Other non-metallic mineral products
- Basic metals
- Fabricated metal products, except machinery and equipment
- Machinery and equipment, transport means
- Furniture; manufacturing n.e.c.
- Recycling
- Production and distribution of electricity

Source: Federal Service for State Statistics.

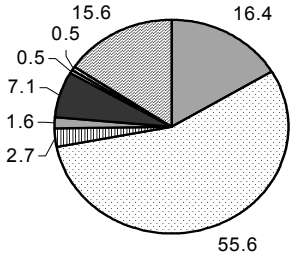
Figure 6. Expenditure on technological innovation in industry by innovative activity

Per cent

2000



2004



- R&D
- Acquisition of technology
- Industrial design
- Market research
- Acquisition of machinery and equipment
- Acquisition of software
- Personnel training
- Other expenditure on technological innovation

Source: Federal Service for State Statistics.

Box 1. The Russian ICT sector

Empirical work suggests that the development of ICT spurs innovation and economy-wide productivity growth *via* three main channels: growth of both output and productivity in ICT-producing sectors; greater use of ICT in the production of other goods and services; and spill-over effects arising as a result of complementary innovations (*e.g.* organisational innovation in conjunction with increased use of ICT).[1]

The Russian ICT sector has been developing rapidly in recent years. Spending on ICT grew by an estimated 27.8% in 2005 to reach just over RUB 1trn (4.7% of GDP). The telecoms sector is the main engine of growth, driven by the explosion of mobile telephony, but this growth is easing as the mobile telephone market approaches saturation.[2] The IT sector, which accounted for about 30% of ICT spending in 2005, is growing at annual rates of 20% or more. Around 70% of IT spending is on hardware, the bulk of which is imported.[3] IT consulting and audit account for a further 15–20%, and software purchases make up the remainder. The state accounts for almost 20% of IT demand and households for a further 20% or so. Business demand for IT products and services is concentrated in industry, financial services and telecommunications. Machine-building, resource extraction, metallurgy and the food industry together account for about 80% of industrial IT demand (CNews, 2006). The low share of expenditure on software reflects the prevalence of piracy in Russia rather than weak software demand.[4] At the same time, the software industry is the only major sub-sector with substantial export success: software exports reached an estimated $ 1bn in 2005, up from less than $ 100m in 1999.

There is still scope for enormous growth in the ICT sector. Overall penetration, though rising rapidly, is still relatively low – Russia has only about 19 personal computers per 100 population, just under half the median level for the OECD countries in 2004, and ICT infrastructure is in need of substantial modernisation. However, there are a number of obstacles to overcome if this growth potential is to be realised. The main structural constraints on ICT growth are as follows:

- *Lack of IT specialists*. Russia trains hundreds of thousands of IT specialists each year, but IT companies complain that the generally high level of their fundamental education is not matched by their practical knowledge and skills. One way to address this problem would be to expand the provision of shorter (perhaps two-year) courses with an emphasis on developing practical skills for specific areas of work.

- *Lack of labour mobility*. The well known barriers to inter-regional labour mobility in Russia mean that IT labour markets are very tight in a few major cities (chiefly Moscow, St Petersburg, Novosibirsk and Nizhni Novgorod), while many of their potential employees are scattered across the country. Yet even in a sector with relatively high wages, the costs of relocation can be prohibitive.

- *Infrastructure*. While high-speed internet access is no longer a problem in the largest cities, companies in many Russian regions face real problems, owing to the low-quality and often expensive infrastructure linking Russian provincial cities to the rest of the world. In many areas, this problem is aggravated by the monopolistic behaviour of the local ‘‘Elektrosvyaz’’ companies – the state companies owning and operating regional networks.

- *Low R&D*. Industry observers believe that low levels of R&D will make it harder for Russia to make the transition from producing specific software modules for software products owned by foreign clients to developing and marketing their own software products.

The IT sector also points to high taxation as a problem. For software firms, wages and salaries make up by far the largest share of costs, so the unified social tax accounts for an unusually large share of their overall tax bill. Proposals now before the State Duma would establish a special tax regime for export-oriented IT firms. Such proposals should be viewed with great caution. Any concessionary tax regime linked to exports is likely to fall afoul of WTO rules, and the practice of designing sector-specific tax regimes risks distorting economic activity. Russia’s social taxes are not, in any case, particularly high by international standards, and income taxes are low. It is difficult, therefore, to argue that the tax system penalises human capital-intensive activities.

1. See OECD (2003c); Hempell (2002) and Van der Wiel (2001).
2. The telecoms sector grew by an estimated 44.1% in 2003, falling to 36.6% in 2004 and 31.4% in 2005.
3. Personal computers are a partial exception: around 80% of desktop computers sold in Russia are assembled there, albeit largely from foreign components.
4. BSA (2003) estimates that 87% of software sold in Russia is pirated.

10. This shift in expenditure patterns reflects the crucial role of imitative strategies in the innovation process in Russia. For sectors in the economy located far from the "technology frontier", introducing already existing technologies may indeed lead to rapid productivity gains, with far less risk than radical innovation activities might entail. In sectors closer to the technology frontier, the growth of total factor productivity requires a much bigger R&D effort. Thus, roughly 30% of the firms surveyed by the Centre for Economic and Financial Research (CEFIR) and the Institute for the Economy in Transition (IET) in 2004 reported having innovation strategies based wholly or partly on imitation, as against just 11% relying solely on the introduction of novel products or technologies.[14] Overall, the survey found that only about 30% of innovating firms conducted any R&D at all.[15] Policies and institutions that facilitate the absorption and diffusion of knowledge are critical to such imitative strategies, a fact which underlines the importance of external openness for innovation. Indeed, since absorption and diffusion problems can limit the impact of targeted interventions aimed at stimulating innovation, resolving such problems may also be critical to the success of innovation policy.

11. Yet this appears to be a weak point for Russia, at least in the eyes of businesspeople: one of Russia's lowest ratings in the World Economic Forum's Executive Opinion Survey for 2005 concerned technology transfer, whether *via* foreign direct investment (FDI) or the licensing of foreign technology.[16] This suggests that Russia is missing a major opportunity to facilitate industrial modernisation and restructuring. As is well known, the importance of FDI stems not simply from the sums invested but from the positive spillovers that it can generate for domestic firms *via* the import of managerial expertise, technology and know-how. Savvides and Zachariadis (2005) find that foreign R&D has a particularly strong positive impact on TFP and the growth of value added. Moreover, the greatest potential spillovers are likely to be in manufacturing, where greenfield FDI in Russia is still relatively low. Studies of FDI in Russia suggest that the beneficial spillovers from foreign-owned firms to other firms in the same industry are significant, although the benefits of trade and FDI liberalisation depend on other policies, including financial sector reform, measures to improve labour mobility and reductions in regional bureaucracy.[17] Slow reforms tend to reduce the beneficial effects of FDI.[18]

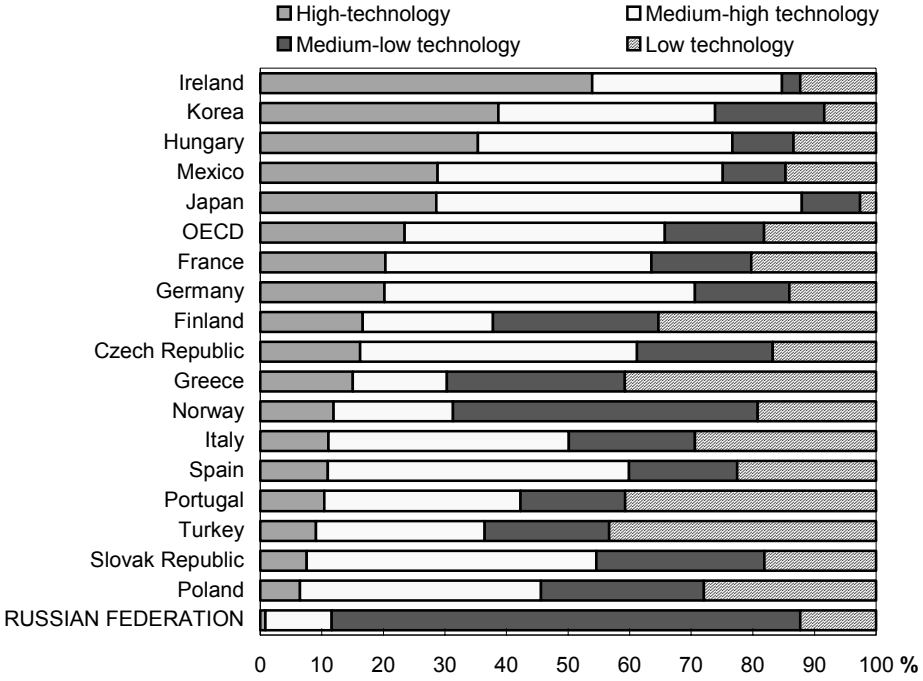
The observed outputs of Russia's innovation system are disappointing

12. Not surprisingly, given the level of business spending on R&D, the production of innovative goods remains subdued. The share of technologically new or improved products in industrial sales was just 5.6% in 2004, and this share does not exceed 10% even for firms engaged in innovation. The share of high-value-added goods in manufacturing exports to OECD countries does not exceed 1% (0.2% for ICT goods) and reaches only 10% for high–medium value-added goods (Figure 7).

13. Knowledge creation in the business sector is also hampered by limited interaction with the public R&D sector. This means that the national innovation system – broadly defined as the "network of institutions and private sectors whose activities and actions initiate, import, modify and diffuse new technologies"[19] – is not performing well. Most research personnel in the Russian Academy of Sciences (RAS) system and in universities have little incentive to worry about the commercial application of their work. This lack of engagement between the science sector and business contributes to relatively poor performance with respect to innovation outputs. One indicator of this weakness is the relatively small number of patents held abroad (Figure 8A).[20] Moreover, a large proportion of patents held abroad are not Russian but foreign-owned. This may be one reason why Russia's share of ICT-related patents in the European Patent Office (EPO) total actually compares favourably with other emerging economies (Figure 8B). Of course, the question of whether and how patents are used is at least as relevant as the number of patents registered. Concerning patents held in Russia, Gokhberg (2003) estimates that only 5% of usable models produced during 1992–2002 became objects of commercial agreements.

Figure 7. Share of high and medium high-technology in manufacturing exports to OECD countries

As a percentage of manufacturing exports, 2004

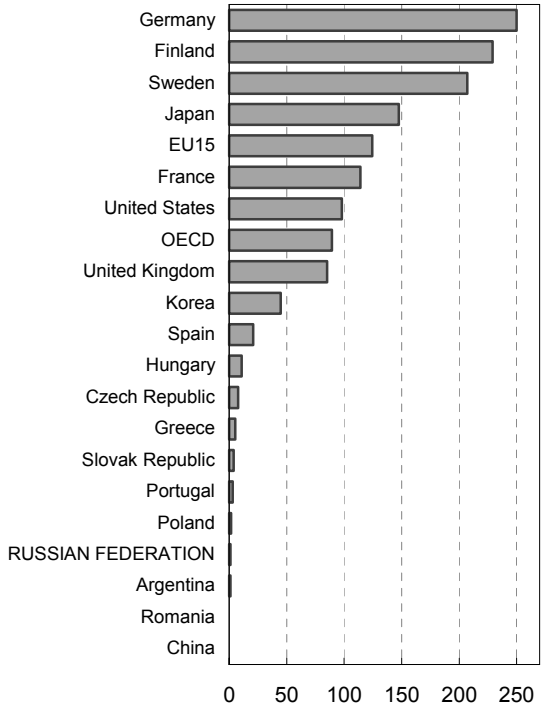


Source: OECD, STAN Bilateral Trade Database 2006/I.

Figure 8. European patent applications and ICT-related patents, 2002

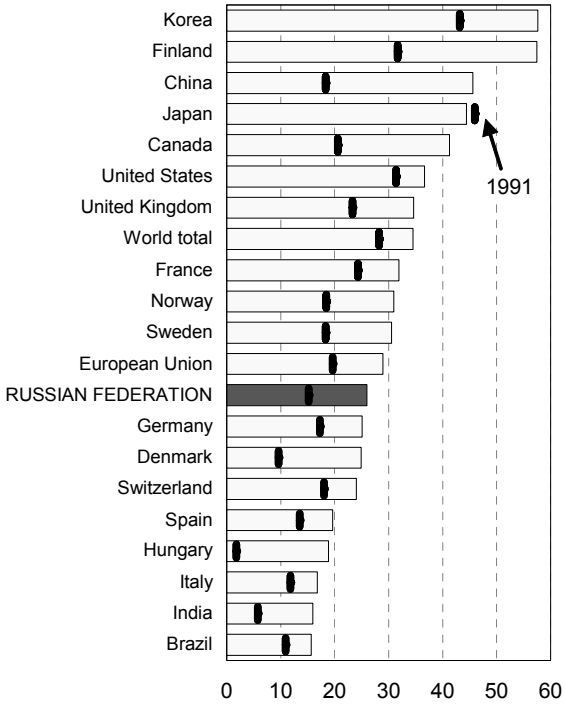
A. Number of European Patent Office patent applications

Per million population



B. ICT-related patents as a percentage of the national total (EPO)

Per cent

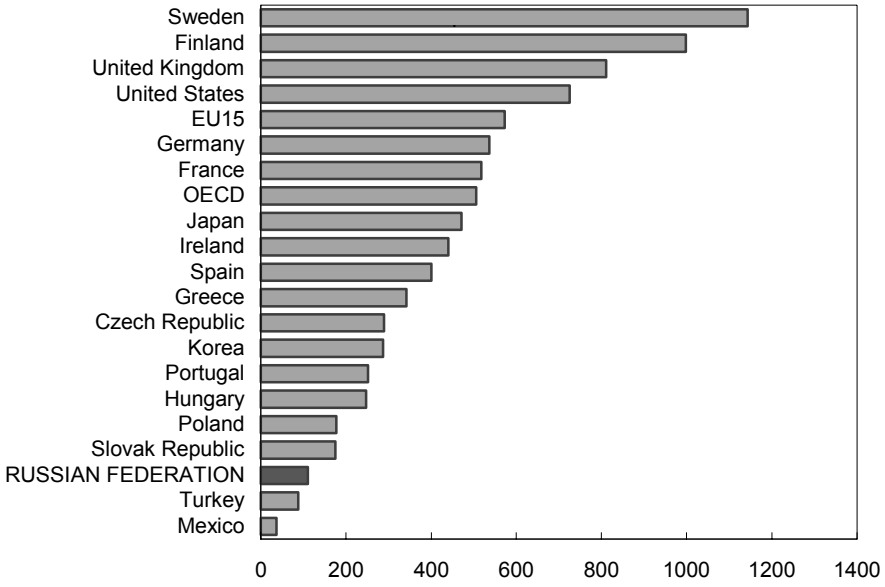


Note: Patent counts are based on the inventor's country of residence, the earliest priority date and fractional counts. Data for 2002 are OECD estimates.

