



# 02:

## How diversified is Russia?

Oil and gas account for a large and increasing share of Russian exports, currently making up around two-thirds of total exports. As a result, a large proportion of Russia's capital and labour is tied up in natural resources and related service sectors. This makes diversification a particularly challenging task, since the skills and technological inputs required by non-commodity exports are likely to be fairly different from those used in Russia's current exports. At the subnational level, diversification of the economy as a whole may be achieved by leveraging regional diversity, with different regions specialising in different areas.

### KEY FACTS:

10%

approximate percentage of workforce employed in manufacturing sectors not directly related to oil, gas or other natural resources in average region

103

Number of products where Russia has revealed comparative advantage, compared with 513 in China

20%

Share of higher-technology products in total manufacturing exports

# How diversified is Russia?

## 1. Introduction

Russia emerged from the Soviet Union with a very particular, industry-heavy economic configuration. In 1990 industry accounted for around 50 per cent of GDP, while services contributed only 35 per cent. Since then, the structure of the economy has shifted significantly, driven by two main factors.

The first is the liberalisation of prices and Russia’s integration into the world economy. As in most other transition economies, this has led to the expansion of services and, in parallel, the contraction of both industry and agriculture. The sectoral breakdown seen in 1990 has now been broadly reversed, with services now making up nearly two-thirds of GDP, while manufacturing, in particular, accounts for just 16 per cent (see Charts 2.1 and 2.2).

The second factor is the increase seen in international hydrocarbon prices since the late 1990s, which has encouraged further specialisation in natural resources – particularly oil, gas and other minerals – within the industrial sector. Increases in hydrocarbon prices have also reinforced the shift from industry to services, as they have led to an improvement in Russia’s terms of trade and an increase in its domestic purchasing power. These have, in turn, raised wages and prices in the service sectors. Thus, the de-industrialisation process that began in the early 1990s has been reinforced by a shift in relative prices resulting from soaring oil and gas prices and strong increases in government revenues.

Given the current breakdown of GDP (see Chart 2.2), the Russian economy may seem fairly diversified. However, the official breakdown overstates the extent of diversification, as oil, gas and other mineral resources are recorded all the way along the production chain – as mining and quarrying (the extraction of those resources), as manufacturing (the refining of oil, for example), as transportation (the moving of oil around the country), as wholesale trade (trade in oil and oil products), and so on.<sup>1</sup>

Russian exports tell a clearer story (see Charts 2.3 and 2.4). These show both the consistently large proportion of exports accounted for by natural resources (with mineral products, metals and precious stones making up more than 75 per cent of Russia’s exports since the mid-1990s) and the sharp rise in mineral exports resulting from the natural resource boom seen since 2000. By 2009 mineral fuels accounted for nearly two-thirds of Russia’s exports in nominal terms – up very strongly from around 45 per cent in the mid-1990s. The largest contributors to exports are crude oil, which makes up 43 per cent of mineral exports and 28 per cent of overall exports, petrochemicals (22 per cent and 14 per cent respectively) and natural gas (14 per cent and 9 per cent respectively). The next largest commodity group is metals, which accounted for 12 per cent of mineral exports in 2009, down from 16 per cent in 2000. Metals exports themselves are highly concentrated, with ferrous metals accounting for 44 per cent of the total. Chart 2.4, which calculates export shares using constant (2007) prices, shows that most of the increase seen in the export share of mineral products since 2000 can be attributed to higher hydrocarbon prices. In other words, there has, in real terms, been very little reallocation across commodity groups, so the concentration of exports has remained broadly stable since 2000. However, even

