07:

Innovation in Russia

By most measures, Russia lags behind advanced economies – as well as some emerging market economies, such as China – when it comes to innovation. This is particularly true of private companies. Russia is held back by its poor protection of intellectual property rights, the limited availability of finance in certain sectors, the limited complementary investment in information and communication technology, its skills gaps, and the low efficiency of public research and development (R&D) activity. For innovation policies to succeed, stronger links need to be established between public R&D and market demand, incentives for private R&D need to be strengthened, and the protection of intellectual property rights needs to be improved.

KEY FACTS:

1% of Russia's national income is spent on R&D, well below average for OECD countries

75% of R&D is conducted by public institutions

600 start-ups were created by 150 institutions (mostly universities) at the end of 2010 due to new legislation

Innovation in Russia

1. Introduction

Russia continues to score relatively poorly in terms of innovation in most international rankings of economies. In 2011, for example, the World Economic Forum ranked Russia 71st out of 142 countries with respect to innovation.[1] While the country was ranked higher in terms of innovative potential, actual outcomes were a long way below potential. As a consequence, the country stood significantly lower than other leading emerging markets in the rankings. These measures (as well as other indicators) suggest that a considerable gulf continues to separate the country's policy objectives – which are notionally designed to make technology and innovation the centrepieces of Russia's diversification and modernisation programme – and realities on the ground.

There is, of course, widespread agreement that the way that economies achieve productivity growth is through innovation. Most emerging markets (including Russia) can be expected to innovate more through imitation than through the commercialisation of cutting-edge inventions. This has certainly been the dominant experience in Asia, where such activity has been centred on large firms benefiting from economies of scale, limited competition and firm entry, and access to long-term financing from banks. Indeed, most available evidence shows that larger firms and incumbent firms are better at innovating through imitation than smaller firms and new entrants. Innovation models centred on invention either at or close to the technological frontier are, in contrast, associated with higher entry rates and greater competitive pressures, with innovation less concentrated in large firms. They are probably also associated with different financing patterns.

In Russia, however, the assumption that the imitation model will apply, with large incumbent firms dominating the sector, is belied by certain features of the Soviet legacy. It is certainly true that the Soviet era saw cutting-edge innovation in some sectors, but this activity has tended to wane over the last couple of decades. Moreover, the production landscape has been dominated by a need to restructure or close many of the larger and less competitive firms, particularly in manufacturing. In this context, Russian innovation is – by contrast with much of East Asia – less likely to emerge in large firms with market power. However, as we shall see, the Russian government's policy approach to innovation has been somewhat schizophrenic. On the one hand, it has implicitly favoured the imitation model by favouring large conglomerates and national champions with preferential access to financing (as well as political patronage). And on the other hand, it has also tried to set the stage for the emergence and proliferation of cutting-edge innovators, particularly small firms operating in competitive markets, whether domestic or foreign. The results to date have been correspondingly mixed.

Although Russia has provided a relatively stable economic environment over the past decade, there is broad agreement that the economy has largely failed to innovate and increase productivity. Furthermore, there is also a fair degree of consensus regarding the factors inhibiting greater innovation in Russia. These include poor protection of property rights, the fact that financing is hard to secure (particularly for smaller companies), poor economic institutions, limited complementary investment (in the field of information and communication technology [ICT], for example),[2] an education system that lags behind those of other countries, and inefficient public research and development (R&D) activity, with limited spillovers to the rest of the economy.

There are, however, widely differing views concerning the means of rectifying these failings. To date, the dominant approach espoused by government has been the favouring of publicly driven and financed top-down initiatives. The state has played an activist role as regards funding, the provision of information and the clustering of activity. This raises the obvious question of whether Russia's relatively low innovation rates can be attributed mainly to major market failures, requiring significant public intervention and funding, or whether other factors also play an important role.

This chapter addresses these issues. It starts by looking at where Russia currently stands in terms of innovation, before turning to the key question of what explains these indicators and rankings, including the role of public policy. It then looks directly at the types of policy that could help Russia to remedy its current low levels of innovation. The focus of this chapter is on innovative capacity (particularly the supply of innovation), infrastructure and information/coordination. The challenges in terms of human capital have already been addressed in Chapter 6, while Chapter 8 looks in detail at the specific issue of how to finance innovation.

2. Russian innovation from a comparative perspective

Russia currently spends around 1 per cent of its national income on R&D. This is significantly below the average for countries belonging to the Organisation for Economic Co-operation and Development (OECD), let alone the levels seen in certain European and Asian economies, as well as Israel. This reflects the country's income level, as well as its current output structure and the R&D-intensity of economic activity. It also reflects the government's preferences in terms of spending.

Why are R&D-intensive activities underdeveloped in Russia? A large body of cross-country evidence shows that innovation is determined by three related factors.

The first concerns the political and economic institutions that account for much of the business environment. Charts 7.1 and 7.2 provide data for a large number of countries, relating measures of economic institutions (taken from the Heritage Foundation) and measures of political systems (taken from Polity IV) to a common measure of innovation: R&D expenditure.[4] These show that better economic institutions and higher levels of democracy tend to be associated with increases in R&D.[5]

[1] World Economic Forum (2011).

[2] While mobile telephones are widely used, other ICT-related indicators (such as access to and use of PCs and the internet) continue to show far more limited use.

[3] Israel spends nearly 5 per cent of its gross domestic product (GDP) on R&D, while Finland, Japan, South Korea, Sweden and Switzerland spend between 3.0 and 3.5 per cent of GDP.

[4] Of course, R&D and innovation are not the same thing. However, R&D expenditure is widely used for this purpose, as it can be measured relatively easily and is available for a large number of countries.