Source: OECD, Main Science and Technology Indicators database, OECD, Patent Database, December 2005.

14. A similar picture emerges when looking into more "upstream" or fundamental R&D activity, at least as measured by scientific publications. Russian scientists publish only 2.7% of the total volume of publications in the world's leading scientific journals (Figure 9).[21] On the other hand, there have been remarkable achievements in a number of areas, and Russia still holds strong positions in fields such as space research, nuclear power generation and laser technologies, as well as in fields connected to the exploitation of mineral resources and areas that do not require major capital investment, like mathematics.[22]

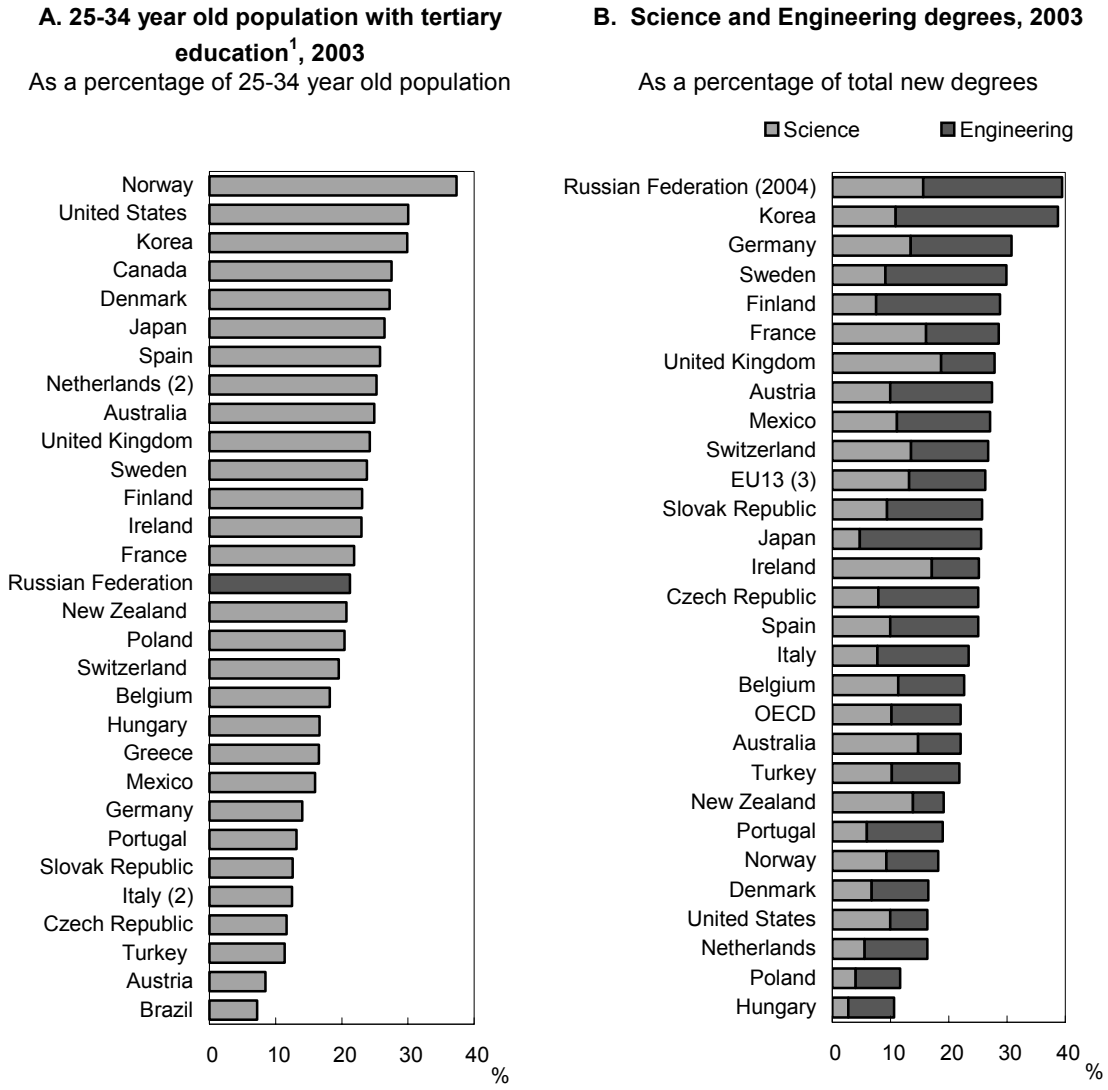
Figure 9. Science and engineering articles, 2003
Per million population



Source: OECD, Main Science and Technology Indicators database; National Science Foundation, Science and Engineering Indicators 2006.

15. In trying to build on these comparative advantages and to improve the diffusion of knowledge, Russia can rely on a well educated workforce. Tertiary education attainment is relatively high in comparison with OECD countries and Russia produces a far higher proportion of graduates in science and engineering subjects than do most OECD members (Figure 10). The number of IT graduates per annum has more than doubled since 1995, a product of the explosion in private-sector provision of IT courses.[23] Since the data on degree classifications do not correspond exactly, Figure 10B may exaggerate Russia's relative strength in this area. Nevertheless, there is little doubt that it *is* a strength: although the quality of higher education overall appears to have fallen during the 1990s, the quality of science and engineering education is reckoned to have held up fairly well.[24] Russia's innovation performance suffers not from a shortage of qualified specialists but from its inability to retain them: the country remains a major exporter of researchers, especially in their late 20s and 30s. Improving conditions of work for such researchers and offering them greater opportunities for career development will be important if Russia is to realise the innovation potential of its higher education sector.

Figure 10. Russian higher education



1. Tertiary-type A and advanced research programmes.
2. Year of reference 2002
3. EU15 excluding Greece and Luxembourg.

Source: OECD, *Education at a Glance, 2005,* Education database and Federal Service for State Statistics.

16. The limited involvement of higher education institutions (HEIs) in R&D represents a second missed opportunity in the university sector. In 2005, HEIs received only about 4.3% of budgetary funding for R&D, down from an already low 6.1% in 2004 (IET, 2006:314). The government aims to raise this share to 20% over the coming decade, while working to facilitate greater university engagement with the enterprise sector in R&D. This represents an opportunity both to help HEIs tap into new sources of funding for research and to engage their knowledge creation capabilities in innovation processes.

Getting framework conditions and institutions right

Improving framework conditions for business is critical to stimulating innovation

17. The gap between private and social returns to R&D and the asymmetry of information that exists between innovators and potential investors suggest a need for some degree of public intervention in innovation policy. In Russia, the mismatch between the public resources devoted to innovation activities and the unsatisfactory results achieved also constitutes an argument for reform. Ultimately, a successful innovation policy, in Russia as elsewhere, must provide the right incentives for those engaged in R&D, facilitate contacts between knowledge producers and business, and create an institutional environment that favours the reallocation of resources needed to turn new knowledge into wealth-creating activities. Given the potential for continued "imitation-based" development, it will also be important to facilitate access to know-how and technology generated abroad. Fulfilling these objectives will not necessarily require an increase in public spending: reform of the institutional framework is likely to be more important.

18. Yet if the case for a degree of public activism is clear, it is important to proceed with a realistic understanding of how far innovation policy can go and what can reasonably be expected of it. OECD (2006a:15) observes that the empirical evidence regarding the effectiveness of different instruments of innovation policy is mixed. This certainly appears to be true in the Russian case: Yakovlev (2006) reports that 12.6% of respondents to an enterprise survey said that they had received state assistance to stimulate innovation in 2004, but such assistance had little impact.[25] Moreover, the impact of specific interventions aimed at correcting market failures is likely to depend in no small measure on the capacities of the public bodies charged with implementing them and on the quality of the overall institutional environment.[26] Thus, while the objectives of innovation policy outlined above are no different to those in OECD countries, the specific actions required to achieve these objectives need to reflect Russian conditions.

19. The creation of sound framework conditions for business would appear to be a *sine qua non* for boosting private innovative activities. A good deal of research highlights the importance of good framework conditions for R&D activity (Jaumotte and Pain, 2005c; OECD 2006b), and most innovation policy initiatives are likely to prove inefficient if the appropriate framework is not in place. Russia still has much to do in this sphere: as the World Bank (2006) notes, this is precisely the area in which Russia lags behind advanced transition countries of Central Europe. Goldberg (2006) highlights survey evidence showing that innovative companies suffer more from problems with the investment climate than do other firms. Moreover, in sectors where Russia is still far from the technology frontier, the catch-up process relies heavily on an imitation strategy, for which general framework conditions matter most.[27]

20. To begin with, the development of innovative activities requires sound macroeconomic conditions. Analysing cross-country differences, Jaumotte and Pain (2005b) find that robust output growth, low inflation and low real interest rates have a positive influence on the rate of growth of R&D. The micro-level characteristics of the investment environment are also critical: secure property rights, low barriers to market entry and a stable institutional environment all have a role to play in fostering innovation. These results are hardly surprising: in a stable and predictable environment, businesses can operate with longer time horizons, and the risks involved in innovative activities are reduced. In the absence of such conditions, rational agents will focus on short-term gains, and there is likely to be little investment in any activity that does not generate very rapid returns. Given the importance of the so-called "bureaucratic burden" on business in Russia, these considerations suggest that progress in reducing corruption and reforming public administration will be important in fostering innovation.

21. A well-developed financial system, which reduces the cost of external financing, also helps foster innovative activities (Jaumotte and Pain, 2005b). In Russia, a large majority of firms rely on retained earnings to finance investment and innovation,[28] and enterprise surveys almost always report the shortage

of own funds and the cost of borrowing as the principal barriers to investment and innovation. Funds devoted to innovation and risk-financing are scarce. The dearth of venture capital in Russia is probably part of the problem here: Jaumotte and Pain (2005d) find that the development of venture capital in OECD countries is negatively correlated with enterprises' assessment of the difficulty of securing external finance, and a similar situation appears to obtain in Russia. In Russia, however, the development of risk capital markets has been impeded by the under-development of financial markets overall (see below).

22. Framework conditions and the regulatory environment also affect the "import" of foreign know-how *via* FDI and collaborative R&D and innovation. Several studies have emphasised the positive impact of foreign-performed R&D and FDI on domestic total factor productivity (Guellec and van Pottelsberghe, 2001; EBRD, 2005; and Hemmings, 2005), and FDI restrictions are found to have a negative impact on patenting (OECD, 2006a). Improving the openness to flows of foreign knowledge may play an important role in boosting innovation in Russia, particularly given that Russia's human capital endowments leave it well equipped to absorb this knowledge.[29] Indeed, given the right framework conditions, this could be a major strength for Russia: Erken *et al*. (2005) find the quality and skill of the labour force, together with the quality of knowledge institutions, to be a critical factor in attracting foreign R&D.

23. One specific feature of Russia's business environment merits particular attention in this context: artificially low energy tariffs for households and businesses. This, combined with the energy inefficiency of the industrial capital stock inherited from the Soviet era, leaves Russia with an exceptionally high energy intensity of GDP: Russian energy consumption per dollar of GDP in 2003 was estimated to be 2.3 times the world average (in PPP terms) and 3.1 times the European average.[30] The Russian government estimates that the country could reduce energy consumption per unit of output by almost half from the levels of 2002–03.[31] Implicit energy subsidies are both economically inefficient – especially in view of rising energy prices worldwide – and environmentally damaging. However, the authorities in recent years have begun steadily increasing domestic energy tariffs, with a view to raising them above long-run cost-recovery levels,[32] as well as introducing tighter emissions standards in some spheres. There are obvious synergies between increased energy efficiency and reduced greenhouse gas emissions, synergies that could be profitably exploited within the framework of the Kyoto protocol.[33] This creates significant incentives for enterprises to invest in cleaner, more energy-efficient technologies.[34] However, their ability to adapt successfully will depend on the creation of conditions that favour technology transfer and innovation.

Strengthening competition would help spur innovation

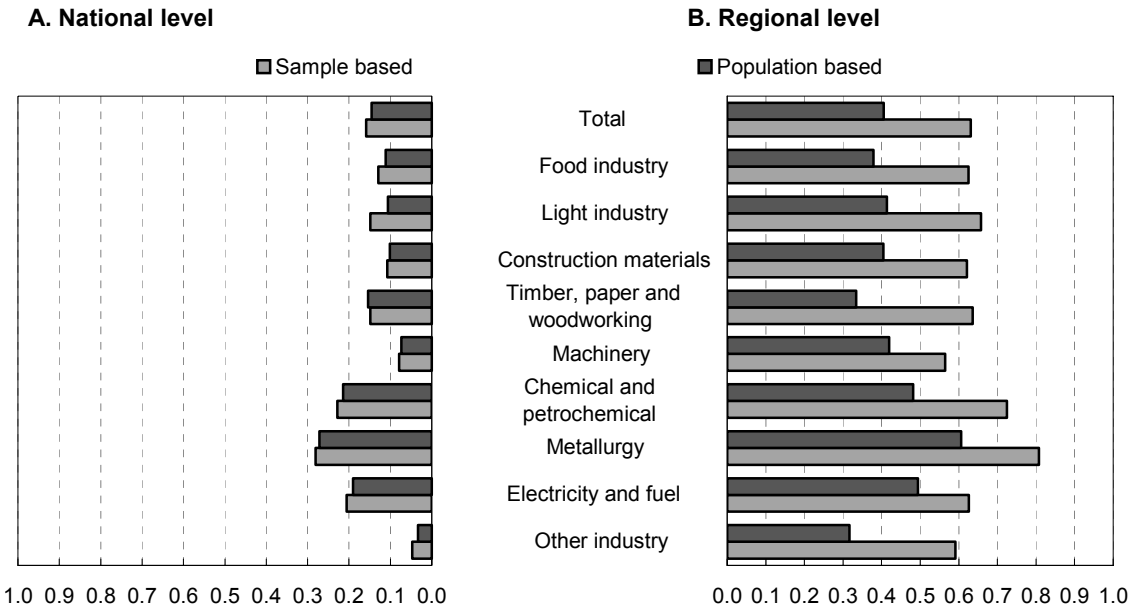
24. Greater openness may also increase productivity through the effect of stronger competition. The theoretical effect of competition in product markets on innovation efforts is ambiguous. Close competition between incumbents can stimulate innovation, but the possibility of gaining a certain degree of market power may also provide a strong incentive to innovate (the so-called Schumpeterian effect). However, most empirical research has found evidence of a positive correlation between innovation and competition.[35]

25. In the Russian case, the empirical evidence supports the view that openness to foreign competition boosts domestic productivity growth (Aghion and Bessonova, 2006). This effect is, however, found to be stronger for firms close to the technological frontier. For less productive firms, entry threat may create a disincentive to innovate by reducing their "life expectancy" and thus shortening time horizons. The greater incentive to innovate in order to escape competition from new entrants predominates, however, so an increase in entry threat is usually found to be growth-enhancing overall (Aghion *et al*., 2002, Aghion and Bessonova, 2006). Kozlov and Yudaeva (2004) find that competition from both foreign and domestic competitors has an inverted U-shape effect on the innovation efforts of Russian producers. However, they conclude that most Russian firms are located on the upward-sloping part of the curve, where innovation activity increases with competition. This result is reinforced by survey data showing that Russian firms in more competitive environments spend significantly more on R&D and also innovate more

than firms facing less competitive pressure.[36] Firms with greater market power innovate less, and monopolistic firms innovate least of all (Goldberg, 2006). Finally, a similar conclusion is reached when looking at the impact of competition on the *outcomes* of innovation activity rather than the inputs: recent empirical work points to a negative correlation between total factor productivity growth and concentration (Table A1.1 or Aghion and Bessonova, 2006). The effect is found to be stronger for import-competing industries.[37] Finally, the incentive to innovate also increases with the degree of similarity between firms within a given sector (the degree of "neck-and-neckness" in terms of their distance from the technological frontier).