Chart 2.1  
Russian GDP by sector, 1990-2010

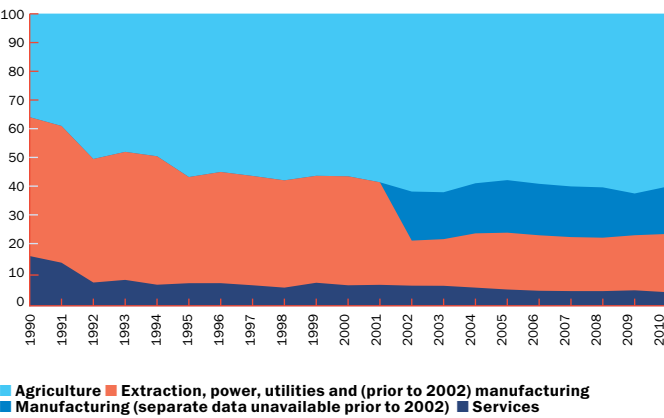
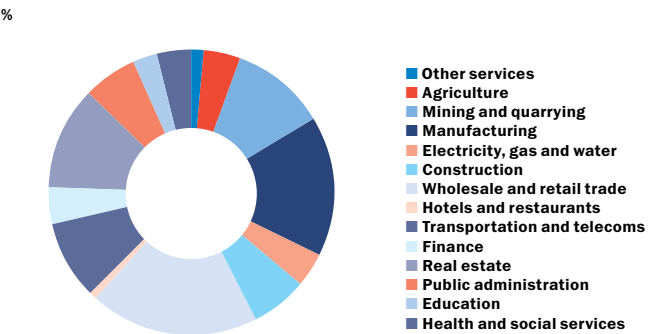


Chart 2.2  
Russian GDP by sector in 2011



<sup>1</sup> See Kuboniwa et al. (2005) for a detailed discussion of how the output of the oil and gas sector is recorded in the national accounts.

with constant prices, mineral products have risen slightly as a percentage of total exports.

Alongside the shift in the composition of production and exports, large shifts have also been seen since 1990 in the relative importance of Russia's various trading partners and the goods traded with particular countries. While trade with countries in the Commonwealth of Independent States (CIS) has declined, trade with the European Union (EU) has increased, driven mainly by exports of mineral fuels. At the same time, exports of manufactured goods have gone mainly to other CIS countries, attributable in part to historical relationships. Recent analysis by the OECD has shown that, besides raw materials, manufacturing exports have been dominated by low to medium-technology items. Higher-technology products account for barely 20 per cent of total manufacturing exports, which is very low by international standards. Given the structure of exports, the contribution made by high-technology industries to Russia's manufacturing trade balance has, accordingly, been highly negative.<sup>2</sup>

## 2. Russia's "product space"

How easy would it be for Russia to move away from its current commodity-dominated export profile and diversify its production and exports? This question can be answered with the aid of a method developed by Ricardo Hausmann, Cesar Hidalgo and a number of co-authors,<sup>3</sup> which uses detailed trade data to map a country's "product space". This method assigns a "value" to every product on the basis of the average income of the countries that export it worldwide. On the basis of the values for individual products, one can then measure the income associated with a country's total export basket (as a weighted average of the values of exported goods). Furthermore, this method can be used to

measure the "distance" between each pair of goods – that is to say, the probability of a country exporting both products at the same time (more precisely, the minimum of the probability of it exporting product A, conditional on it being an exporter of product B, and vice versa). Using this measure, it is possible to map a country's "product space" on the basis of the distances estimated between the various exports.

The usefulness of these country-specific product maps lies in the fact that, by showing the "location" of the country's current exports, they also indicate neighbouring product regions in which a country might be able to develop a comparative advantage relatively easily. This is based on the assumption that, although the distance between two goods in the product space is based purely on export patterns, "proximate" export goods rely on similar sets of inputs (such as physical assets, knowledge and infrastructure) that are specific to that activity. Established industries will generally have an organised supply of inputs and other requirements, such that, from a dynamic perspective, the cost of introducing and producing proximate products will be correspondingly lower and the chances of developing a comparative advantage will be higher.

This implies that if a country specialises in products located in a dense part of the product space where small distances separate a large number of products, it is easier to capitalise on existing comparative advantages and increase exports in adjacent areas. By contrast, if a country specialises in products located in peripheral, poorly connected areas of the product space, where inputs and skills tend to be highly specialised, developing new exports is likely to be more difficult.

The starting point for our analysis is Russia's product space in 1996. At that point in time, Russia had a comparative advantage