[5] Note that these scatter graphs exclude low-income countries, where R&D expenditure is generally either miniscule or absent entirely.

Second, innovation depends on the supply of finance, inputs and knowledge, as well as the market structure. A strong education system capable of producing both innovative talent and an adequately trained supportive labour force is essential. Experience also indicates that innovation is closely linked to scientific knowledge and that much of this knowledge tends to be generated in publicly financed entities, whether universities or specific research institutions. Moreover, the evidence points unequivocally to the key role played by private companies. Successful, innovative economies also tend to be associated with greater turnover of firms, as new firms enter and failing companies exit.[6]

Third, innovation ultimately relies on demand for the products or services generated. This link tends to be more highly developed when sources of invention – such as universities – have good channels linking them to potential users or entities that are able to commercialise their products or services. However, this fundamental market discipline is often neglected by governments seeking to sponsor innovation.

1%

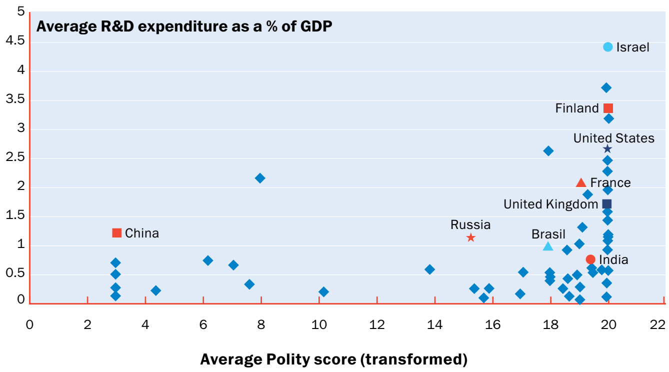
of Russia's national income is spent on R&D

In addition to R&D spending as a percentage of GDP, commonly used measures of an economy's innovative ability include the number of researchers, the number of patents that are lodged, the ratio of applications to patents granted and innovation counts. Charts 7.3 to 7.7 provide information on these indicators, as well as providing details of the percentage of exports accounted for by ICT goods and services, an indicator of the extent to which Russia has shifted into higher-technology activities.

The charts, in which Russia is compared with other leading emerging markets (as well as Israel, a country noted for its innovation), show mixed results. In terms of ICT goods and services as a percentage of exports, Russia lies well below the leading countries (China in the case of goods, and India and Israel in the case of software). As far as patents are concerned, Russia enjoyed a boom in applications in the early 1990s (presumably reflecting a stock of innovation accumulated during the Soviet period, which had not previously been commercialised), followed by a decline. Over the last decade patent applications have been stable at around 25,000 a year, which is far less than in China, but more than in other emerging markets and (tiny) Israel. The success rate for patents – as measured by the ratio of patents granted to applications submitted – is similar to the mean for the sample at around 60 per cent.

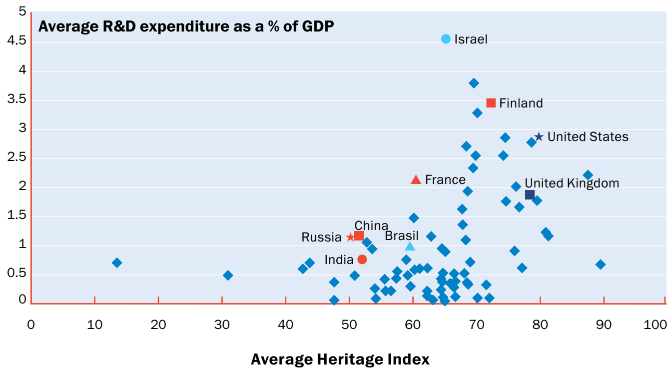
At around 1 per cent of GDP, Russia's R&D expenditure is significantly lower than that of Israel, but not markedly different from that seen in other emerging markets. However, most of that spending is carried out by publicly funded or directed institutions. Indeed, nearly 75 per cent of all R&D is currently conducted by public organisations (such as research institutes in specific industries), with the bulk of funding coming from the federal

Chart 7.1
Political institutions and innovation: 2000-10



Source: World Development Indicators and Polity IV.

Chart 7.2
Economic institutions and innovation: 2000-10



Source: World Development Indicators and Freedom House.

[6]This forms the core of much of modern growth theory; see, for example, Aghion and Howitt (1998).

[5]See, for example, Canning (2004).
[6]Aside from PISA data, these include data from the Progress in International Reading Literacy Study (PIRLS) and the Trends in International Mathematics and Science Study (TIMSS).
[7]See the description in Anderson et al. (2010). The primary sampling unit is the school.

budget.[7] In other words, R&D in the business sector is, in fact, mostly funded and conducted by government agencies that are organisationally separate from the companies themselves. Company-level spending on R&D accounts for less than 9 per cent of expenditure, resulting in weak company-led innovation. This is despite the company landscape still being dominated by large firms, which generally account for the largest share of R&D (accounting for more than 70 per cent of R&D in OECD countries, for example).

The fact that, in Russia, relatively little R&D is conducted in these companies can be traced not only to historical organisational factors, but also to weak incentives to invest in innovation. Neither does it appear to be the case that large firms provide a market for innovation originating in small and medium-sized enterprises (SMEs) or innovation stemming from outside the country. One recent estimate suggests that innovative SMEs – defined as those with significant potential in the fields of science and technology – account for no more than 2 per cent of the overall SME sector.[8] The government's focus on stimulating high-technology sectors may also have deflected attention away from the need to increase innovation levels in existing companies.