26. The question that naturally arises from the foregoing discussion is whether or not product markets in Russia are sufficiently competitive. Calculated on the basis of a 5-digit classification, Herfindahl–Hirschman Indexes and market shares at the national level do not point to a particularly high degree of concentration, except for metallurgy and electricity. This picture, however, is distorted by the high degree of segmentation of markets. At regional level, the same indicators suggest much weaker competition in all sectors (Figure 11).[38]

Figure 11. Herfindahl-Hirschmann concentration indexes, 2004



Source: Bessonova (2006).

27. These results suggest that there are important institutional barriers to inter-regional trade. Over time, market shares have exhibited a fairly stable evolution and there has been no significant increase in competition since the mid-1990s.[39] Enterprise surveys give a complementary view of the segmentation of local markets: an OECD-sponsored survey of approximately 650 industrial firms found the *average* share of the three main clients in sales reaches almost 50% (Figure A2.1). The same percentage obtains for the share of the enterprise's three main suppliers.[40]

28. This raises the question of regulatory obstacles to business development. Anti-competitive barriers are now perceived to be one of the major problems for small businesses, along with corruption and frequent changes in the law.[41] According to the Federal Anti-Monopoly Service, entry barriers are a particular problem where regional authorities seek to protect local markets from outside penetration: the

service has observed a sustained increase in violations of competition law by regional and municipal authorities.[42] Barriers to competition are found to be an even more serious problem than government regulations and tax administration, which seem to have improved since 2003. The potential sanctions incurred in the case of anti-competitive practices are currently too low,[43] which is one reason why some 43% of competition law infringements are repeat offences.[44] If lowering barriers to entry and improving the predictability of state policy towards business would benefit the business community in general, such steps are likely to have an even greater positive effect on innovation.[45]

A better domestic IPR regime would also help

29. From a theoretical point of view, establishing a balanced IPR regime is not easy. A certain level of protection is necessary to stimulate innovation, but over-protection risks allowing patent-holders and other innovators to capture excessive rents at the expense of the rest of society. Moreover, recent empirical work suggests that IPR strictness does not necessarily have a significant effect on R&D spending (Jaumotte and Pain, 2005b). In Russia, however, with its rather weak IPR protection, there is little doubt about the need to shift the balance towards both greater protection and more efficient specification and assignment of IPR.

30. The underdevelopment of the legal framework governing IPR is among the major obstacles to the commercialisation of R&D outputs in Russia. In an enterprise survey conducted by the Interdepartmental Analytical Centre (MATs), 50% of respondents cited weaknesses in the IPR regime as a major impediment to the commercialisation of R&D outputs: only lack of access to financing (57%) was cited more frequently. There have been significant improvements in Russia's IPR regime in recent years, but they have largely been concerned with trademarks and copyright issues – questions that have loomed large in Russia's WTO accession negotiations – rather than with the products of R&D activity (Rospatent, 2005; Yusufov, 2004).[46] Resolution of problems concerning the assignment, specification and protection of IPR to R&D outputs would mark an important step towards the formation of a well functioning market in the products of R&D activity. The present regime complicates collaboration among agents (whether public or private) in R&D activities, inhibits technology transfer and sometimes creates conflicts of interest for researchers and the organisations that employ them.

31. The first problem concerns the *assignment* of IPR, particularly where R&D is financed from budgetary sources – as most Russian R&D is. Until recently, the state retained the rights to the results of budget-financed R&D, but under a government decree issued in November 2005, this is now an issue to be addressed in the contracts concluded between the state bodies financing R&D and the (state or private) organisations carrying it out. The decree allows IPR to be awarded to the latter, except in specified cases, although some compensation may have to be paid to the budget in return for acquiring these rights.[47] This is a significant step forward, but it is unlikely to trigger a dramatic upsurge in innovation in the near term. First, it will take time for R&D organisations to develop the procedures needed to regulate internal issues such as the allocation of rights between staff and the organisation of technology transfer offices (TTOs) or similar institutions to attract investors and facilitate commercialisation. This will not be easy. As OECD (2004c:81) notes, the emphasis on patenting the results of publicly funded research elsewhere has, with a few notable exceptions, generally failed to achieve the success that was hoped for. This is partly because the results of academic research are often far from commercialisation and thus difficult to value, but it also reflects the tendency of inexperienced new TTOs (often under pressure to maximise revenue) to demand more for their IPR than a prudent investor would pay. Secondly, the law may actually *reduce* the degree of *informal* appropriation of IPR produced by budget-financed R&D. R&D organisations that were previously indifferent to their employees' exploitation of the results of budget-financed R&D now have an incentive to prevent them from doing this. While this is in principle a positive development, it may slow some innovative activity in the short term.

32. However, the main reason why the short-term importance of the November decree should not be exaggerated is that IPR *enforcement* remains weak. WEF (2005) ranks Russia 105th of 117 countries in terms of its level of IPR protection.[48] In fact IPR protection in Russia is probably better than this result suggests,[49] but the WEF assessment is based on a survey of Russian businesspeople and thus gives some indication of how IPR protection is *perceived* in the country. The MATs survey data present a paradoxical picture. Some 3.8% of respondents regarded the quality of legal protection of R&D outputs as "good" and 38.7% as "satisfactory". Only 34.9% described it as "unsatisfactory". Yet two-thirds did not believe that patents provided effective protection of inventions, and around one-third of respondents reported having had their rights to the results of R&D violated. One in ten of these reported having successfully asserted its rights in court but none secured punishment of the violators or payment of compensation. The contradictory character of these results is probably more apparent than real: the relatively high level of satisfaction with IPR protection probably reflects the limited needs of the great majority of firms, while the dissatisfaction reflects the experience of those that have tried to protect their IPR. In general, survey respondents attached a higher priority to improving the strength of enforcement of IPR than to the transfer of IPR from the state to researchers, but the data suggest that the two measures in combination could indeed have a significant positive effect (Chulok, 2006).

33. Finally, there are problems with the *specification* of IPR in Russia. Some 45% of MATs survey respondents reported that patent protection was inadequate because Russian patent procedures fail to prevent the patenting of copy-cat inventions that differ from the original in insignificant ways. The principle of the "inventive level" is enshrined in Russian law but is rarely enforced.[50] Rospatent (2006) insists that it is becoming more demanding with respect to patent awards and the ratio of patents awarded to applications submitted has indeed fallen in the last three years. However, few patent applications are rejected owing to an insufficient inventive level, and assessing the degree of differentiation from inventions already patented can be difficult. Nevertheless, the real problem here concerns judicial behaviour rather than the law on the books: many judges fail to appreciate that the existence of a "copycat patent" is not a decisive argument in favour of the claims of the party holding it. Much here depends on the region. Judges in Moscow and some other regions appear to have a better grasp of IPR issues than their colleagues elsewhere. Precisely for this reason, many firms involved in IPR violations register in regions with weaker judiciaries – defendants generally have the right to fight civil suits in their place of registration.

There is a need to overhaul the arrangements for financing the state science sector

34. Fundamental reform of the state science sector will be critical to realising Russia's innovation potential over the long term. The first issue concerns finance. The sector's funding arrangements generate few incentives for research institutes or individual researchers to concern themselves with possible commercial applications of their work. Most science funding comes from the state budget – in 2005, the budget provided around 60% of total science funding – and it is largely allocated to institutions with few, if any, strings attached. Thus, the Russian Academy of Sciences has tended to receive around 40% of budget funding for science to allocate among its institutes, with the Russian Academy of Medical Sciences receiving 6% and higher educational institutions about 5%.[51] Only a small share of total science funding is allocated on a competitive basis. This emphasis on institution-based financing tends to protect incumbents and creates few incentives to increase efficiency, productivity or innovation. On the contrary, since much funding is "cost-based" and allocated with reference to employment levels and fixed assets, greater efficiency could lead to loss of funding.

35. There is thus a need to shift to greater reliance on competitive allocation and project-based funding. There has already been some progress in this direction. Ministry of Education and Science agencies involved in financing research have begun shifting towards much greater reliance on competitive procedures. However, these agencies are mainly concerned with financing applied research under federal

targeted programmes, rather than with basic science, and they administer only a small part of the overall federal science budget, which is still allocated primarily on the basis of line-item budgets for institutions ("Strategiya", 2006:30). Thus, the 2006 budget envisages the allocation of only 14.6% of all civil science funding on a competitive basis. Just over half of this is to be channelled through the Russian Foundation for Fundamental Research and the Russian Humanities Science Fund. The Ministry of Education and Science wishes to shift the ratio of institutional funding to project funding from 80/20 in favour of the latter to perhaps 50/50. The government strategy envisages reform of funding mechanisms proceeding in tandem with a shift in priorities towards greater financing of fundamental rather than applied research. The intention here is clearly to attract more private capital into downstream R&D, leaving the state to finance basic science.

36. One factor that may smooth this difficult transition in funding mechanisms is that it is to be implemented at a time when science funding is on the increase. Higher funding should ease some of the distributional conflicts that would otherwise arise. However, if this additional funding is not to be wasted, it will be important to ensure that it is targeted at clearly defined priorities, selected on the basis of wide consultations involving government, business, the scientific community and civil society. Technology foresight approaches employed in other countries could be adapted to Russian conditions to help structure this process. The priorities chosen, moreover, should be subject to regular review. While support for fundamental research will remain primarily a government responsibility, the authorities should seek to limit direct funding of applied research to areas where there is good reason to believe that social returns exceed the private returns and to employ co-financing mechanisms such as public-private partnerships where possible (OECD, 2004a).

37. While a shift to more reliance on competitive, project-focused finance arrangements is clearly welcome, there are significant dangers here. The potential for corruption in the conduct of tenders is obvious and highlights the extent to which science reform will be affected by the success or failure of public administration reform.[52] Critics of the new approach argue that the selection criteria used in those competitive processes that have been introduced focus primarily on the bid documents and on the status of the bidders, rather than on their track records (IET, 2006:315). The risk here is that competition for funds may be too restricted, leading to a high degree of monopolisation of available funds. This risk is heightened by the trend towards directing funds to fewer, larger projects. Such a concentration of resources is, in principle, to be welcomed, as it should allow better targeting of key priorities. State R&D spending is currently too fragmented. However, greater concentration of expenditure will make the quality of the tender/competition arrangements, as well as the probity and transparency with which they are conducted, even more important.

Changes to financing arrangements will also necessitate some organisational restructuring

38. There has already been much discussion of transforming the organisational structure of Russia's research institutes, and the government currently plans to turn many of them into "autonomous institutions", a new legal form for which legislation is now being developed. The draft legislation has attracted fierce criticism, and while much of it appears simply to reflect fear of losing guaranteed budgetary funding, the push to create autonomous institutions must be regarded as a highly risky initiative. The creation of new organisational–legal forms in Russia has often been fraught with problems, because each new form tends, initially at least, to be under-regulated in law and to give rise to its own peculiar governance problems and abuses. Nevertheless, there is clearly a need to move research institutes and HEIs away from the current system of simply transferring budgetary funds to them in amounts deemed sufficient to cover anticipated costs. Such "*smetnoe*" financing creates incentives to inflate costs and fails to establish a link between resources and outputs. Moreover, where institutes are interested in cooperating with business in R&D projects, their status as budgetary organisations can limit their ability to operate flexibly.[53] Whatever legal form they ultimately take, public research institutes need both greater financial

freedom *and* greater financial responsibility. Those responsible for administering the funds should be accountable for their use but their performance should be evaluated in terms of the institution's work and aims, not in terms of conformity to externally defined line-item budgets. Transparency, accountability and regular external evaluation of organisations' work will be the key requirements.

39. Restructuring the state science sector will involve not only reorganising many institutions (transforming state unitary enterprises and state institutions into other legal/organisational forms) but also consolidation and downsizing. The state science establishment is both too large and too fragmented – the state owns around 2 900 R&D organisations, and the number of research institutes has actually risen in recent years, mainly as a result of splits and spin-offs rather than any increase in research capacity. Many of these organisations now perform little if any research, while others conduct research that does not obviously need to be in the state sector. Some of the latter might be good candidates for privatisation, while others might simply need to be liquidated or taken over by other institutions. In numerical terms, at least, the medium-term reorganisation and consolidation goals set out in the government's reform strategy (Table 1) should thus be regarded as modest but by no means unambitious. Given the complexity of the issues involved in reorganising public science, it would be very risky to force the pace of reorganisation and consolidation. However, there is likely to be scope for a more extensive rationalisation of the public science sector over the longer term.