Chart 2.3  
Structure of exports in nominal terms

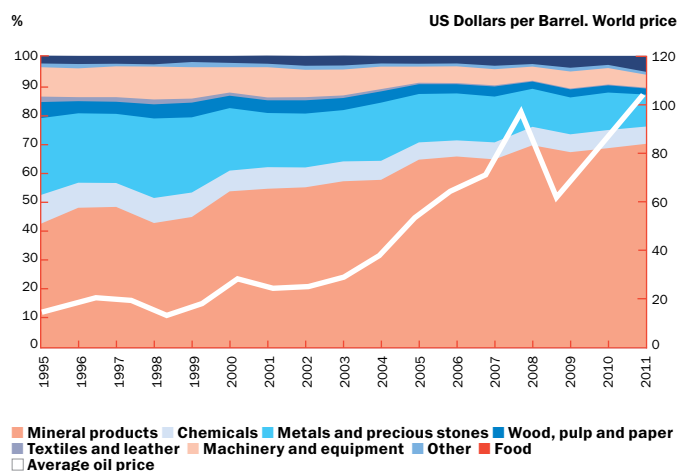
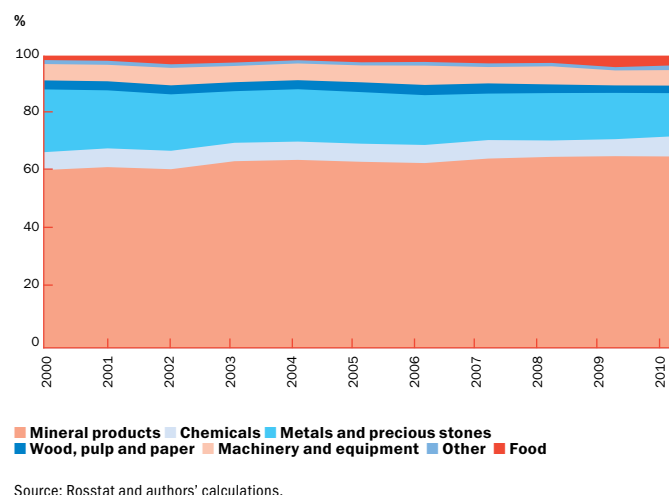


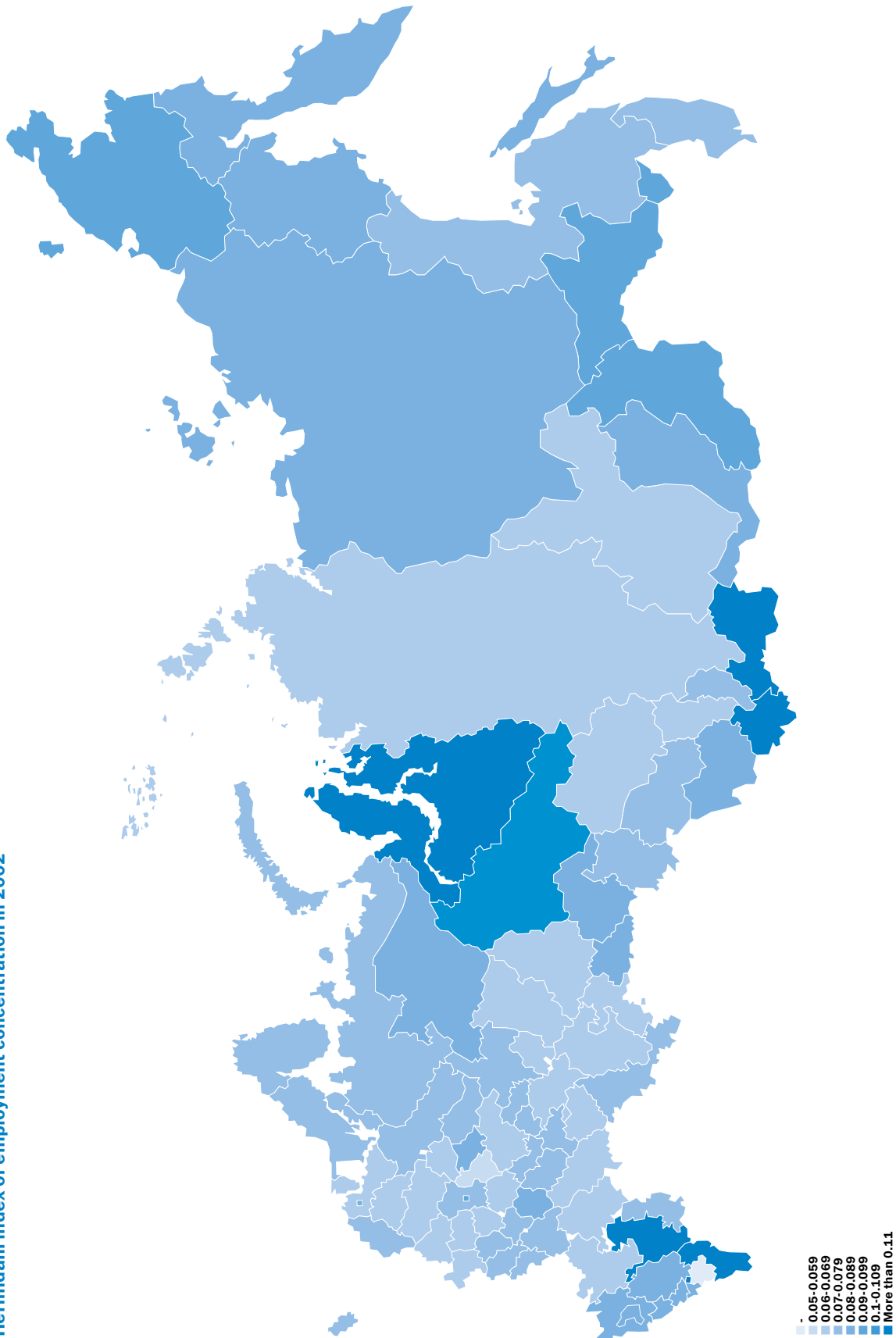
Chart 2.4  
Structure of exports in real terms (at constant prices)