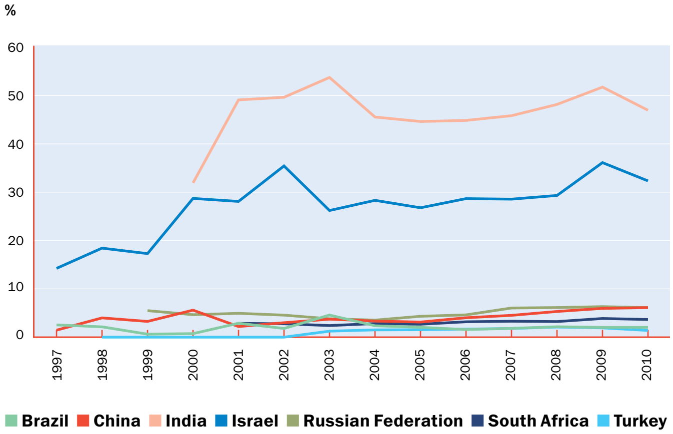
It remains difficult to gain a detailed picture of innovation carried out at company level, as reliable time series data are not available. The fifth round of the Business Environment and Economic Performance Survey (BEEPS), which was conducted by the EBRD and the World Bank in 2011-12, found that roughly one-fifth of the manufacturing firms sampled carried out some form of R&D, although the actual content of that spending was not indicated. The survey also shows that in the three-year period from 2008 to 2011 almost 40 per cent of firms introduced a new product.

75%

of R&D is currently conducted by public institutions

Chart 7.4

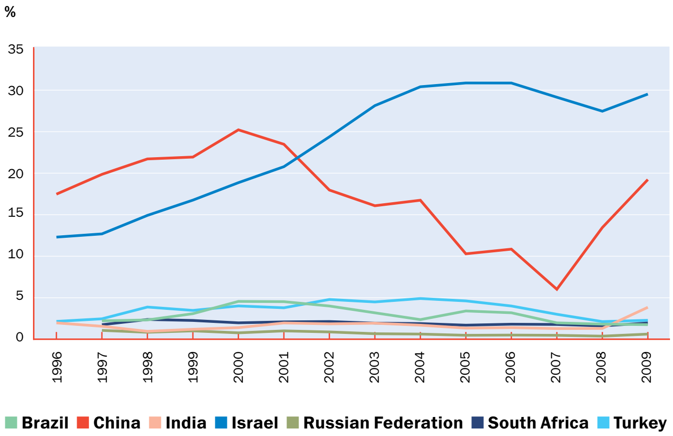
Exports of ICT services as a percentage of total exports of services



Source: World Development Indicators.

Chart 7.3

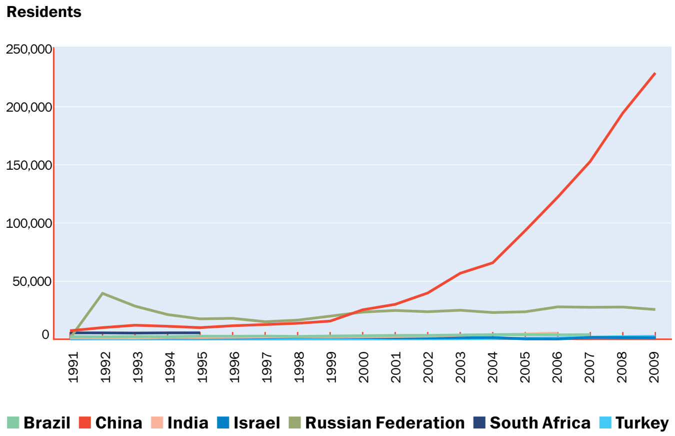
Exports of ICT goods as a percentage of total goods exports



Source: World Development Indicators.

Chart 7.5

Patent applications by residents



Source: World Development Indicators.

[7] See Dezhina (2011), who calculates that federal funding accounted for more than 66 per cent of public R&D by 2009, with that share rising. That compares with 16 per cent in Japan, 28 per cent in the United States and 38 per cent in France.
[8] See OECD (2011), p. 29. That report argues that SMEs account for around 12 per cent of both GDP and employment, suggesting that innovative SMEs account for a tiny percentage of output.

Table 7.1 explores the relationship between firms' productivity (measured in terms of sales per employee), the introduction of new products and spending on R&D. This exercise controls for the size of the firm (measured by the number of employees), the number of competitors and the industrial sector. The table indicates that introducing a new product is, in all cases, associated with increased sales, even when controlling for firm size, the number of competitors and whether the firm is an exporter (which is itself strongly associated with higher productivity levels).

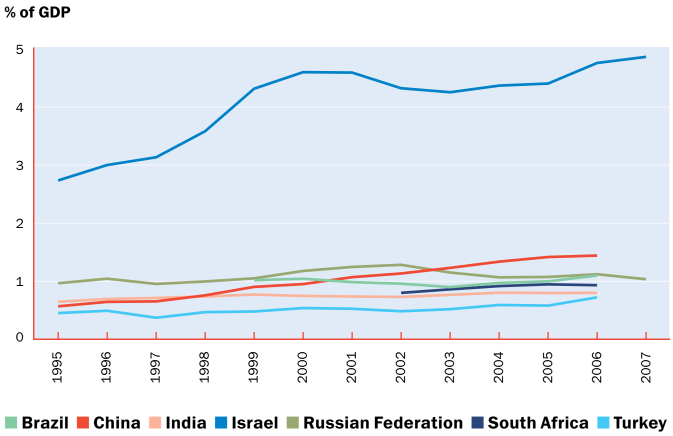
This does not necessarily imply a causal relationship – it could just reflect the fact that successful firms tend both to enjoy higher productivity levels and to introduce new products – but it does suggest that innovation and increased sales go hand in hand. Conducting some form of R&D is not, however, strongly associated with companies' performance. Evidence from the BEEPS survey also showed that innovating firms expected significantly stronger sales growth in the future. In fact, innovation appears to be the only robust predictor of firms' expectations as regards growth.