Table 1. Organisational transformation of the state science sector, 2005–10

	2005	2008	2010
Breakdown by sector (%)			
Academy of Sciences	32.7	31	34.4
Applied research sector	48.1	44.3	31.3
Higher education	19.2	24.8	34.4
Breakdown by organisational form (%)			
State unitary enterprises	48	2.4	1.3
State institutions	50	28.6	25
Autonomous state institutions	0	11.9	21.9
Non-commercial autonomous state institutions	0	9.5	15.6
Majority state-owned joint stock companies	2	47.6	36.3
Number of organisations (memorandum item)	*2600*	*2100*	*1600*

Source: Ministry of Education and Science.

40. This consolidation process will extend below the level of institutes and R&D organisations to researchers themselves. At present, Russian science organisations still carry a great deal of "ballast": the Siberian Branch of the RAS, generally reckoned to be one of its more active and successful branches, nonetheless estimates that 20–25% of its researchers have published nothing for three years or more. An assessment carried out under the aegis of the Russian Foundation for Fundamental Research concluded that only about 50–70% of researchers were engaged in real research, and other studies suggest that perhaps only 40–45% of researchers are really productive (IET, 2006:302–7). Whatever the true figure, there are too many on the public payroll, as well as an unusually large number of support staff. However, reducing over-staffing is only part of the solution. There is also a need to improve pay and incentives. Remuneration packages for productive researchers should be not only better but *better designed*, in terms of their ability to stimulate and reward good performance.

41. These changes cannot take place in isolation. Changing pay arrangements without changing conditions of work is unlikely to achieve much. In particular, there is a need to provide more avenues for the career development of younger researchers. At present, Russia seems to be a major exporter of such individuals: as IET (2006:318–19) observes, there has been growth in the number of researchers under the

age of 30 and over the age of 50, and the research corps of the RAS and other institutes has aged substantially. However, the number of 30–49 year-olds employed in Russian research institutes has continued to fall, suggesting that many young researchers in their late 20s and early 30s are either leaving science or leaving the country, or both. While higher pay elsewhere clearly plays a role here, many of the departing researchers also cite frustration with the prospect of slow progress up the very hierarchical structures of Russian institutes. The scope for rapid advancement is simply far greater abroad. In addition to better salaries, the wider availability of funding on a competitive basis should help ameliorate this problem, by reducing mid-career researchers' dependence on funding controlled by their hierarchical superiors and creating new opportunities for them to pursue their work and advance their careers within Russia.

Designing efficient innovation-promotion initiatives

The tax treatment of private R&D could be further improved

42. Stimulating greater knowledge-creation in the private sector is as urgent a priority as reform of public R&D institutions. The government is therefore exploring ways to use the fiscal system to stimulate private R&D. Most OECD countries provide fiscal incentives for R&D in the form of tax breaks or direct subsidies. The two types of measure are not equivalent. Tax incentives potentially benefit all innovative activities, reducing the risk of capture and attempts by bureaucrats to "pick winners". On the other hand, direct funding may reduce dead-weight losses by focusing on areas where the gap between private and social returns is the highest and may be more effective in supporting innovative start-ups and small firms that have few tax liabilities. In both cases, there is the problem of assuring the *additionality* of government support, which should stimulate – not replace – private-sector investment. Otherwise, the state may simply subsidise activities that would have been undertaken anyway. This risk is probably greater with direct subsidies than with tax breaks. However, tax breaks may tend to favour incumbents to the detriment of new entrants.

43. In any case, empirical research into the impact of fiscal support on innovation yields mixed results. Jaumotte and Pain (2005c) find that tax reliefs have a bigger effect than direct subsidies, although their overall impact is limited.[54] Targeted subsidies are usually more successful when designed for small businesses (Hall and Van Reenen, 2000; David *et al.* 2000; Klette *et al.*, 2000). In general, the effectiveness of fiscal instruments appears to be highly sensitive both to environmental factors like the particular forms of market failure that need to be addressed or the framework conditions for business and to the specific design of the instruments themselves (OECD, 2004c; World Bank, 2006). In these circumstances, instruments adopted in OECD economies may not be easily transferred to emerging economies.

44. In the Russian case, an important first step would be to reduce the fiscal *dis*incentives to R&D. Until 2005, for example, private companies could write off R&D spending in even tranches over three years. If the R&D in question did not lead to a positive result, moreover, the write-off was capped at 70% of such expenditure, in an effort to prevent corporates from inflating reported R&D costs in order to reduce their tax bills. Now they can write off all such expenditure, and they may do so over two years rather than three in cases where the R&D is used in production or sales. The government is considering proposals to allow accelerated write-offs, possibly up to 100% in one year for capital expenditure. This could be a positive step, especially given that low levels of private R&D investment appear to be one of the major impediments to greater innovation in Russia. On the basis of an enterprise survey conducted in late 2005, Kuznetsov *et al.* (2006) identify these two measures as among the most likely to stimulate increases in business R&D. As noted above, the literature suggests that tax incentives are more efficient than subsidies. Such rapid write-offs would also avoid the distortions that arise from targeting subsidies or tax breaks at specific groups of enterprises.

45. If R&D work results in the creation of an intangible asset, such as a patent or some other object of IPR, it must be declared as such and depreciated over an extended period – a requirement that reinforces incentives *not* to patent, especially since these costs are incurred even if the patent does not generate income.[55] Amending this provision of art. 258.2 of the Tax Code should address this problem. Finally, the government should either scrap or substantially revise the existing VAT tax break for R&D, which is precisely the kind of tax incentive that is to be avoided: it applies only to R&D expenditures undertaken by "research organisations" – specifically, those that generate over 50% of their turnover from the provision of R&D services.[56] Whatever fiscal incentives are offered should be targeted to stimulate certain activities, not to support specific sectors or groups of enterprises.

Interventions intended to spur innovation should be carefully targeted and rigorously assessed

46. The government has recently undertaken a range of targeted interventions aimed at fostering contacts and information flows between business and science, creating favourable conditions for the growth of innovation clusters and developing venture capital (Box 2). Before examining some of the more important initiatives in detail, a few general caveats are in order:

- The empirical evidence concerning the effectiveness of such initiatives is mixed. Governments undertaking such efforts are to some extent involved in an on-going process of experimentation. Regular, rigorous, external monitoring and evaluation of programmes are therefore critical, as are mechanisms for winding up programmes whose benefits do not justify the costs involved.
- Programme evaluation, both *ex ante* and *ex post* should lay particular stress on additionality. Although the government's efforts do indeed address some of the main weaknesses of the national innovation system – weak links between business and science, and the low level of privately financed R&D – the emphasis on creating clusters under various rubrics conceals a considerable risk of dead-weight losses.[57]
- State support should in all cases be limited, in terms of both amount and duration. The aim of these initiatives should be to *spur* new activities, not to sustain them.

47. Adherence to the above criteria will not be easy, since programmes and bureaucracies often acquire a life of their own: those who benefit from tax breaks and other benefits will be reluctant to surrender them. It is therefore important to build in evaluation criteria, sunset clauses and other such mechanisms from the beginning.

48. It is also important that the development of specific innovation-support instruments be undertaken within the context of an overall strategy that is coherent and well coordinated. In this respect, the adoption of a strategy covering the period to 2015 is to be welcomed. However, the large number of measures envisaged by the strategy and the large number of actors involved raises the risk of duplication of effort, on the one hand, and very slow decision-making on the other. The development of both technoparks and venture capital funds, among other things, has been delayed by inter-departmental disagreements and turf battles. The multiplication of innovation-specific measures also raises the risk that initiatives will be under-funded and/or lose momentum very rapidly: the IT industry, for example, recalls the fanfare with which the government launched its "Electronic Russia" e-government programme in 2002. In the event, the programme has never received more than about 20% of planned financing. While the authorities' determination to do more to spur innovation is to be commended, the risks of waste, market distortions and rent-seeking involved in innovation-promotion programmes suggest that it proceed with caution as well as urgency when it comes to targeted interventions.

Box 2. Targeted innovation initiatives

The government has recently launched a large number of targeted initiatives aimed at spurring innovation. Among the most prominent are:

Special Economic Zones (SEZs). The biggest new initiative is the creation of 4 technical-innovation zones[1] within the framework of the 2005 law on SEZs (see below). The transport and engineering infrastructure for the zones is to be in place by end-2007.

Technoparks. The government is planning to create eight technoparks across Russia,[2] and its new innovation strategy lays considerable emphasis on the development of a network of technoparks, business incubators, technology transfer centres and other elements of innovation infrastructure. The regions have primary responsibility for creating the parks, which, unlike the SEZs, will not enjoy tax or customs preferences. They will, however, receive financial support from the state and will be eligible for participation in small business development programmes. The authorities hope that some large companies will use technoparks to modernise their plant and equipment and diversify their activities.

Science towns. Work is proceeding on the creation of more so-called "science towns" – large science and technology centres. There are already ten such towns, and several more towns are expected to receive this status, which entitles them to receive federal funds to develop their science base. Science towns can create technoparks and innovation "business incubators" on their territories.

Venture capital. Three ministries have undertaken venture capital initiatives.

- The Ministry of Economic Development and Trade is working on the creation of a 10–12 regional venture capital funds with initial capitalisation of RUB 2.1–2.5bn, of which one-quarter would come from the federal budget, one quarter from regional budgets and the balance from private investors. These closed share investment funds would focus on high-risk (but potentially high-return) projects undertaken by small innovative firms.
- A Venture Investment Fund (VIF) project was launched under the auspices of the former Ministry of Industry, Science and Technology in 2000. It was supposed to be a "fund of funds", investing in venture funds rather than real-sector firms, but little was done owing to a lack of resources – only RUB 50m was ever actually allocated to the VIF. It has been superseded by the Russian Venture Company (RVC) created in August 2006. The RVC has a capitalisation of RUB 15bn provided by the state, which is to be used to finance 49% stakes in up to 15 new venture capital funds. The RVC's contribution to each fund will range from RUB 600m to RUB 1.2bn but will not in any case exceed the 49% limit. The aim of the fund is to improve the risk-return relationship for private investors, so the state's return will be capped at 3%, and private investors will be able to buy the state shares in successful investments for their nominal value.
- An August 2006 government decree established the Russian Investment Fund for Information and Communications Technologies (RIFICT), which is to be overseen by the Ministry of Information Technologies and Communications. The fund will be allocated an initial RUB 1.45bn from the federal budget. Its authorised share capital is then to be increased via an additional share issue, and investment will begin once the state's share in the fund falls to 51%, a target that is to be reached within a year. The state share is to fall to 25% by 2009 and the fund is ultimately to be fully privatised. Investment in a single project is to be capped at RUB 100m. .

While these initiatives show a heightened awareness of the need to overcome the barriers to innovation in Russia, the rapid growth in the number of innovation-promotion projects highlights the need for coordination among state bodies, for close monitoring of the use of budgetary funds and for planned, rigorous and regular evaluation of the effectiveness of various schemes. There is otherwise a very high risk of duplication of effort, waste, rent-seeking and the prolongation of measures that may well fail to justify the costs involved.

1. These are in the Moscow district of Zelenograd (microelectronics), Dubna, in Moscow Oblast (nuclear physics-based technologies), Tomsk (new materials), and St Petersburg (IT).
2. Novosibirsk, Tyumen', Kazan (Tatarstan), Sarov (Nizhni Novgorod Oblast) and Obninsk. Two more have since been created in Moscow Oblast.

The state's role in promoting venture capital should be limited and well defined

49. Information asymmetries between firms and their suppliers of finance can be particularly strong in innovation. In many countries, venture capital (VC) firms help to rectify this by providing both equity and management services to firms. VC has thus played a key role in the development of radical innovations in many countries, especially where wholly new technologies are developed by start-ups rather than established firms.[58] VC is thus increasingly seen as having an important role to play in any drive to spur innovation in Russia. However, the Russian venture capital industry, though growing fast, is still in its infancy: the Russian Venture Capital Association (RVCA) estimates that VC firms invested $ 427m in Russian companies in 2003–04, or around 0.04% of GDP, up from an estimated 0.014% in 2002.[59] Moreover, most Russian VC continues to be attracted to mature companies operating in mature markets. Ammosov (2006) estimates 2005 venture investment in Russian high-tech companies at just $ 62.7m. However, VC firms' interest in high-tech companies – and, to a lesser extent, start-ups – is growing rapidly, albeit from a very low base.[60] A further peculiarity of Russia's VC industry is that it is dominated by foreign players, chiefly multinational financial institutions: only three of the RVCA's 16 full members have Russian origin, and two of these are government-sponsored entities providing technical assistance and consulting services rather than project finance.[61]

50. The obstacles to the development of VC are considerable. VC firms face the same problems that confront other financial firms, such as poor protection of minority shareholders (Annex 1.A2). VC investors are particularly affected by the lack of viable "exit" strategies, due to the under-development of the IPO market and the lack of depth of financial markets. The RVCA proposes creating a secondary market to serve as an outlet for IPOs. The association also claims that VC investors can be subject to double taxation under current arrangements, particularly if they provide management as well as funding. VC firms' growth is also constrained by problems with the broader business environment and the bottlenecks at other stages in the innovation chain. Because only a small percentage of VC investments yield returns at the high levels required to make VC risk-taking worthwhile, a successful VC industry needs a large number of suitable projects, the emergence of which depends on factors such as the conditions affecting market entry, the state of management and accounting practices in the *non*-financial sector, and the strength of IPR protection. Finally, Russian VC firms face a potential clientele that is not yet interested in VC, despite pervasive complaints about access to finance. A 2004 RAVI-sponsored survey of small innovative companies found that only 13% of those seeking external finance had turned to venture funds. While RAVI suggests that this partly reflects ignorance of VC, it is also largely due to a reluctance to offer equity to outsiders: only 9% of the RAVI survey respondents were prepared to consider offering a blocking (25%+1 share) stake in return for investment and only 3.5% would consider parting with a controlling (50%+1) stake.

51. The government has long been aware of the need to develop VC in Russia, and VC initiatives have been undertaken by a number of ministries in recent years (Box 2). This is not unusual: many countries subsidise VC firms and, as noted above, the VC industry in Russia is already heavily dependent on entities like the EBRD and USAID. Moreover, advocates of public involvement in VC argue that it is preferable to grant-based schemes, as it ensures that the private-sector plays the leading role in selecting projects and it gives entrepreneurs greater freedom in the use of funds. Some public grant programmes have been criticised precisely because the grants are often highly restrictive with respect to use of funds (to the point of specifying maximum allowed amounts for specific purposes) and because selection panels are often dominated by bureaucrats and academics, who focus on the scientific value rather than the commercial promise of proposed projects. Government support for VC does, of course, raise an issue of moral hazard, and the track record of state-owned or -managed VC funds in most countries is not very good.[62] The danger here is generally thought to be greater if support for VC funds take the form of loan guarantees, rather than direct government investment in them.