<sup>2</sup> OECD (2011), p. 77.

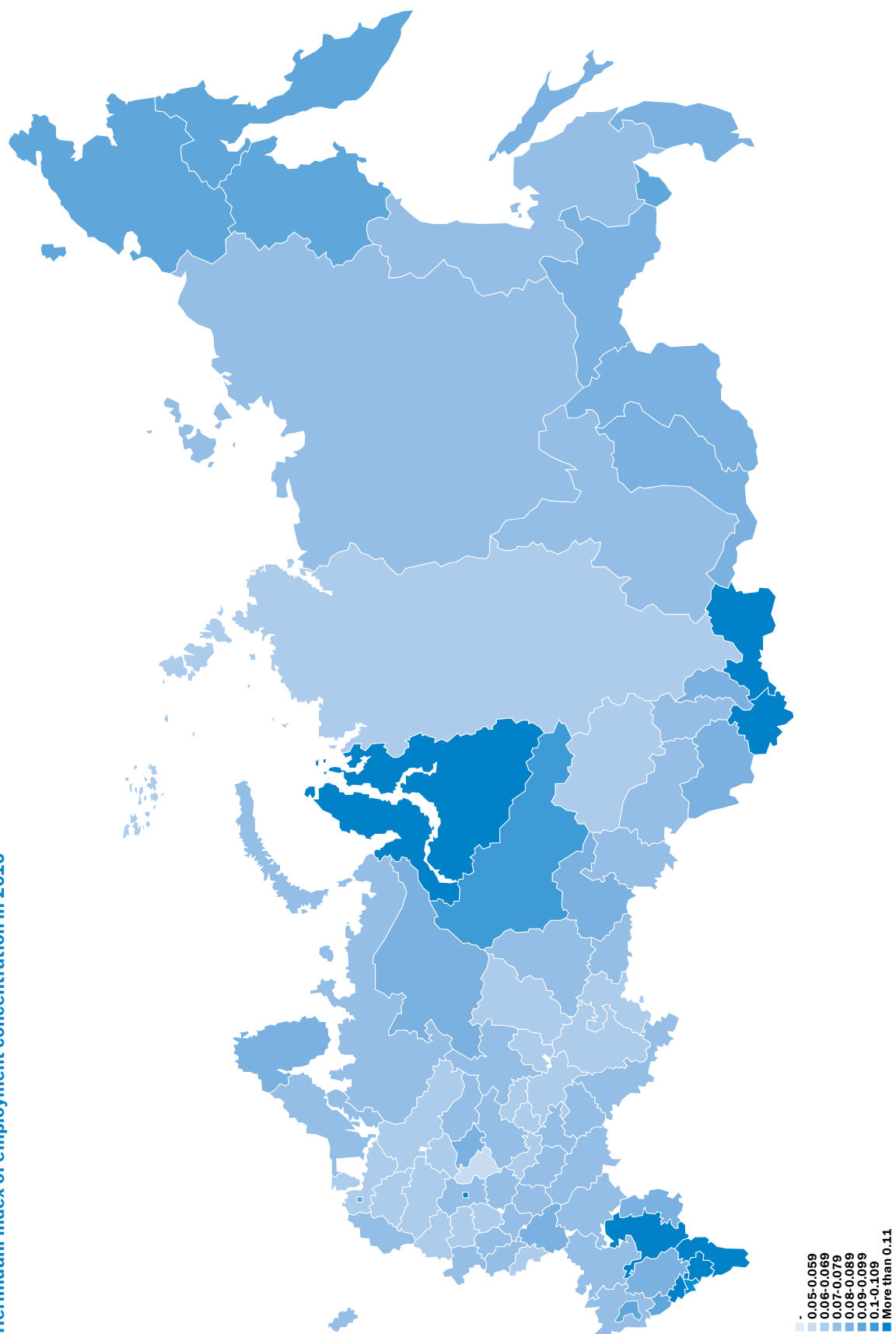
<sup>3</sup> See Hausmann et al. (2007), Hidalgo et al. (2007) and Hausmann and Klinger (2007) for more details and the application of this method to countries in Europe and Central Asia.