Although Chart 7.7 shows a very large pool of researchers relative to other countries, this legacy of the Soviet system is also notable for its ageing population and the relatively small inflow of young researchers in recent years. Furthermore, simply using quantitative indicators looking at numbers of scientists or researchers is inadequate. One alternative is to try to measure relative specialisation, looking at a country's share in publications in a given field – for example, mathematics – relative to that country's overall share in the world's scientific publications. This exercise shows that Russia has specialised strongly in chemistry and research concerning the Earth and space, as well as in physics and, to a lesser extent, mathematics.[9]

Interestingly, these are fields in which the United States has specialised less – indicating some possible complementarity[10] – but areas in which other leading emerging markets, notably India and China, have also developed some specialisation. Taking this further and looking at the impact of individual publications,[11] the picture changes somewhat. In all fields, the impact of Russian publications is fairly limited compared with the United States, India, China and Brazil, suggesting issues relating to the quality of Russia's scientific research. That said, there are exceptions to this, including successful attempts to create new private research universities in specific fields (see Boxes 7.1 and 7.3).

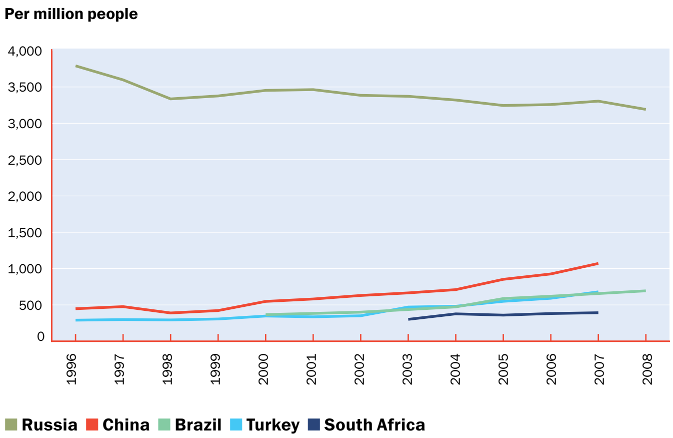
All in all, Russia's ability to innovate has been fairly limited, despite some positive features of the Soviet legacy. Particularly troubling has been the weakness of company-level innovation. This is consistent with evidence presented in other chapters pointing to problems in the business environment and relatively low turnover rates for firms. Public-sector institutions have continued to account for the majority of R&D, and this has ensured relatively weak links between R&D spending and the application of that research. Companies have increasingly acquired new technology through the importing of foreign capital goods, but even there acquisition levels remain low. R&D conducted by foreigners (R&D conducted by multinationals, for example) also accounts for a very small share, despite attempts to attract foreign investors by setting up special economic zones (SEZs) for technology (in Dubna and Zelenograd, for example). Furthermore, given that foreign firms have played a major role in innovation in other transition economies through local R&D operations and co-invention, this relative absence probably comes at considerable cost to Russia.[12] The new Skolkovo initiative, which aims to establish an "innovation city" near Moscow, is the most recent attempt to address this problem. We now turn to the main strategic and policy issues relating to innovation in Russia.

Chart 7.6
R&D expenditure as a percentage of GDP



Source: World Development Indicators.

Chart 7.7
R&D researchers per million residents



Source: World Development Indicators.

[9] These indicators are calculated by Athreye and Prevezer (2008) and include data up to 2004.
[10] This may, of course, be attributable in part to some offshoring of R&D, and there is some limited evidence suggesting that this may have been a significant explanatory factor for Russia.
[11] Athreye and Prevezer (2008) calculated the average impact of publications on the basis of the number of times that journals containing scientific papers were cited, but this did not generally include Russian-language publications.
[12] The World Bank (2011) presents some evidence on the way in which foreign firms have contributed to innovation.

3. Role of the public sector in innovation

As noted above, public institutions and spending dominate R&D in Russia, accounting for nearly 75 per cent of all R&D. This is very different from the situation observed in advanced economies and differs considerably from that seen in many other emerging markets. R&D is dominated by the three components of the publicly funded system, namely: (i) the government sector, in which the academies of science account for the majority of such activity; (ii) higher education, including universities; and (iii) the significant number of industry-specific R&D organisations. While the various academies were historically the leading research entities in Russia, several decades of limited and/or erratic funding, combined with organisational failings, have led to a widespread deterioration in the quality of research, accompanied by the emigration of some leading researchers. Historically, only limited research has been conducted in universities. The government has recently introduced a number of policy changes aimed at encouraging more research through the creation of "research university" status, which is linked to additional funding. In addition to granting that special status and financing to Moscow State University and St Petersburg State University, the federal government has also put resources, both directly and indirectly, into two business schools – Skolkovo in Moscow and the Graduate School of Management in St Petersburg. It is too early to tell whether these recent initiatives have been successful. Neither business school has, as yet, been able to gain a place in international rankings for business schools. In 2009 Russia's Education Ministry agreed a process for the evaluation of R&D organisations, but this will probably not be implemented before end-2012.