52. In that respect, Russia's approach looks more promising than some, particularly as the new innovation strategy explicitly states that the RVC's resources are to be allocated on a competitive basis and that the state's share in the new VC funds will decline over time. In some respects, the role that the innovation strategy envisages for the RVC looks similar to that of Israel's successful YOZMA fund, which, having played a critical role as a catalyst for venture capital development, was privatised and sold (Baygan, 2003). To minimise the risks involved in state financing of VC, the state's direct involvement should be limited to acquiring shares in VC funds and the private sector should not only invest but bear a good deal of the risk: the government might, indeed, wish to consider reducing the 49% cap on RVC holdings in individual funds. State-financed VC investments should be authorised by an independent committee, supervised by a representative board, on the basis of independent external peer assessments. The committee, board and assessments should involve some inputs from non-nationals, and all procedures should be transparent.

Special Economic Zones should be rigorously evaluated for their "additionality"

53. The June 2005 law on Special Economic Zones (SEZs) is perhaps the most high-profile government initiative aimed at diversifying Russia's production and export structure and stimulating innovation (Box 3).[63] The law provides for two types of SEZ: industrial production zones and technical-innovation zones (TVZ).[64] It is the latter that are of concern here.[65] TVZ are in some respects best understood as technoparks with fiscal privileges rather than large internal "offshore" zones of the kind that were created in some Russian regions in the 1990s – the maximum size of such a zone is 2km^2, and they can be established for a period of no more than 20 years. The state defines the tasks for each zone, and federal, regional and local budgets finance the necessary engineering, transport and social infrastructure.[66] Residents of TVZ may be Russian or foreign individuals or firms. They enjoy certain tax and customs preferences, including exemption from regional property and land taxes for five years and protection against subsequent changes in legislation concerning taxes and duties. They are also subject to a unified social tax (ESN) rate of 14%, rather than the standard rate of 26%. This reflects the fact that, since human capital is critical to innovative firms, ESN can constitute a very large part of their tax burden. Residents will also be able to treat current R&D expenditures as costs for tax purposes. SEZ residents will be subject to simplified registration procedures and less frequent tax inspections, and will enjoy significant customs privileges.[67]

54. The SEZs will be overseen by a new Federal Agency for Managing Special Economic Zones, which has been created under the Ministry of Economic Development and Trade. A special committee consisting of representatives of various ministries is responsible for assessing applications for the creation of SEZs, and SEZ projects are approved on a competitive basis. The six SEZ sites approved in December 2005 will soon be followed by others. It was originally envisaged that each SEZ would have its own management company and its own supervisory board, which would include representatives of resident companies as well as the state. However, this is now in question and governance of the zones may yet give rise to disputes, as the respective roles of the agency and the regional authority, in particular, could be clearer. Moreover, the law stipulates that disputes concerning the creation and operation of SEZs are to be settled in Russian courts under Russian law; international arbitration does not appear to be an option.

55. The Ministry of Economic Development and Trade estimates that firms operating within a technical-innovation zone will be able to cut their costs by 23–29%[68] and that the average SEZ will generate annual output of $ 210m, create 14 000 jobs and attract $ 330m in foreign investment. The ministry calculates that a zone's activities will generate an average of $ 36m per annum in fiscal revenues. However, OECD (2006b) observes that the government does not seem to have conducted an overall assessment of costs and benefits of SEZs. This lack of a careful *ex ante* cost-benefit analysis is a concern, particularly because the agency appears not to have any clear plans for *ex post* evaluation either. The establishment of a dedicated agency, together with the emergence of a corps of firms eager to enjoy SEZ

benefits, virtually ensures that there will be a constituency supporting the continuation of the programme, although it is far from clear that SEZs will generate the kind of returns that would warrant its expansion. There is thus a serious question concerning additionality here: the zones may simply subsidise a great deal of activity that would have been undertaken anyway.

56. Creating exceptional conditions for specific sectors and enterprises risks distorting markets and weakening competition, particularly given that much of the attraction of the zones consists of nothing more than the opportunity to secure lower tax rates and to escape some of the defects of Russia's general business environment. In this context, the lower rate of ESN offered to residents of TVZ is a concern. It is meant to enable them to pay higher wages to skilled specialists. While this may, at the margin, reduce "brain drain", by reducing the pay differentials between Russia and other countries, it may also distort the domestic labour market, by granting a small sub-population of firms a significant advantage when it comes to competing for highly skilled workers. Similar distortions may arise as a result of the tax and customs privileges enjoyed by firms resident in the zones. Moreover, Russia's recent experience with special zones of various types has not been a happy one.[69] Critics fear that the SEZs will turn into zones of concentration of "grey" activities – yet another generation of "internal offshores" serving purposes other than those for which they were created. This risk must be taken seriously, given Russia's endemic corruption and the state's limited administrative capacities.

57. The government is well aware of these risks and has attempted, in drafting the SEZ legislation, to provide safeguards against the kinds of abuses seen in the 1990s, when the numerous special zones created by federal and regional governments failed to generate much new investment but cost the budget dearly and facilitated corrupt business practices. It is therefore important to underline the extent to which the 2005 law differs from previous initiatives.[70] First, the law abolishes previous special zones.[71] This must be counted as a step forward in and of itself. Secondly, the law provides a uniform procedure for the creation of special zones – the kind of opaque bilateral deals that were negotiated in the 1990s are excluded – and the rights and privileges of residents of special zones are fixed in law. Thirdly, the procedure for establishing zones is competitive and requires lower-level governments wishing to create such zones to make significant commitments of their own; they can no longer use special zones simply to extract resources from the federal budget.

Box 3. The law on Special Economic Zones

The 2005 federal law on Special Economic Zones (SEZs) provides for two categories of SEZ, which can be established on publicly owned land for a maximum period of 20 years:[1] industrial production zones and technical innovation zones. Technical innovation zones form a part of the government's innovation strategy. Industrial production zones, which aim to stimulate high value-added manufacturing, can occupy up to 20km^2 and must involve a minimum of € 10 million in greenfield investment (€ 1 million in the first year) in activities other than metallurgy or natural resource extraction and processing. Residents of industrial production zones are eligible for various tax incentives, including exemption from regional property and land taxes for the first five years, accelerated depreciation of capital investments, greater freedom to transfer their losses to following years and the opportunity to include R&D spending in current expenditures. In addition, zone residents will benefit from customs privileges, including exemption from customs duties and VAT on imports and from excise duties on Russian goods. Exports from the zones will not be subject to customs duties, VAT or excise taxes. Registration procedures for firms in special zones are to be simplified under a "one window" arrangement, and the number of tax inspections to which they may be subject is to be reduced. The state will also finance the creation of the zones' infrastructure.

1. The law was amended in 2006 to allow for the creation of tourist-recreation zones as well.

58. It is important to note that the new law eschews the emphasis on regional development of previous such initiatives. While this means that the law is unlikely to reduce inter-regional disparities – and may even reinforce them – it also changes regional administrations' incentives. A competitive process that rewards successful regions for well designed projects should prompt other regions to try to emulate the winners. The federal resources associated with the creation of zones should thus reward good regional governance rather than poor regional economic performance. This may tend to limit the "additionality" of the SEZs: zones are likely to be awarded to regions that are already relatively successful. If the implementing regulations are applied in a transparent, non-discriminatory manner, they may enable successful regions to stimulate some additional investment, but they are very unlikely to transform regional investment climates. It is also important that, within the very broad terms set out in the law, the selection processes for choosing zones should be neutral as between sectors: regions with different comparative advantages should compete on an equal footing.

59. While the risks associated with the creation of SEZs are well known, the Russian authorities fear that, unless some risks are taken in an effort to jump-start innovation activities, Russia will remain on the sidelines of the world's high-tech sectors for many years to come. Nevertheless, the presence of these risks makes it all the more important that the zones be monitored carefully with respect to both probity and cost effectiveness. Moreover, while the authorities are keen to move rapidly to advance their innovation strategy, they should proceed with caution in establishing yet more SEZs before much is known about how the first wave are working. Once established, SEZs will be almost impossible to wind up prematurely without sending an extremely negative signal to investors about the dangers of *ex post* changes in policy. This must be regarded as an argument against expanding the SEZ programme too quickly. The speed with which the number of zones has grown since the law was adopted must therefore be a source of some concern.

Early-stage support for small innovative firms could help overcome financial constraints

60. As noted above, R&D activities in Russia are highly concentrated in large firms, and access to finance appears to be much more constraining for SMEs and start-ups. Enterprise surveys suggest that the gap between desired and actual levels of R&D activity, as a share of turnover, is much higher for smaller firms. This is hardly surprising, given the almost total absence of early stage venture capital or "angel investors" in Russia. Venture capital does not in any case offer a solution to the market failures that limit the emergence of innovative start-ups and early-stage development of such firms; in general, VC is aimed at assisting business growth at a later stage.[72] A measure of public intervention and direct support may therefore be needed to address bottlenecks in the innovation chain that hamper start-ups and firms in the first stages of development. In order to avoid rent-seeking, such programs must be carefully designed. Selection should be made in a transparent manner and based on independent assessment of the quality of projects rather than criteria reflecting an *ex ante* desire to "pick winners". For such direct subsidies, grants and mini-grants are certainly more appropriate than loans, given the risky nature of investment and the uncertainty of future cash-flow generation. They should also, however, be limited in scope.

61. The Foundation for Assistance to Small Innovative Enterprises (FASIE), which administers 1.5% of the federal budget for civil science, has provided such assistance to small businesses since 1994. More than 1,000 projects have been co-financed over 12 years, and the track record of the Fund is good: roughly two-thirds of grant recipients are still in business. Since 2004, FASIE has been developing a new grant programme for start-ups, which also looks promising. The selection process relies on outside expertise, with the jury made up of representatives of the science sector, the business community and the fund. The initial small grant may be extended if the applicant attracts private investment. Building on such experience may help foster innovation in the SME sector, provided that other programmes follow similar rules. Greater emphasis on evaluating the outcomes of such programmes should also be an important element in the design of future targeted innovation policy.

62. Business support services in the form of training or the establishment of incubators may also help innovators to develop the skills needed to commercialise the fruits of their work. The effectiveness of business incubators or technological parks in transition economies has been questioned (World Bank, 2006). In Russia, such facilities are often used simply to secure subsidised rents (IET, 2005). For recent graduates and university students, however, such incubators may prove helpful, provided there is a binding exit constraint that gives a clear incentive to obtain results.[73] More generally, business support should be as demand-driven as possible and should rely as much as possible on private sector expertise and skill.

Conclusion

63. The new emphasis on spurring innovation that has been evident in Russia over the last couple of years is to be welcomed. The country's innovation potential is both unusually great for a country at its level of per capita GDP and exceptionally poorly developed. Realising this potential should undoubtedly be a major emphasis of government policy. The first priority should be to sustain macroeconomic stability and strengthen framework conditions for business – policies that will not only facilitate innovation but will enhance overall economic performance. Indeed, sound framework conditions should be seen as the *sine qua non* of success, since innovation-promotion efforts will almost certainly fail if the overall business environment is not conducive to long-term investment in new activities. Secondly, Russia needs to undertake the long-overdue reform of its public science sector, a reform that could, if successful, turn a sector that has long subsisted on budgetary subsidies into a significant source of growth. Finally, there is clearly scope for some public intervention where market failures occur in the innovation process. However, the authorities should proceed with caution in devising such interventions. Innovation policy remains a field in which there is still considerable uncertainty about what policies work best under any given set of circumstances. It is an experimental science, and the government should therefore proceed in that spirit, viewing measures like targeted interventions as experiments requiring rigorous evaluation and review at regular intervals, as well as a willingness to drop initiatives that fail to produce results.

BIBLIOGRAPHY

Aghion, P. and E. Bessonova (2006), "On Entry and Growth: Theory and Evidence", *Revue de l'OFCE* 97 bis 2006/3, June.

Aghion, P., N. Bloom, R. Blundell, R. Griffith and P. Howitt (2005), "Competition and Innovation: An Inverted U Relationship", Quarterly Journal of Economics 120:2, May.

Aghion, P., R. Blundell, R. Griffith, P. Howitt and S. Prantl (2004) "Entry and Productivity Growth: Evidence from Micro-Level Panel Data", Journal of the European Economic Association: Papers and Proceedings, 2:265–76.

Aghion, P., W. Carlin and M. Schaffer (2002) "Competition, Innovation and Growth in Transition: Exploring the Interactions between Policies", William Davidson Institute Working Papers Series 501, William Davidson Institute at the University of Michigan., http://wdi.umich.edu/files/Publications/WorkingPapers/wp501.pdf.

Aghion, P. and R. Griffith (2005), "Competition and Growth", MIT Press.

Ammosov, Yu. (2006), "Igra na povysheniya", *Ekspert*, 23 January.

Askenazy, P. and C. Gianella (2000), "Le paradoxe de la productivité : les changements organisationnels facteur complémentaire à l'informatisation", *Economie et Statistique* № 339/340:219–42.

Baygan, G. (2003), "Venture Capital Policy Review: Israel", *OECD STI Working Paper*, 2003/3, January.

Bessonova, E. (2006), "Competition and Efficiency in Russian Industrial Sectors", mimeo, Centre for Economic and Financial Research, Moscow.

Blundell, R., R. Griffith and J. Van Reenen (1999), "Market Share, Market Value and Innovation in a Panel of British Manufacturing Firms", *Review of Economic Studies*, Vol. 66:3, July.

BSA (2003), *Trends in Software Piracy: Eighth Annual BSA Global Software Piracy Study*, Business Software Alliance, London, Singapore and Washington, June, http://images.autodesk.com/adsk/files/4564692_2003_Global_Piracy_Study.pdf.

CEFIR (2005), "Presentation on the Results of Monitoring of Administrative Barriers to Small Business Development in Russia: Round 5", http://www.cefir.ru/index.php?id=32.

Chulok, A. (2006), "Zashchita prav na intellektual'nuyu sobstvennost' v Rossii: dve storony odnoi medali", mimeo, Interdepartmental Analytical Centre, Moscow, April.

CNews (2006), "Itogi 2005", *CNews Analitika*, April, http://www.cnews.ru/reviews/free/2005/.

Coe, D.T. and E. Helpman (1995), "International R&D Spillovers", *European Economic Revie,* 39:5, May.

Coe D.T., E. Helpman and A. Hoffmaister (1997), "North-South R&D Spillovers", *Economic Journal* 107: 134-49, January.