Map 2.1  
Herfindahl index of employment concentration in 2002



Sources: Rosstat and authors' calculations.

Map 2.2  
Herfindahl index of employment concentration in 2010



Sources: Rosstat and authors' calculations.



## Herfindahl index and location quotients

The location quotient approach compares the structure of regional employment with the structure of national employment. The location quotient for industry  $i$  is calculated as the ratio of the share of industry  $i$  in total regional employment to the share of that same industry in total national employment. A location quotient of less than one means that a given region is less strongly specialised in a given sector than the country as a whole, while location quotients of more than one correspond to greater than average specialisation in a particular industry.

These figures emphasise the fact that, despite the policy rhetoric, Russia's export basket has become even more concentrated since the mid-1990s. Furthermore, Russia's ability to shift into proximate products and diversify appears to be highly constrained. In short, the evidence indicates that Russia's exports have narrowed and that, given their composition, it will not be easy to diversify. A focus on natural resources is associated with a narrow set of specialist inputs and capabilities that cannot readily be redeployed in other areas of activity.

With these caveats in mind, the two measures of concentration used to assess the extent of regional specialisation are a Herfindahl index of employment concentration and location quotients (see Box 2.1). Maps 2.1 and 2.2 show regional Herfindahl indices for 2002 and 2010.

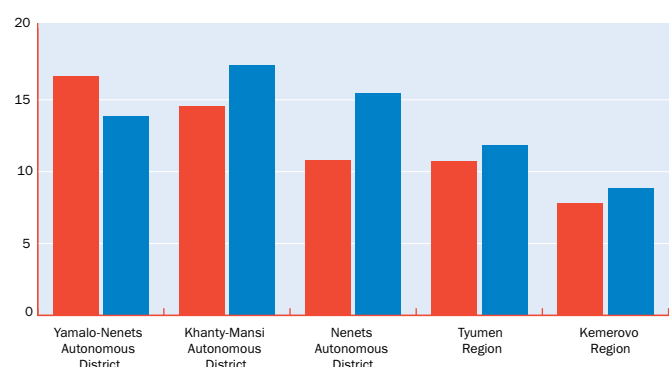
# 35%

Share of services  
in GDP at the  
start of transition

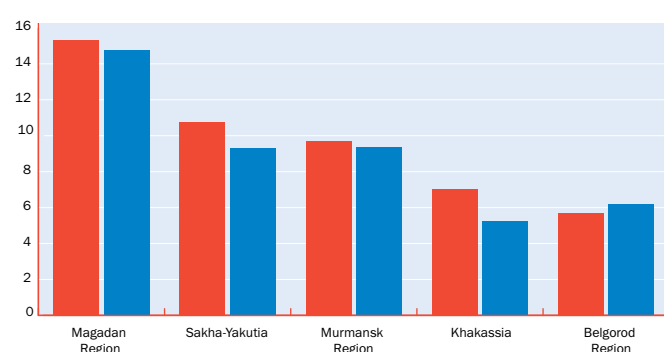
The index values are relatively low on average, but vary widely across regions (ranging from 0.05 to 0.2). Regions in the Urals (such as the Yamalo-Nenets Autonomous District) and the south of the country (such as Dagestan and North Ossetia) tend to be the most specialised. In the Urals, this is due to natural resource endowments, which lead to higher levels of employment in mining industries and mineral-related manufacturing. In the south, it is the large numbers of people employed in public administration and social services that account for the high levels of concentration. By contrast, regions in European Russia (that is to say, the Central and North-West federal districts) tend to be more diversified (with the Vladimir Region having the lowest level of concentration).