The major funding organisations for basic research are the Russian Foundation for Basic Research, which concentrates on natural sciences, and the Russian Foundation for the Humanities, which concentrates on social sciences. These award grants on a competitive basis. They are broadly modelled on the National Science Foundation in the United States. Their budgets are fixed by law at 7 per cent of total federal spending on science. While their procedures are regarded as largely transparent, the total volume of spending remains relatively small, as does the average grant size. In the case of the natural sciences, the average grant is less than US$ 9,000, with grants capped at around US$ 18,000. Aside from the low level of funding, available evidence suggests that Russian R&D spending is overly concentrated in public institutions with weak track records. Moreover, because such funding has historically been provided to established institutions, as well as being cost-based and often tied to employment levels in those institutions, there have been perverse incentives for efficiency.[15] Consequently, many of these government and industry-level organisations are effectively unreformed, unproductive and immaterial to the creation of high-quality R&D. In conclusion, the public funding of basic research has failed to really act as a catalyst.

Table 7.1
Performance, expectations and product innovation: evidence from the 2011-12 BEEPS survey

	Sales per worker as dependent variable					
Introduction of new product	0.37***	0.32***	0.32***	0.33***	0.26**	0.21*
	0.08	0.08	0.09	0.11	0.11	0.11
Log of employment			0	-0.06	-0.10**	-0.11**
			0.04	0.05	0.05	0.05
Number of competitors				0.01**	0.01**	0.01**
				0	0	0
Exporter					0.65***	0.61***
					0.14	0.15
Spending on R&D (yes or no)						0.19
						0.13
Industry fixed effects	NO	YES	YES	YES	YES	YES
Number of observations	1,017	1,017	1,017	658	657	655
R squared	0.02	0.07	0.07	0.07	0.1	0.1

	Expectation of increase in sales as dependent variable					
Introduction of new product	5.77***	5.54***	5.81***	6.42***	6.29***	5.22***
	1.04	1.06	1.09	1.36	1.37	1.39
Log of employment			-0.59	-0.46	-0.55	-0.76
			0.39	0.5	0.52	0.52
Number of competitors			0.03	0.05	0.03	0.03
					0.05	0.05
Exporter					1.35	0.34
					1.75	1.87
Spending on R&D (yes or no)						6.16
						1.9
Industry fixed effects	NO	YES	YES	YES	YES	YES
Number of observations	1,102	1,102	1,096	711	709	702
R squared	0.03	0.05	0.05	0.06	0.06	0.08

Source: BEEPS survey and authors' calculations.

4. Reforming Russia's research arrangements

A key element in the fostering of more effective R&D will be the improvement of incentives for innovators, notably with regard to their ability to appropriate the returns from innovation and invention. There are two parts to this. The first concerns legal enforcement. If intellectual property rights are poorly enforced – as is presently the case in Russia – it is hardly surprising that innovation remains subdued. Even in China, where R&D spending has grown substantially, evidence suggests that there have been relatively limited returns and smaller-than-expected spillovers from foreign direct investment (FDI). These outcomes can be traced, among other factors, to the weak protection of intellectual property rights. Russia joining the World Trade Organization (WTO) in 2012 may foster improvements in enforcement. The second part concerns the channels and institutional arrangements through which innovators are able to achieve returns. This section concentrates on this element, notably with regard to the

[14] For example, the global rankings compiled by the Financial Times for business schools' MBA (Masters of Business Administration) programmes have a number of institutions from emerging markets in their top 20 (such as Hong Kong's UST, China's CEIBS, and India's IIM and ISB), but no Russian school has even made it into the top 100.
[15] Gianella and Tompson (2007).

appropriability of returns from basic research. More generally, the returns that companies are able to achieve as a result of investment in R&D will depend primarily on the market structure and the extent of the competition that they face.[16]

Comparative experience shows that universities and other research institutions can be a major source of innovation and technical change. In the United States, for example, universities account for around half of all basic research and at least 5 per cent of all patents originating in the country. This has also been shown to have demonstrable effects on the R&D productivity of private-sector firms, as well as increasing productivity growth at a sectoral level through direct knowledge spillovers and the transfer to private industry of knowledge incorporated in licensed university inventions. There is also evidence to support the view that incentives for researchers – such as the share of licence royalties received by academic inventors – affects the volume and quality of inventions. Probably the most striking example in this respect is the United States, where the passing of the Bayh-Dole Act in 1980 gave universities the right to patent and license discoveries made as a result of government-funded research. The consequences of that legislation have been debated long and hard, but what is clear is that it was followed by a large increase in patents and licences originating from universities. While universities retain exclusive control over inventions, the rights to cash flows stemming from licensing are shared between the inventor and the university in accordance with specific royalty rules.

In terms of institutional arrangements, this has led a number of universities to establish licensing offices for technology. Royalty rules vary widely from university to university. Arrangements favouring inventors could be expected to increase the licensing value of an invention, and evidence suggests that this has indeed been the case.[17] In other words, the manner in which intellectual property rights are controlled and returns are achieved by inventors and institutions can have a major effect on scientific research.[18] In the case of private universities in the United States, a 10 per cent increase in royalty shares is associated with a 45 per cent increase in income from licensing.

2012

the year that Russia joined the World Trade Organization (WTO)

Interestingly, the incentive effect is much smaller in public institutions, which can, in part, be traced to the way in which universities' licensing offices operate and the incentives that their staff have.