David, P.A., B.H. Hall and A.A. Toole (2000) "Is Public R&D a Complement or a Substitute for Private R&D? A Review of Econometric Evidence", *Research Policy*, 29:4–5, April.

Davis, M. (2005), "The Debate on Elimination of Free Enterprise Zones in Ukraine", *World Bank Note*, 12 December.

Donselaar P., H.P.G. Erken and L. Klomp (2004), "R&D and Innovation: Drivers of Productivity Growth", in G.M. Gelauff, L. Klomp, S.E.P. Raes and T.J.A. Roelandt (eds), *Fostering Productivity. Patterns, Determinants and Policy Implications*, Elsevier, Boston.

EBRD (2005), *Transition Report 2005*, European Bank for Reconstruction and Development, London.

"Energeticheskaya strategiya" (2003), *Energeticheskaya strategiya Rossii na period do 2020 goda* (*Energy Strategy of Russia for the Period to 2020*), RIA TEK, Moscow, August.

Erken, H., M. Kleijn and F. Lantzendörffer (2005), "Improving the R&D Investment Climate: Sharpening a Double-Edged Sword", Ministry of Economic Affairs Research Series, The Hague, http://appz.ez.nl/publicaties/pdfs/05OI21.pdf.

EVCA (2003), *Preliminary Survey of Pan-European Private Equity and Venture Capital Activity 2002*, European Venture Capital Association, Brussels.

Gokhberg, L.M. (1997), "Russian R&D: A Sectoral Analysis", *STEEP Discussion Paper*, No. 40, July, www.sussex.ac.uk/Units/spru/publications/imprint/steepdps/40/steep40.html.

Gokhberg (2003), "Russia: A New Innovation System for the New Economy", paper delivered at the First Global Conference "Innovation Systems and Development Strategies for the Third Millennium", Rio de Janeiro, November.

Gokhberg, L. M. (2005a), "Tendentsii innovatsionnoi deyatel'nosti v rossiiskoi ekonomiki", mimeo, State University–Higher School of Economics, Moscow.

Gokhberg, L. M. (2005b), "Integratsiya nauka i obrazovaniya", mimeo, State University–Higher School of Economics, Moscow.

Goldberg, I. (2006), 'Competitiveness and the Investment Climate in Russia: An Assessment by the World Bank and the Higher School of Economics, Moscow', presented to the 10th annual St Petersburg International Economic Forum, 12–14 June.

Guellec, D. and B. van Pottelsberghe de la Potterie (2001) "R&D and Productivity Growth: Panel Data Analysis of 16 OECD Countries", *OECD STI Working Paper*, 2000/4, June, http://www.oecd.org/findDocument/0,2350,en_2649_33703_1_119684_1_7_1,00.html.

Hall, B.H. and J. Van Reenen (2000), "How Effective are Fiscal Incentives for R&D? A Review of the Evidence", *Research Policy*, 29:4–5.

Hemmings, P. (2005), "Hungarian Innovation Policy: What is the Best Way Forward?", *Economics Department Working Papers*, No. 445, September.

Hempell, T. (2002), "Does Experience Matter? Innovation and Productivity of ICT in German Services", *ZEW Discussion Pape*r, 02-43, Centre for European Economic Research.

Huber, P. and A. Wörgötter (1998), "Observations on Russian Business Networks", *Post-Soviet Affairs* 14:1.

IDC (2006), "Russian IT Market Tops $12 Billion in 2005, Says IDC", IDC Press release, 4 April. http://idc.com/getdoc.jsp?containerId=pr2006_04_03_173130.

IEA (2006), *Optimising Russian Natural Gas: Reform and Climate Policy*, International Energy Agency, Paris.

IET (2005), *Russian Economy in 2004 Trends and Perspective*, Institute for the Economy in Transition, Moscow, http://www.iet.ru/publication.php?folder-id=44&category-id=2083.

IET (2006), *Rossiiskaya ekonomika v 2005 godu: Tendentsii i perspektivy*, Institute for the Economy in Transition, Moscow, http://www.iet.ru/publication.php?folder-id=44&category-id=2083.

"Indicators" (2004), *Indicators of Innovation: Data Book*, Ministry of Education and Science and State University–Higher School of Economics, Moscow.

Jaumotte, F. and N. Pain (2005a), "An Overview of Public Policies to Support Innovation", *Economics Department Working Paper*s, No. 456, OECD, Paris, http://www.oecd.org/dataoecd/49/29/20686301.HTM.

Jaumotte, F. and N. Pain (2005b) "From Ideas to Development: The Determinants of R&D and Patenting", *Economics Department Working Papers*, No. 457, OECD, Paris, http://www.oecd.org/dataoecd/49/29/20686301.HTM.

Jaumotte, F. and N. Pain (2005c) "Innovation in the Business Sector", *Economics Department Working Papers,* No. 459, OECD, Paris, http://www.oecd.org/dataoecd/49/29/20686301.HTM.

Jaumotte, F. and N. Pain (2005d), "From Development to Implementation: Evidence on Innovation Determinants from the Community Survey", *Economics Department Working Papers,* No. 458, http://www.oecd.org/dataoecd/49/29/20686301.HTM.

Keller, W. (2004), "International Technology Diffusion", *Journal of Economic Literature* 42:3, September.

Klette, T.J., J. Moen and Z. Griliches (2000) "Do Subsidies to Commercial R&D Reduce Market Failures? Micro-econometric Evaluation Studies", *Research Policy*, 29:4–5, April.

Kozlov, K. and K. Yudaeva (2004), "Imitations and Innovations in a Transition Economy", mimeo, Bank of Finland Institute for Economies in Transition (BOFIT), October, http://www.bof.fi/bofit/seminar/bofcef05/innovations.pdf.

Kuznetsov, B., M. Kuzyk, Yu. Simachev, S. Tsukhlo and A. Chulok (2006), "Osobennosti sprosa na tekhnologicheskie innovatsii i otsenka potentsial'noi reaktsii rossiiskikh promyshlennykh predpriyatii na vozmozhnye mekhanizmy stimulirovanie innovatsionnoi aktivnosti (tezisy)", Inter-Departmental Analytical Centre, Moscow, 19 May.

Livanov, D. (2006), "Gosudarstvo i nauka: sposoby vzaimodeistviya", National Innovation Centre for Science and Innovation, Moscow, 31 May, http://www.sciencerf.ru/client/doctrine.aspx?ob_no=2749.

Lopez Claros, A. (2005), "Russia: Competitiveness, Growth, and the Next Stage of Development", in *Global Competitiveness Report 2005*, The World Economic Forum, Geneva, September.

Nickell, S.J. (1996), "Competition and Corporate Performance", *Journal of Political Economy* 104:4, August.

"Ob osobykh" (2005), 'Federal'nyi zakon RF ot 22.07.2005 № 116-FZ "Ob osobykh ekonomicheskikh zonakh v Rossiiskoi Federatsii"'.

OECD (1994), *National systems of innovation: general conceptual framework*. OECD, Paris.

OECD (2001), *The New Economy: Beyond the Hype*, OECD, Paris.

OECD (2003a), *The Sources of Economic Growth in OECD Countries*, OECD, Paris.

OECD (2003b), *Tax Incentives for Research and Development: Trends and Issues*, OECD, Paris.

OECD (2003c), *ICT and Economic Growth, Evidence from OECD Countries, Industries and Firms*, OECD, Paris.

OECD (2004a), *Fostering Public–Private Partnership for Innovation in Russia*, OECD, Paris.

OECD (2004b), *OECD Economic Surveys: Russian Federation*, OECD, Paris.

OECD (2004c), *Science and Innovation Policies: Key Challenges and Opportunities*, OECD, Paris.

OECD (2004d), *Competition Law and Policy in Russia: An OECD Peer Review*, OECD, Paris.

OECD (2005a), *Communications Outlook*, OECD, Paris.

OECD (2005b), *OECD Reviews of Regulatory Reform: Russia: Building Rules for the Market*, OECD, Paris.

OECD (2006a), *Economic Policy Reforms: Going for Growth, 2006 Edition*, OECD, Paris.

OECD (2006b), *2006 Investment Policy Review of the Russian Federation: Enhancing Policy Transparency*, OECD, Paris.

RAVI (2004), *Obzor rossiiskogo rynka pryamykh i venchurnykh investitsii 1994–2004*, Russian Association of Private and Venture Investment, Moscow.

RAVI (2005), *Obzor rynka pryamykh i venchurnykh investitsii v Rossii 2003–2004*, Russian Association of Private and Venture Investment, Moscow.

Rodrik, D. (2004), "Industrial Policy for the Twenty-first Century", *CEPR Discussion Paper*, No. 4767, November.

Rospatent (2005), "Godovoi otchet 2004", Federal Service for Intellectual Property, Patents and Trademarks, Moscow, http://www.fips.ru/rep2001/rep2004/index.htm.

Rospatent (2006), "Analiticheskie materialy i statistika po nekotorym napravleniyam deyatel'nosti Rospatenta v 2005 g.", Federal Service for Intellectual Property, Patents and Trademarks, http://www.fips.ru/ruptoru/stat2005.rtf.

Savvides, A. and M. Zachariadis (2005), "International Technology Diffusion and the Growth of TFP in the Manufacturing Sector of Developing Economies", *Review of Development Economics* 9:4, November.

Sheenan, J. and A. Wykoff (2003), "Targeting R&D: Economic and Policy Implications of Increasing R&D Spending", *OECD STI Working Paper*, 2003/8, OECD, Paris. http://www.oecd.org/findDocument/0,2350,en_2649_33703_1_119684_1_4_1,00.html.

"Strategiya" (2006), "Strategiya razvitiya nauki i innovatsii Rossiiskoi Federatsii v Rossiiskoi Federatsii na period do 2015", RF Ministry of Education and Science, Moscow, 15 February.

Van der Wiel, H. (2001), "Innovation and productivity in services", *CPB Report,* 2001/1.

WEF (2005), *Global Competitiveness Report 2005–2006*, World Economic Forum, Davos, September. http://www.weforum.org/site/homepublic.nsf/Content/Global+Competitiveness+Programme%5CGlobal+Competitiveness+Report

World Bank (2006), *Public Financial Support for Commercial Innovation: Europe and Central Asia Knowledge Economy Study, Part I*, The World Bank, Washington, DC.

Yakovlev, A. (2006), "Mery gosudarstvennoi podderzhki promyshlennosti: masshtaby, adresaty, effektivnost'", mimeo, State University–Higher School of Economics, Moscow, July.

Yusufov, A. (2004), 'Bor'ba s pravonarusheniyami v sfere IC: problemy formirovaniya pravoprimenitel'noi praktiki' *Promyshlennaya sobstvennost'* 12, December.

ANNEX A1

Competition and efficiency in Russian industrial sectors

1. This Annex presents a brief overview of the empirical results obtained by Bessonova (2006) concerning the influence of competition on enterprise performance in Russian industry. The theoretical framework is that developed by Aghion, Bloom *et al.* (2005) and the data set is that used in Aghion and Bessonova (2006). The database contains around 14 000 firms in 83 industries, covering about two-thirds of industrial output and employment.[74]

2. While Aghion and Bessonova (2006) focuses on the impact of *foreign entry* on total factor productivity (TFP) growth, the empirical estimation presented below concentrates on the impact of *competition on domestic markets* on growth and productivity. It also explores the potential interaction between competition and the degree of similarity between firms within a given industry. Aghion, Bloom, Blundell, Griffith and Howitt (2005) argue that the incentive to innovate maybe stronger in so-called "neck-and-neck" industries, because the potential gains from escaping competition are higher. This hypothesis is tested below on the Russian data, with the degree of "neck-and-neckness" measured by the standard deviation of the distance to the production frontier in a given industry[75] and the degree of competition by Herfindhal–Hirschmann concentration indexes.

The empirical model

3. The effect of the degree of concentration and the degree of "similarity" between industrial firms on their efficiency gains is estimated according to the following specification:

$$\Delta TFP_{it} = \beta_1 HHI_{jt-1} + \beta_2 \underset{k,k\in j(i)}{STD}\left(Dist_{kt-1}\right)\times HHI_{jt-1} + \beta_3 \underset{k,k\in j(i)}{STD}\left(Dist_{kt-1}\right) + X_{it}\gamma + \nu_t + u_i + \varepsilon_{it}$$

where ΔTFP_{it} is the TFP growth of firm (i) in sector (j) at date (t), HH_{jt-1} is the lagged Herfindahl-Hirschman Index of industry *j*, calculated at the regional level; $\underset{k,k\in j(i)}{STD}\left(Dist_{kt-1}\right)$ is the lagged standard deviation of the distance to the production frontier in sector (j) and X_{it} is a vector of firms and industry characteristics (essentially the level of employment and the import penetration ratio). Concerning the error components, ν_t are time dummies, u_i firm-specific effects and ε_{it} is an error term assumed to be uncorrelated through time (typically a "white noise"). TFP is computed according to the Jorgenson method (see Aghion and Bessonova, 2006).

The results

4. Results are reported in Table A1.1. The coefficient β_1 is negative and significant in all specifications, which means that an increase in competition has a positive effect on efficiency. The impact is found to be stronger in import-competing industries (industries where the share of imports exceeds 30%), while not really significant for export-oriented industries. The latter result is relatively intuitive, as Russia's exporters are mostly in resource sectors, where competition takes place at the world level.

Interestingly, the positive effect of competition on productivity growth is found to be stronger if firms are relatively similar within an industry (β_2 is positive and significant). On the other hand, in industries characterised by substantial technological gaps between firms, increased competition is not associated with significant increases in efficiency (firms at the frontier need not fear the potential threat of their laggard competitors, for whom innovating in order to catch-up could prove costly).

Table A1.1. Efficiency Regressions. TFP growth – Jorgenson method

Dependent variable **TFP growth**	**All industries**	**Manufacturing industries**	**Import competing industries**	**Export oriented industries**
β_1	-0.151* [0.087]	-0.158* [0.086]	-0.390** [0.020]	0.043 [0.892]
β_2	0.207** [0.010]	0.224*** [0.008]	0.338** [0.019]	0.360 [0.204]
β_3	-0.120** [0.002]	-0.131*** [0.001]	-0.164** [0.018]	-0.288* [0.069]
Constant	0.282*** [0.002]	0.298*** [0.001]	0.179 [0.295]	0.505 [0.287]
Year dummies	yes	yes	yes	yes
Number of obs.	45486	43914	14169	2202
Number of firms	13593	13053	4459	868
R^2	0.014	0.014	0.009	0.022

Fixed effects estimations.
p-values in parenthesis.
* significant at 10% level; ** significant at 5% level; *** significant at 1% level.
Source: Bessonova (2006).