A comparison of the two maps reveals that production patterns have remained broadly unchanged, with only a limited shift in the level of specialisation over time. In other words, regions that were more specialised in 2002 remained more specialised in 2010. If anything, the maps point to the further concentration of employment in some already specialised regions. Only 34 of the 83 regions saw their index values decline (corresponding to moves towards greater diversity), and in only 15 cases were such changes of a non-negligible magnitude. The five most diversified regions in 2002 – the Tula, Kaluga, Leningrad, Vladimir and Tver Regions – were also the five most diversified regions in 2010, albeit in a slightly different order. And the four most specialised regions in 2002 – Tyva, Ingushetia, Dagestan

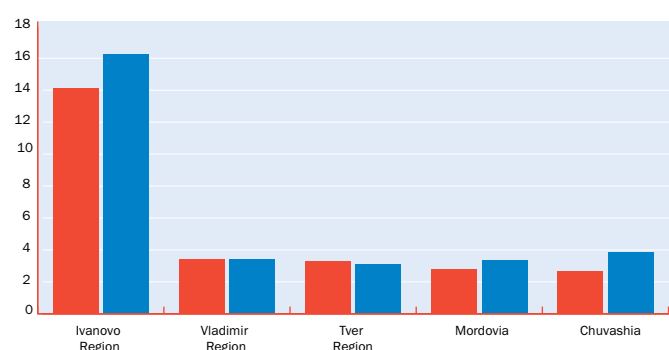
**Chart 2.5a**  
**Location quotients for the oil and gas industry**



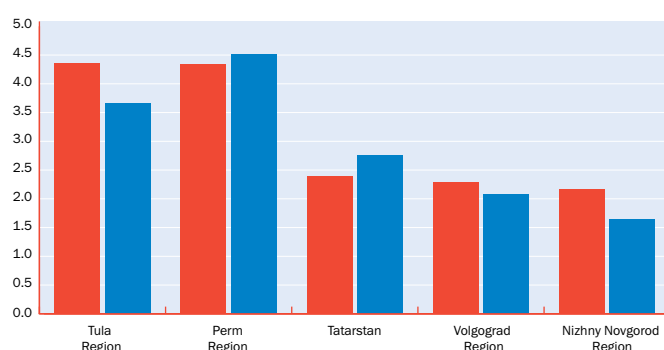
**Chart 2.5b**  
**Location quotients for other mining industries**



**Chart 2.5c**  
**Location quotients for textile manufacturing**



**Chart 2.5d**  
**Location quotients for chemical manufacturing**



■ 2002 ■ 2010

Sources: Rosstat and authors' calculations.

Note: The location quotient for industry  $i$  is calculated as the ratio of the share of industry  $i$  in total regional employment to the share of that same industry in total national employment.



Box 2.2  
Silicon Taiga

This technological hub has its roots in the 1950s, when the Soviet Academy of Sciences founded the educational and scientific centre Akademgorodok in Novosibirsk, a large city in Siberia, and established dozens of research institutes there. A few years later, the Novosibirsk State University opened its doors. Following the collapse of the Soviet Union, government investment in scientific activity declined sharply and many scientists left long-established institutions in search of better conditions. Some decided to leave Russia, while others established their own private businesses, often software-related high-technology IT companies. Over time, some of these companies have grown into large, internationally recognised software providers.

Building on the success of what has become known as “Silicon Taiga”, a technology park was launched in 2010 to further support innovation in a number of high-technology areas. These include telecommunication systems, power supply, bioengineering, laser technologies, precision instruments, medical tools and equipment, and new materials (such as nanoceramics and superhard and biocompatible materials).

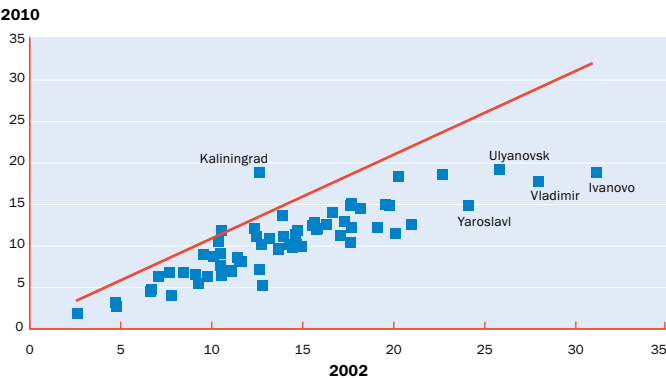
and the Yamalo-Nenets Autonomous District – remained the least diversified in 2010.