From this perspective, the situation in Russia remains complicated. Since 2008, Russian federal law has allowed intellectual property rights for government-funded research to be transferred to the contractor or recipient of public resources, except in particular cases (notably when the research relates to matters of defence or security). The procedure for transferring rights involves an open tender or auction, with the proceeds of sales going back into the government budget, and with the purchaser being committed to commercialising the research (although it is not clear how that commitment would be monitored or penalties would be enforced in the event of non-compliance). The overall approach is, moreover, at odds with most practices seen elsewhere – and certainly with practices seen in countries with strong records in the commercialisation of R&D. Rather than relying on additional tax receipts from any commercialisation, the Russian government has tried to raise revenues through auctions. This is not an incentive framework that is likely to accelerate the translation of research into commercial applications. This is reflected in the small percentage of public research contracts that are associated with patenting.[19]

More promising was the passage in 2009 of Law 217-FZ, which facilitates the creation of start-up ventures by federally funded research and education institutions. This has allowed small firms to commercialise research on the condition that the originating institution holds 25-33 per cent of their equity. By the end of 2010 this new framework had seen nearly 600 start-ups created by nearly 150 institutions, mostly universities. It is not yet clear whether this has led to the widespread establishment of university licensing offices operating with the appropriate incentives. While this is a natural institutional arrangement, alternatives would include allowing inventors to work with outside agents or independently on the basis of a revenue-sharing agreement concluded with the research institution. At this point, the fact remains that Russia's publicly funded institutions continue to supply only very limited amounts of high-quality research which is suitable for commercial applications (see also Box 7.2).

5. Infrastructure for innovation

Policy-led measures to foster the clustering of skills and activities have been widely pursued by governments, albeit with mixed results. Indeed, the Soviet system employed its own form of clustering, establishing "science cities" and closed cities focusing on science.[20] Unfortunately, most of those science cities have since fallen into disrepair, surviving mainly because of the concentration of employment in those areas, and giving rise to transfers from local and federal budgets.

More recently, innovation policy in Russia has turned to different methods of clustering activity in the belief that, by reducing search costs both for markets and for inputs (as well

[16] Aghion et al. (2005).
[17] Lach and Schankerman (2008); Belenzon and Schankerman (2007).
[18] There is, of course, the question of whether commercial imperatives have driven out pure research. [16] However, the question of this potential trade-off appears largely irrelevant in Russia, where both pure and applied research have under-performed.
[19] Dezhina (2011).
[20] Currently, 14 science cities receive government funding (although this funding has been declining over the years).

Box 7.1
The new economic school

The New Economic School (NES) is a private graduate school in Moscow dedicated to economics. Founded in 1992, it aims to establish a centre of excellence for teaching and research in the field of economics and to contribute to public policy, both through graduate training and through applied research at its Centre for Economic and Financial Research (CEFIR). Two further research centres were launched in 2011: the Centre for Demographic Studies and the Centre for New Media and Society. The core of the school comprises a faculty of 30 resident economists with PhDs from leading universities in North America and Europe. It offers two-year Masters programmes in economics and finance, and in 2011 it launched a small undergraduate programme in collaboration with the Higher School of Economics. Nearly one-half of of its graduates have gone on to pursue doctorates in leading western universities, as well as taking up positions in Russia's Economics and Finance Ministries, international organisations, investment banks, and Russian and Western universities.

In 2007 NES became one of the first establishments in Russia to set up an endowment foundation, which contributes to the long-term financial sustainability of the school. NES is also unusual in Russia in actively seeking interaction with the international academic community, including through an international advisory board consisting of leading economists. NES has been supported by a number of international foundations: the initial grant allowing operations to begin was awarded by the Soros Foundation, with significant subsequent support from the Eurasia Foundation, the Ford Foundation, the World Bank and the Citi Foundation. NES is one of three Russian universities to be supported by the MacArthur Foundation, along with the European University in St Petersburg, a private graduate school, and the Moscow State Institute of International Relations. These institutes have been at the forefront of attempts to jump-start social sciences in Russia by creating new research faculties outside the state system.

RePEc (Research Papers in Economics) currently considers NES to be the best economics institution in a former communist country. SSRN (the Social Science Research Network) considers NES to be one of the 100 best economics departments in the world and the top economics department in a non-OECD country. RePEc also considers CEFIR to be one of the top 20 economic think-tanks in the world. The NES model could potentially be replicated in the areas of science and engineering.

71st

Russia's ranking with respect to innovation according to the World Economic Forum

as transaction costs), clustering can lead to improvements in productivity. Consequently, technology parks, SEZs and other such arrangements have become a feature of the post-Soviet landscape. By 2011, there were (notionally, at least) 64 technology parks scattered across 35 regions or oblasts in Russia, of which between one-third and half were actually functioning as intended. These parks were largely set up in response to funding or subsidy opportunities provided by government. Most remain linked to universities, while firms operating within those parks have been there for an average of around 10 years – considerably longer than in most equivalent arrangements in other countries. Recent embellishments to the basic model have been the "IT parks" that the government began to encourage in 2007. Funding was set aside to build infrastructure for 11 such parks in major Russian cities between 2008 and 2010. There has, as yet, been no proper evaluation of the performance of IT parks and technology parks, although anecdotal evidence suggests mixed results.[21] The technology park in Tomsk, for instance, has been held up as an example of good practice.[22]

SEZs have also been created. These normally obtain 50 per cent of their funding from the federal government and 50 per cent from local government and/or local businesses. Most aim to establish links with existing manufacturing activities in a given region by offering complementary services and/or products. Reduced operating costs and other advantages (principally relief from tax and customs duty) have been used to attract occupants. Even so, it seems that SEZs established in existing high-technology areas (such as Zelenograd or Tomsk) have struggled to achieve a scale sufficient to foster clustering effects. Furthermore, the 2005 legislation that supported the creation of SEZs has one major drawback, namely that any disputes would have to be settled under Russian law and without international arbitration. This has been a deterrent to foreign investors.