Notes

1. See, *e.g.*, Coe, Helpman and Hoffmaister (1997); and Guellec and van Pottelsberghe (2001). On transition economies, see World Bank (2006).

2. There would appear to be potential spillovers here with respect to human capital accumulation, since incentives to train workers and incentives to innovate are related. Enterprise surveys suggest that innovative firms train workers more than do non-innovators (Goldberg, 2006).

3. This observation is borne out by the comparison of different innovation indices in the annex to World Bank (2006).

4. One major limitation is that investment in innovation may also include activities that are not recorded as formal R&D, such as the acquisition of equipment and the training/re-training of workers.

5. On the peculiarities of the state unitary enterprise, or GUP, as an organisational form, see OECD (2004b:93).

6. See "Strategiya" (2006:9).

7. At market exchange rates, this would be closer to 5%.

8. "Strategiya" (2006). The number of small businesses involved in "science and scientific activities" is approximately 22 000.

9. Defined as activity related to the transformation of ideas (usually R&D results or other S&T achievements) into technologically new (to the market) or improved products, services or production techniques. For more detail, see "Indicators" (2004:174).

10. The high correlation between the two types of innovation is consistent with the observation that productivity gains generated by ICT equipment are higher if they are accompanied by organisational changes (see Askenazy and Gianella, 2000).

11. Around half of these acquisitions are imports. In this context, the temporary suspension of import duties on a range of high-tech investment goods in 2006 is likely to have a significant, albeit one-off, positive effect on industrial modernisation.

12. Survey results presented in Kuznetsov *et al*. (2006) show a much lower share of spending on technical innovation – just 8% – devoted to R&D.

13. In real terms, spending on both activities has risen over the last decade, but it has been far outstripped by the growth of spending on new machinery and equipment and on "other" innovation activities.

14. For details, see Kozlov and Yudaeva (2004). The actual figures may be higher than these estimates suggest, since non-respondents were classified automatically as non-innovators – over half of all firms that actually responded to the survey claimed to be involved in innovative and/or imitative activity. Kuznetsov *et al*. (2006) also find evidence of a high degree of imitative activity in their survey.

15. This is consistent with Gokhberg's (2003) estimate that 70% of reported innovations are minor adaptations or improvements to existing technology. Since much of this technology is obsolete or nearing obsolescence, it would not make sense to devote substantial R&D resources to improving it.

16. See Lopez Claros (2005).

17. See Yudaeva *et al*. (2003) and Bessonova *et al.* (2003).

18. These conclusions highlight the complementarities among different strands of reform and also dovetail with the analysis of industrial competitiveness presented in OECD (2004a), which draws attention to the impressive productivity improvements recorded in sectors with exceptionally high levels of foreign participation.

19 . See OECD (1994) for an extensive definition of a national system of innovation. Interactions among public and private unites may be technical, commercial, legal and financial, inasmuch as the goal of the interaction is the development, protection, financing or regulation of new science and technology.

20. Patenting activity may not be an ideal measure of innovation output in Russia, given that Russian firms appear to prefer commercial secrecy to patents in what remains, after all, an uncertain IPR environment. Survey data show that confidentiality is the preferred method of protection for 37% of innovative enterprises, against 30% for patenting. However, the European Commission's "Community Innovation Survey 3" suggests that the preference for secrecy is not unusually high in Russia. The survey covers the period 1998–2000 (Jaumotte and Pain, 2005d).

21. International publications are, of course, a lagging indicator, and the data for 2003 could yet be seen as the consequence of severe cuts in science funding in the 1990s. However, science funding has been growing strongly for a number of years and no inversion of the downward trend has yet been observed.

22. Gokhberg (2003:13).

23. This is the one science subject where private higher education has really developed: in 2003/04, less than 0.2% of students in non-state higher education institutions were in science and engineering subjects. This largely reflects the fact that such subjects are capital-intensive and therefore costlier to provide. Higher education in the natural sciences is still overwhelmingly concentrated in the state sector.

24. Staff-student ratios did not rise anything like as sharply as in most subjects – student numbers grew, but far less rapidly than in other disciplines – and science teaching remained concentrated in established state universities. The demand for Russian science and engineering graduates abroad also speaks well of the quality of their training.

25. In fact, this result suggests that the proportion of enterprises receiving assistance may actually have exceeded the proportion reporting that they were engaged in innovation activities. However, the discrepancy may reflect the characteristics of the sample, differences in definition or other factors.

26. For example, improved patent protection only works in the official economy. While strengthening such protection may, at the margin, increase incentives for firms to operate in the formal sector, it is likely to achieve little if the state is otherwise acting in ways that encourage businesses to retreat into the shadow economy. Likewise, the impact of policies aimed at assisting innovation-oriented start-ups will depend in part on the conditions for establishing new businesses in any sphere.

27. It should also be noted that general framework conditions also matter for non-innovative activities, where there are still very high returns expected in many Russian sectors.

28. See Kozlov and Yudaeva (2004): from 71 to 87% according to different surveys of enterprises.

29. See Jaumotte and Pain (2005a). One encouraging recent development in this respect was GM's announcement in October 2005 that it planned to establish an R&D centre in Russia.

30. "Energeticheskaya strategiya", (2003:21). Such high ratios of energy consumption to output are also in part the product of factors such as geography, climate and the structure of industrial production. These factors were compounded by the sharp fall in GDP during the 1990s – output fell far faster than energy consumption. Consequently, the growth of recent years has tended to reduce the energy intensity of GDP.

31. "Energeticheskaya strategiya" (2003:21).

32. And, in the case of electricity, ultimately liberalising prices.

33. See IEA (2006) for a discussion of how Russia may implement the Protocol.

34. It should be acknowledged that phasing out implicit energy subsidies is a only a first, albeit critical, step; there may still be scope for interventions intended to tackle directly the environmental externalities associated with industrial production.

35. The degree of concentration usually serves as a proxy for competition. See Nickell (1996) and Blundell *et al.* (1999). More recent work from Aghion *et al.* (2005) however suggests that the relationship is a concave one, with the Schumpeterian effect dominating at higher levels of competition.

36. Interestingly, the survey also highlights huge variance in firm productivity. This gap reflects in particular different attitudes towards innovation and the restructuring of production.

37. Import-competing industries are defined as industries where the share of imports exceeds 30%.

38. The concentration index is a Herfindahl–Hirschman Index for Russian industries in 5-digit classification. The index is calculated at the regional and national level in two ways: taking total industrial output as denominator (population-based market shares), which gives an *under*estimation of the real value, and on

the basis of the total output of the sample (sample-based estimation) which gives an *over*estimate. The gap between the population- and sample-based indexes thus gives us a range for the extent of concentration.

39. On regional barriers to market entry in the 1990s, see Huber and Wörgötter (1998).

40. These results are not highly dependent on the size of the firm; see Figure 4.A2.2.

41. See CEFIR (2005) for details of the fourth round of the joint World Bank/CEFIR monitoring of the administrative burden on small business.

42. Discriminatory procedures for procurement/tenders are especially common. Given the potential role of public procurement in stimulating demand for innovation, this must be seen as a problem. For more on these issues, see OECD (2004d).

43. The maximum sanction is RUB 500 000. This amount is to be increased in a new competition law.

44. For a recent overview of competition policy issues, see OECD (2005b), Chapter 3.

45. Russia is hardly unique in this respect: Jaumotte and Pain (2005c) confirm the adverse effect of rigid regulations on business sector R&D expenditure and on the level of patenting in OECD countries.

46. Copyright/trademark issues account for around 80% of the disputes brought before the Patents Chamber of the Russian Agency for Patents and Trademarks (Rospatent).

47. Rights may remain with the state if the results of the R&D will be restricted in use or if the Russian Federation agrees to assume the costs of commercialisation. The rights may either remain with the state or be shared between the state and the researchers if the products of the research are required for state functions concerned with national security, defence or public health.

48. The country's score of 2.4 puts it far closer to a rating of "1, weak or nonexistent" than to "7, equal to the world's most stringent".

49. It is not clear how comparable the subjective judgements given by respondents in different countries are.

50. Thus, a firm patenting industrial chemicals, for example, may add a neutral component to a rival's product and patent the resulting "new invention", despite the fact that it differs from the original in no significant respect.

51. Other funding is divided among hundreds of research institutes and other organisations outside these systems.

52. That said, few would argue that the current system is by any means corruption-proof.

53. See, for example, Norilsk Nickel's difficulties in working with an Academy of Sciences institute; *Vedomosti*, 22 April 2005.

54. On the basis of a survey of a large body of empirical research, Kuznetsov *et al*. (2006) conclude that there is little difference between the impact of tax breaks and subsidies in the short run but that subsidies tend to be more effective in the long run. However, they do not appear to take size/state of development of the firm into account. In fact, the appropriateness of the instrument will depend in part on just such factors.

55. Article 258 of the Tax Code holds that such assets must be depreciated over the period covered by the patent or other right of exclusive use. Otherwise, they are depreciated over ten years.

56. Livanov (2006) notes that around 90% of the organisations that meet this criterion are state-owned anyway.

57. When conducting such evaluations, it should be borne in mind that a successful programme may spur more failures than successes: provided that the support extended is not too extensive and that the successes are great enough, the programme may nevertheless pay for itself (Rodrik, 2004).

58. Radical innovation is often undertaken by start-ups, because established firms face high adjustment costs when engaged in radical innovation.

59. RAVI (2005) and EVCA (2003).

60. RAVI (2005) finds that IT has become the largest sector for VC investments, with biotech the fastest growing. Investment in start-ups accounted for just under 5% of VC investment and investments in young firms for just under 20%.

61. This high degree of foreign dominance is likely to prove transitional, as it largely reflects the fact that foreign players enter the sector with a degree of expertise that local actors are just developing.

62. World Bank (2006:29–30).

63. "Ob osobykh" (2005).

64. Legislation on a third type of zone, the tourist-recreational zone, is also being developed.

65. For details on industrial production zones, see OECD (2006b:29–31).

66. The relative shares of the different budgets vary from zone to zone, but the most common pattern is roughly 50/50 between the centre and the region. Only in a few cases is there a local budget contribution.

67. These include exemption from customs duties and VAT on their imports and exemption from excise duties on Russian goods. Goods exported from SEZs will not be subject to customs duties, VAT and excise taxes.

68. This estimate takes account of lower tax bills and administrative barriers, state-financed infrastructure provision and the economies generated by concentration of production in the zones.

69. Nor has the experience of neighbouring Ukraine with such zones been a happy one. See Davis (2005).

70. This discussion draws on IET (2006:25–6).

71. The sole exception is the special zone for the Kaliningrad exclave, which has been substantially revised under new legislation. On the Kaliningrad zone, see Mau (2005).

72. World Bank (2006:28).

73. The experience of the Tomsk State University for Systems Management and Radio Electronics, for example, looks encouraging.

74. See Aghion and Bessonova (2006) for a description of the dataset. The database has, however, been extended to cover the period 1996–2004, rather than 1996–2002, as previously.

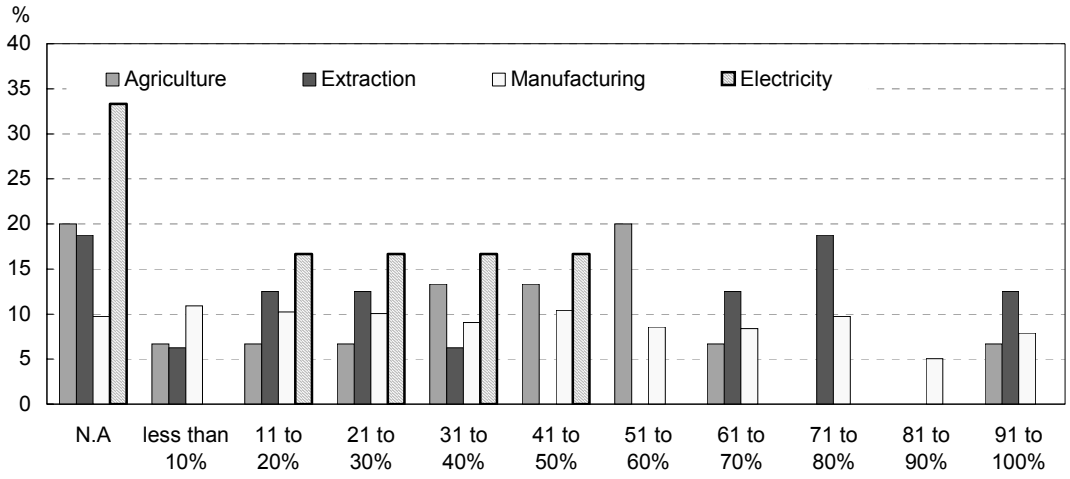
75. Distance to the frontier is computed as the gap between the labour productivity of a given firm and the labour productivity of the firm with the highest productivity in the industry.