Analysis based on location quotients, which compares the structure of regional employment with the structure of national employment (see Box 2.1), confirms that regional specialisation patterns have been fairly stable over time (see Chart 2.5). For example, the Ivanovo Region remains heavily specialised in the textile industry, while regions in the Urals and Siberia (such as the Khanty-Mansi Autonomous District, Sakha-Yakutia and the Tyumen and Kemerovo Regions) tend to be heavily specialised in one or more of the mining or metals industries. In many of these regions, location quotients for dominant extraction industries have increased over the last decade. Similarly, the Ivanovo Region has increased its specialisation in textiles, the Kostroma and Kirov Regions are specialising more in the wood and paper industry, the Perm Region and Tatarstan are specialising more heavily in the chemical industry, and Samara has increased its specialisation in vehicle manufacturing.

The picture is similar if one looks specifically at employment in manufacturing sectors not directly related to oil, gas or other natural resources (see Chart 2.6). In an average region, around 10 per cent of the workforce are employed in these sectors. Chart 2.6 shows that this share declined almost universally between 2002 and 2010, with the exception of the Kaliningrad Region. Non-commodity manufacturing sectors account for around one-fifth of total employment in the Ivanovo and Ulyanovsk Regions, the largest shares of all the Russian regions.

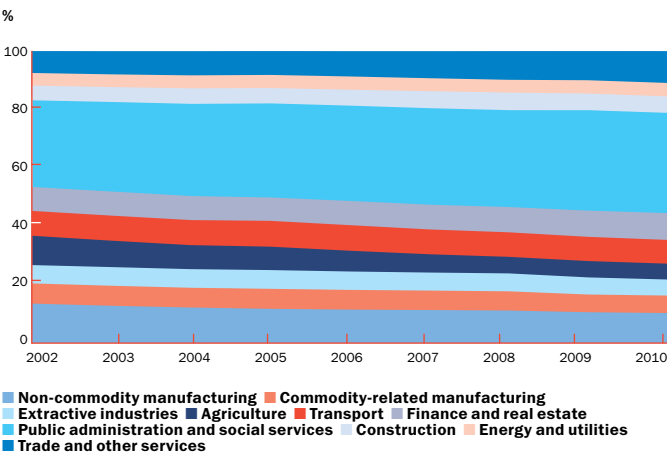
Furthermore, employment has gradually shifted away from manufacturing, towards service sectors (such as finance and real estate, trade, and public administration and social services; see

Chart 2.6  
Employment in non-commodity manufacturing as a percentage of total employment



Sources: Rosstat and authors' calculations.  
Note: "Non-commodity manufacturing" comprises textiles and leather, shoes, food, electronics, machinery and equipment, and vehicle manufacturing.

Chart 2.7  
Breakdown of employment by sector



Source: Rosstat.  
Note: "Commodity-related manufacturing" comprises wood and paper, chemicals and plastics, petrochemicals, metals and minerals. "Non-commodity manufacturing" comprises all remaining manufacturing industries.

Chart 2.7). The number of regions in which more than 10 per cent of the workforce are employed in higher-value-added services (especially trade) has trebled over the past decade.

Apart from this trend, specialisation patterns have proved largely resilient (although there have been some promising attempts at developing specific innovative sectors in certain regions; see Box 2.2 and Chapter 7). Econometric analysis suggests that growth in inward foreign direct investment (FDI) has been associated with increases in product diversity at the regional level (see Chart 2.8),<sup>4</sup> despite the fact that foreign investors have tended to target regions that were already less narrowly specialised. This relationship is not particularly strong however.

Should regional economies be more diversified? As the previous chapter argued, cross-country analysis suggests that greater economic diversification tends to be associated with improvements in economic performance. But while there is a strong case for Russia diversifying at the national level, it is difficult to say with any certainty what the right level of diversification is at the regional level. Indeed, the location of production at the subnational level tends to be influenced by geography and resource endowments, which lead, in turn, to the formation of clusters and the concentration of employment.<sup>5</sup> In other words, the diversification of a country's economy may rely on it having a diverse range of specialised regions, rather than intra-regional diversification.