The most prominent attempt to cluster innovative activity has been the Skolkovo initiative, which aims to establish a scientific and technological hub near Moscow, loosely modelled on Silicon Valley and the Boston Corridor (see Box 7.3). The objective is to

[21] Dezhina (2011).
[22] OECD (2011).

attract research institutions (including a new technical university), as well as start-ups and established companies, with a focus on five designated areas: energy efficiency; information technology; telecommunications; biotechnology; and nuclear technology. Incentives for firms to establish themselves in that area include tax exemptions and tax relief, simplified technical and regulatory rules (including simplified dealings with government ministries), and a liberalised immigration regime allowing the attraction of foreign talent. The federal government has allocated around US$ 3 billion to this project for the period 2010-14.

Policies to foster clustering can make considerable sense. But experience also shows that success depends very much on the strength of the institutional and regulatory framework, as well as the incentives offered to companies. Reviews of international experience also suggest that innovation enclaves are less likely to lead to success than clusters that are reasonably well integrated into the wider economy. In this respect, China's experience highlights the role of such clusters in attracting FDI and increasing exports. Some of these features are replicated in certain regions of Russia (such as Kaluga, where activity is centred on the automotive sector), but this approach is rather different from the "beacon model" exemplified by a project such as the Skolkovo initiative.

6. Innovating through industrial policy

As with the Skolkovo project, the Russian government has selected a number of broad areas that are to benefit from "vertical" or "targeted" industrial policies, namely: information technology; nano-systems; medical, space and nuclear technology; and energy efficiency. These priority areas currently account for around 35 per cent of public funding. In addition (as discussed in greater detail in the next chapter), financing arrangements – notably the Rusnano initiative – have been established in order to fund ventures in these priority areas.

While experience with industrial policy across the globe has consistently emphasised the importance of appropriate "horizontal" or "framework" policies, evidence regarding the efficacy of vertical policies is far more ambiguous.[23] Arguments in favour of activist vertical policies have had to rely on sustained market failures and/or strategic cooperation between the public and private sectors, with the public sector potentially acting as a coordinator and improving the flow of information to private companies.[24] This can occur through a variety of channels, including advisory and business services, the promotion of trade and the establishment of long-term relationships between government and companies. One successful example is Canada's Investor Assistance Programme, which provides prospective entrepreneurs with robust assessments of the likely viability of – and returns on – potential projects. Furthermore, private producers commonly need fairly specific inputs (as regards legislation, accreditation and infrastructure, for example), which the public sector may be best placed to provide. Indeed, evidence with respect to technical regulations, national standards and certification in Russia indicates that there is currently a lack of

Box 7.2

A case study in innovation: a Moscow-based pharmaceutical company

PX is an interesting success story – an innovative pharmaceutical company that has experienced rapid growth in recent years, thanks to a combination of a unique scientific background, successful commercialisation and a focus on high-quality management.

PX is one of very few Russian companies which have been able to develop their own branded medicines, register their products and commercialise them. Indeed, the company has become a successful market player, with its own R&D, production and sales capacities. Founded in 1996 by highly regarded Russian scientists, the company has a strong line in influenza vaccines and other medicines in the fields of immunology and viral diseases. Partly owing to large government purchases of vaccines for certain sections of the population, the company's turnover increased roughly sevenfold between 2007 and 2010. Following a €50 million investment programme, the company now operates a state-of-the-art plant on the outskirts of Moscow.

The basic scientific research that led to the establishment of PX was carried out in the Soviet era, but was not effectively taken to the market until the late 1990s. Since then, the company has placed considerable emphasis on further R&D. Of its total workforce of nearly 500 employees, around 60 work exclusively on R&D. Despite the fact that the teaching of science in Russian universities is perceived to have deteriorated, leading to considerable difficulties with the recruitment of high-quality young scientists, the company manages to hire and retain the best experts in the field – perhaps because employees are motivated not only by monetary compensation, but also by the innovative nature of their work, and perhaps because opportunities outside the company are fairly limited.

The company has also been successful in managing its growth thus far – an important challenge for many innovative small firms. As the start-up became a medium-sized manufacturer, it gradually improved its management practices and governance, adopting International Financial Reporting Standards (IFRSs), hiring professional managers and establishing a board of directors.

[23] EBRD (2008).
[24] As argued by Hausmann and Klinger (2008) and Rodrik (2008).

Box 7.3
Skolkovo

Skolkovo Innovation City is a high-technology business area being built in Skolkovo, one mile outside the Moscow Ring Road. Announced by President Medvedev in early 2010, it aims to become an innovation hub supporting the development and commercialisation of advanced technologies and helping to accelerate Russia's transformation from a resource-intensive to an innovation-based economy. The innovation centre will be financed primarily by means of Russia's federal budget. The Russian government spent around US$ 300 million on the project in 2011 and is expected to invest around US$ 4 billion by 2013, not including indirect support through tax breaks for companies. The innovation city will span roughly 400 hectares, house a permanent population of 21,000 and employ 31,000 people, including commuters from Moscow and the surrounding regions.

The vision for Skolkovo is centred on five "clusters" specialising in IT, energy, nuclear technologies, biomedicines and space technologies. Skolkovo's innovation ecosystem will encompass the Skolkovo Institute of Science and Technology (SkTech), a new graduate research university established in partnership with the Massachusetts Institute of Technology (MIT), 40 corporate R&D centres, business incubators, private seed and venture funds, and a technological park housing up to 1,000 start-ups. In addition, Open University Skolkovo (OpUS), launched in 2011, is expected to act as a source of prospective candidates for SkTech's Masters and PhD programmes, as well as interns for Skolkovo's partner companies.