ANNEX A2

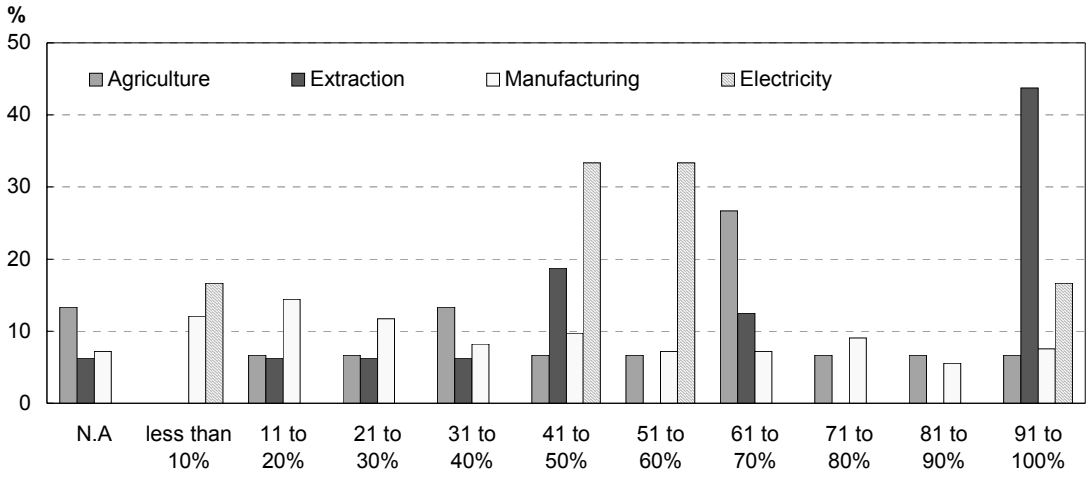
Concentration of suppliers and clients

Figure A2.1. Concentration indicator by sector

A. Distribution of firms by share of three main suppliers



B. Distribution of firms by share of three main clients in sales

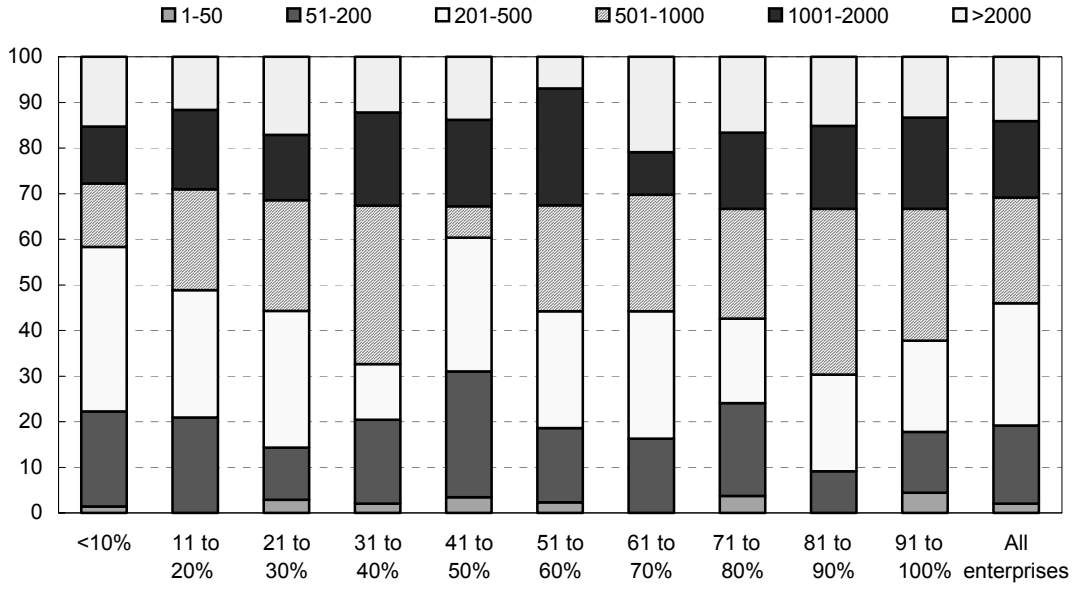


Source: Survey of 643 individual firms conducted by the IET's Laboratory for Conjunctural Surveys on behalf of the OECD.

Figure A2.2. Breakdown of the concentration indicator by size of firms in the manufacturing sector

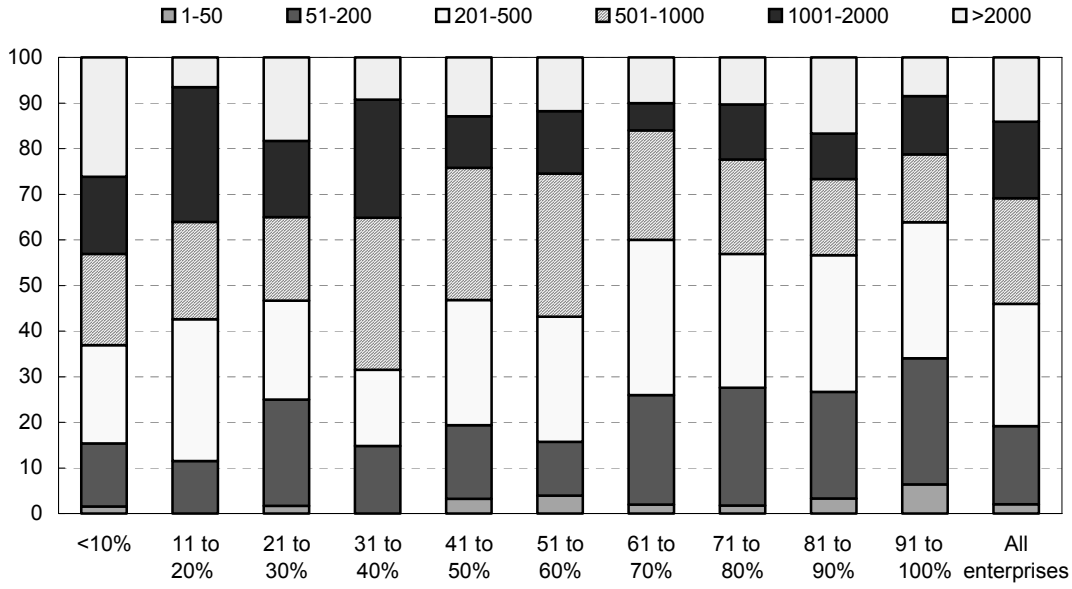
A. Share of 3 main clients in sales

Size of enterprises (number of employees):



B. Share of 3 main suppliers in sales

Size of enterprises (number of employees):



Source: Survey of 643 individual firms conducted by the IET's Laboratory for Conjunctural Surveys on behalf of the OECD.

WORKING PAPERS

The full series of Economics Department Working Papers can be consulted at www.oecd.org/eco/Working_Papers/

534. *Social security reform in Brazil: Achievements and remaining challenges*
(December 2006) Fabio Giambiagi and Luiz de Mello

533. *Improving labour utilisation in Brazil*
(December 2006) Luiz de Mello, Naércio Menezes Filho and Luiz G. Scorzafave

532. *Boosting innovation performance in Brazil*
(December 2006) Carlos H. de Brito Cruz and Luiz de Mello

531. *Consolidating macroeconomic adjustment in Brazil*
(December 2006) Luiz de Mello and Diego Moccero

530. *Product market regulation in the non-manufacturing sectors of OECD countries: Measurement and highlights*
(December 2006) Paul Conway and Giuseppe Nicoletti

529 *The Turkish pension system: further reforms to help solve the informality problem*
(November 2006) Anne-Marie Brook and Edward Whitehouse

528 *Policies to improve Turkey's resilience to financial market shocks*
(November 2006) Anne-Marie Brook.

527 *Upgrading Japan's innovation system to sustain economic growth*
(November 2006 Randall S. Jones and Tadashi Yokoyama

526 *Strengthening the integration of Japan in the world economy to benefit more fully from globalisation*
(November 2006) Randall S. Jones and Taesik Yoon

525. *OECD's FDI regulatory restrictiveness index: Revision and extension to more economies*
(November 2006) Sven Blöndal and Alain de Serres

524. *Globalisation and inflation in the OECD economies*
(November 2006) Nigel Pain, Isabell Koske and Marte Sollie

523. *Identifying determinants of Germany's international price competitiveness – A structural VAR approach*
(November 2006) Martin Meurers

522. Short-term pain for long-term gain: the impact of structural reform on fiscal outcomes in EMU
(November 2006) Paul van den Noord and Boris Cournède

521. *Interactions between monetary and fiscal policy: How monetary conditions affect fiscal consolidation*
(November 2006) Rudiger Ahrend, Pietro Catte and Robert Price

520. *Restoring fiscal sustainability in the Euro Area: raise taxes or curb spending?*
(October 2006) Boris Cournède and Frédéric Gonand

519. *Should Measures of Fiscal Stance be Adjusted for Terms of Trade Effects*
(October 2006) David Turner

518. *Monetary policy and inflation expectations in Latin America: Long-run effects and volatility spillovers*
(October 2006) Luiz de Mello and Diego Moccero

517. *Social safety nets and structural adjustment*
(September 2006) Paul van den Noord, Nathalie Girouard and Christophe André

516. *Adapting the Icelandic education system to a changing environment*
(September 2006) Hannes Suppanz

515. *Forecasting monthly GDP for Canada*
(September 2006) Annabelle Mourougane

514. *Finland's housing market: reducing risks and improving policies*
(September 2006) Laura Vartia

513. *The Danish housing market: Less subsidy and more flexibility*
(September 2006) Espen Erlandsen, Jens Lundsgaard and Felix Huefner

512. Labour *market reform in Germany: How to improve effectiveness*
(September 2006) Eckhard Wurzel

511. *Removing obstacles to employment for women in Ireland*
(September 2006) Boris Cournède

510. *Assessing Russia's non-fuel trade elasticities: Does the Russian economy react "normally" to exchange rate movements?*
(September 2006) Christian Gianella and Corinne Chanteloup

509. *Regulation, competition and productivity convergence*
(September 2006) Paul Conway, Donato De Rosa, Giuseppe Nicoletti and Faye Steiner

508. *Improving education achievement and attainment in Luxembourg to compete in the labour market*
(September 2006) David Carey and Ekkehard Ernst

507. *Raising economic performance by fostering product market competition in Germany*
(August 2006) Andrés Fuentes, Eckhard Wurzel and Andreas Reindl

506. *Regulation of financial systems and economic growth*
(August 2006) Alain de Serres, Shuji Kobayakawa, Torsten Sløk and Laura Vartia

505. *Enhancing Portugal's human capital*
(August 2006) Bénédicte Larre and Stéphanie Guichard

504. *Improving labour market performance in France*
Améliorer la performance du marché du travail en France
(July 2006) Stéphanie Jamet

503. *Wage setting in Finland: Increasing flexibility in centralised wage agreements*
(July 2006) Åsa Johansson

502. *Taxation, business environment and FDI location in OECD countries*
(July 2006) Dana Hajkova, Giuseppe Nicoletti, Laura Vartia and Kwang-Yeol Yoo

501. *The political economy of structural reform: Empirical evidence from OECD countries*
(July 2006) Jens Høj, Vincenzo Galasso, Giuseppe Nicoletti and Thai-Thanh Dang

500. *Labour market performance, income inequality and poverty in OECD countries*
(July 2006) Jean-Marc Burniaux, Flavio Padrini and Nicola Brandt

WORKING PAPERS

The full series of Economics Department Working Papers can be consulted at www.oecd.org/eco/Working_Papers/

534. *Social security reform in Brazil: Achievements and remaining challenges*
(December 2006) Fabio Giambiagi and Luiz de Mello

533. *Improving labour utilisation in Brazil*
(December 2006) Luiz de Mello, Naércio Menezes Filho and Luiz G. Scorzafave

532. *Boosting innovation performance in Brazil*
(December 2006) Carlos H. de Brito Cruz and Luiz de Mello

531. *Consolidating macroeconomic adjustment in Brazil*
(December 2006) Luiz de Mello and Diego Moccero

530. *Product market regulation in the non-manufacturing sectors of OECD countries: Measurement and highlights*
(December 2006) Paul Conway and Giuseppe Nicoletti

529 *The Turkish pension system: further reforms to help solve the informality problem*
(November 2006) Anne-Marie Brook and Edward Whitehouse

528 *Policies to improve Turkey's resilience to financial market shocks*
(November 2006) Anne-Marie Brook.

527 *Upgrading Japan's innovation system to sustain economic growth*
(November 2006 Randall S. Jones and Tadashi Yokoyama

526 *Strengthening the integration of Japan in the world economy to benefit more fully from globalisation*
(November 2006) Randall S. Jones and Taesik Yoon

525. *OECD's FDI regulatory restrictiveness index: Revision and extension to more economies*
(November 2006) Sven Blöndal and Alain de Serres

524. *Globalisation and inflation in the OECD economies*
(November 2006) Nigel Pain, Isabell Koske and Marte Sollie

523. *Identifying determinants of Germany's international price competitiveness – A structural VAR approach*
(November 2006) Martin Meurers

522. Short-term pain for long-term gain: the impact of structural reform on fiscal outcomes in EMU
(November 2006) Paul van den Noord and Boris Cournède

521. *Interactions between monetary and fiscal policy: How monetary conditions affect fiscal consolidation*
(November 2006) Rudiger Ahrend, Pietro Catte and Robert Price

520. *Restoring fiscal sustainability in the Euro Area: raise taxes or curb spending?*
(October 2006) Boris Cournède and Frédéric Gonand

519. *Should Measures of Fiscal Stance be Adjusted for Terms of Trade Effects*
(October 2006) David Turner

518. *Monetary policy and inflation expectations in Latin America: Long-run effects and volatility spillovers*
(October 2006) Luiz de Mello and Diego Moccero

517. *Social safety nets and structural adjustment*
(September 2006) Paul van den Noord, Nathalie Girouard and Christophe André

516. *Adapting the Icelandic education system to a changing environment*
(September 2006) Hannes Suppanz

515. *Forecasting monthly GDP for Canada*
(September 2006) Annabelle Mourougane

514. *Finland's housing market: reducing risks and improving policies*
(September 2006) Laura Vartia

513. *The Danish housing market: Less subsidy and more flexibility*
(September 2006) Espen Erlandsen, Jens Lundsgaard and Felix Huefner

512. Labour *market reform in Germany: How to improve effectiveness*
(September 2006) Eckhard Wurzel

511. *Removing obstacles to employment for women in Ireland*
(September 2006) Boris Cournède

510. *Assessing Russia's non-fuel trade elasticities: Does the Russian economy react "normally" to exchange rate movements?*
(September 2006) Christian Gianella and Corinne Chanteloup

509. *Regulation, competition and productivity convergence*
(September 2006) Paul Conway, Donato De Rosa, Giuseppe Nicoletti and Faye Steiner

508. *Improving education achievement and attainment in Luxembourg to compete in the labour market*
(September 2006) David Carey and Ekkehard Ernst

507. *Raising economic performance by fostering product market competition in Germany*
(August 2006) Andrés Fuentes, Eckhard Wurzel and Andreas Reindl

506. *Regulation of financial systems and economic growth*
(August 2006) Alain de Serres, Shuji Kobayakawa, Torsten Sløk and Laura Vartia

505. *Enhancing Portugal's human capital*
(August 2006) Bénédicte Larre and Stéphanie Guichard

504. *Improving labour market performance in France*
Améliorer la performance du marché du travail en France
(July 2006) Stéphanie Jamet

503. *Wage setting in Finland: Increasing flexibility in centralised wage agreements*
(July 2006) Åsa Johansson

502. *Taxation, business environment and FDI location in OECD countries*
(July 2006) Dana Hajkova, Giuseppe Nicoletti, Laura Vartia and Kwang-Yeol Yoo

501. *The political economy of structural reform: Empirical evidence from OECD countries*
(July 2006) Jens Høj, Vincenzo Galasso, Giuseppe Nicoletti and Thai-Thanh Dang

500. *Labour market performance, income inequality and poverty in OECD countries*
(July 2006) Jean-Marc Burniaux, Flavio Padrini and Nicola Brandt