Resident companies will enjoy numerous privileges in terms of tax incentives (exemption from profit, land and property taxes for 10 years, a reduced rate for compulsory insurance, and benefits as regards customs duty), simplified regulations and a streamlined visa regime. The Patent Service and various government ministries will also set up offices on-site to make regulatory compliance and the protection of intellectual property easier. To encourage more start-ups to participate, the Skolkovo Foundation (the main agency responsible for the Skolkovo project) will provide start-ups with initial grants. In order to receive these grants, tax breaks and other benefits, firms must first apply for "resident status", with applications being reviewed by experts in the relevant fields.

More than 500 companies have been granted resident status so far, with more than 100 receiving grants from the Skolkovo Foundation. Around half of these have also attracted standard venture capital, mostly from Russian firms.

adequate consultation between government and the private sector regarding technical regulation, as well as an excessive number of products requiring certification.[25]

The assumption underlying all of these types of intervention is that government is primarily there to assist – rather than direct – private firms in finding opportunities for innovation and diversification. In Russia, however, the coordination argument has been deployed in order to stimulate entry into new areas of activity where considerable fixed costs – including absent capabilities – are believed to exist. Thus far, the Russian approach seems directive in the sense that areas of activity have already been selected and accorded precedence, not least in terms of funding (see also Chapter 8). This risks repeating the countless selection failures that have littered the history of vertical industrial policy.

7. Tax treatment

Experience in OECD countries indicates that tax credits for R&D can play a positive role in increasing R&D activity, although the evidence is less clear-cut with respect to innovative output. Tax credits tend to be more effective when companies are already under competitive pressure to innovate. However, it is only relatively recently – since 2009 – that the Russian government has tried to use its tax regime to stimulate investment in innovation. Some forms of R&D spending are now given preferential treatment as regards tax, including the ability to write off spending. However, permissible expenditure has been limited to 32 "advanced" technologies and does not cover R&D in more traditional industries. Furthermore, the way in which innovation is treated for tax purposes has not always been consistent with other tax rules and regulations, so ambiguities in Russia's tax law have resulted in varying interpretations and thus a degree of arbitrariness in the application of such legislation. This seems to have led companies to avoid taking up tax benefits owing to the potential for disputes over interpretation.[26]

Consequently, complaints by companies concern not only the lack of clarity in the drafting of tax rules, but also the relatively narrow range of R&D spending that benefits from such favourable tax treatment. In addition, legislation amending tax law has been drafted in ways that tend to lead to the unequal treatment of parties and, in particular, favour larger firms. One proposal would be to significantly extend the range of eligible R&D expenditure, thereby covering a larger number of industries. Other complementary measures that could be considered include lowering payroll taxes for personnel involved in R&D activity, as well as exemptions from land tax for organisations involved in R&D. More generally, there may be a case for tapering the introduction of taxes for start-ups in particular sectors.

8. Policy implications

Innovation in Russia has continued to lag behind other countries and there are, as yet, limited signs that this is about to change. To its credit, the Russian government has recognised the scale of the problem. This has been accompanied by a range of policy

[25] Dezhina (2011).
[26] See the discussion of this issue in Dezhina (2011).

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Technology parks existed in 2011

initiatives targeting the key drivers of innovation. In particular, innovation policy has focused on improving the standard of publicly funded research, as well as investing in infrastructure (notably through technology parks, SEZs and other mechanisms promoting clustering). The Skolkovo project is the most recent and high-profile of these initiatives. While most of these attempts to improve the climate for innovation are in keeping with practices elsewhere, some specific features of Russia's initiatives stand out.

First, the supply of high-quality research by public-sector institutions remains very limited and it is difficult to imagine any rapid improvement in this area, not least because of the incentives for younger talent to migrate and the significant difficulties that research institutions – as well as companies – face in hiring skilled personnel from abroad. These problems are further exacerbated by the insularity that pervades Russian institutions and attitudes.

Second, little attention has been paid to linking research to the market and customer demand. Indeed, for research conducted by public institutions, the incentives and vehicles facilitating this matching have been largely absent. The legal framework has begun to move in the right direction, but recent changes are yet to bear fruit.

Third, despite the fact that evidence from a wide range of countries points to the importance of company-led innovation, incentives for private companies to invest in R&D remain limited, whether in terms of tax treatment or in terms of the quality of the business environment more generally. Thus far, incentives for clustering have also proven to be of very limited benefit.

Fourth, while considerable progress has been made in terms of establishing a legislative framework that ensures adequate legal protection for intellectual property rights – notably the intellectual property rights clause in the Civil Code, which came into force in January 2008 – pervasive limitations remain in terms of enforcement. An intellectual property rights court has yet to be set up and become operational.

Fifth, the government's overall approach to the issue of innovation continues to have a pronounced dirigiste or top-down feel, with priority given to directing and funding innovation in predetermined sectors and technologies. Furthermore, it is not always clear whether these privileged sectors have been selected on the basis of a robust analysis of Russia's likely dynamic advantages, rather than on an aspirational and conjectural basis. Recently, greater attention has been paid to providing a supportive environment allowing innovation to occur more spontaneously and allowing invention to thrive, but policy changes in these areas have been only partial and are yet to yield results.

Sixth, an economy's ability to innovate will always be determined by the set of skills available to that economy. As previous chapters have indicated, these skills are fundamentally shaped by the education and training system, the quality of which has deteriorated in Russia. The availability of high-quality management also plays a role, and Russia's immigration policy has limited the scope for using foreign personnel to fill skills gaps.

Lastly, experience in other transition countries shows very clearly that foreign companies are major players in investment in innovation, often in collaboration with local companies. This has largely been absent in Russia, to the country's detriment.

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