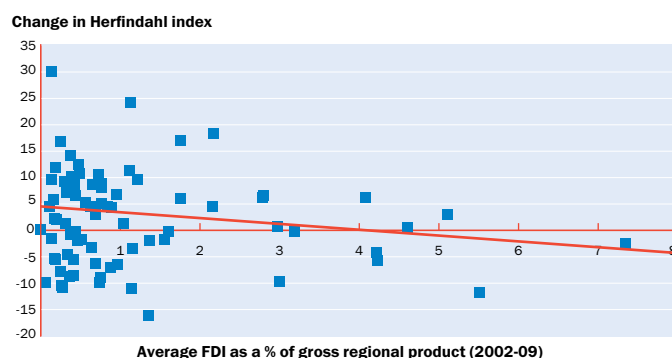
In fact, there appears to be a strongly positive relationship between specialisation and growth in Russian regions, as can be seen from Chart 2.9, which plots the average real growth observed in Russia's various regions over the period 2002-10

against those regions' average employment concentration (as measured by the Herfindahl index) over the same period. Regions that are more specialised have, on average, tended to enjoy higher rates of growth. It is also possible to demonstrate a link – albeit a weaker one – between the pace of specialisation (as measured by changes in the Herfindahl index between 2002 and 2010) and economic growth. In other words, stronger growth is associated with greater concentration of employment.<sup>6</sup> This may suggest that, rather than aiming to achieve economic diversification within each individual region, Russia's diversification strategy may want to focus on establishing new non-commodity-related production and export capacity in regions that are particularly well-suited to the chosen areas of activity. This could apply, in particular, to regions that are already fairly diversified – or indeed specialised in non-commodity-related areas of activity.

# 10%

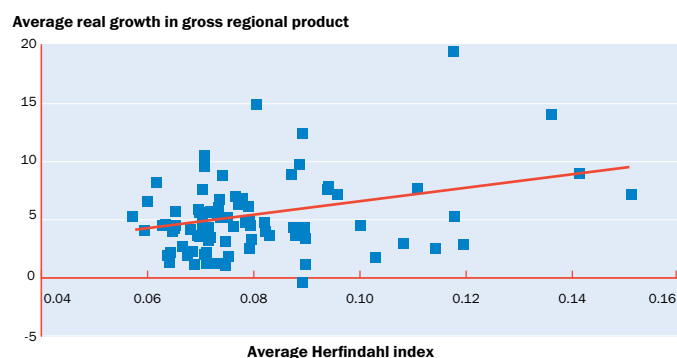
approximate percentage of workforce employed in manufacturing sectors not directly related to oil, gas or other natural resources in average region

**Chart 2.8**  
**FDI and regional diversification**



Sources: Rosstat and authors' calculations.  
Note: Fitted line is for a quadratic specification.

**Chart 2.9**  
**Regional specialisation and growth: 2002-10**



Sources: Rosstat and authors' calculations.

<sup>4</sup> Also reported in Volchkova (2011).

<sup>5</sup> See, for example, Overman et al. (2001).

<sup>6</sup> This holds if one controls separately for the share of employment in extractive industries (in other words, the relationship is not driven purely by strong growth in commodity-rich regions). The correlation between an abundance of natural resources and average regional growth is positive, but relatively low (0.12).

Although Russia's output structure may, at first sight, appear reasonably diversified, the competitiveness of Russian exports outside the natural resource sectors is limited and changes seen in Russia's export structure since the early 1990s have not been associated with greater diversification of the economy. Instead, the evidence indicates that Russia's exports are more concentrated today than they were 15 years ago, partly in response to the increases seen in international natural resource prices.

What will it take for Russia to reverse this trend and diversify away from natural resources? The evidence presented in this chapter suggests that one option may be to take advantage of Russia's enormous diversity at the regional level. Diversification at the national level does not mean that every region in Russia should try to diversify. On the contrary, diversification at the level of the economy as a whole may involve greater regional specialisation, as individual regions leverage their natural comparative advantages and reap the benefits of economic clustering. That said, if Russia's overall diversification strategy is to succeed, many regions will need to develop new areas of comparative advantage.

Given that Russia has tended, so far, at the level of the economy as a whole, to specialise further in the extraction of natural resources and commodity-related industries, diversifying Russia's exports and production will require specific policy efforts at both the national and the regional level. International evidence on economic development outside the natural resource sectors suggests that this should be based on policy efforts in a number of specific areas. The first concerns the establishment of a supportive business climate and the availability of skilled

managers and workers. These are issues that we address in greater detail in the next few chapters (with Chapters 3 and 4 discussing the business environment at the national and regional level, while Chapters 5 and 6 discuss management and general skills). Also important are policies aimed specifically at the promotion of exports, which may include the establishment of an independent federal agency tasked with redesigning tools for the promotion of exports and conducting all necessary activities in this area. The efforts being made at present in terms of the promotion of exports are fairly limited by international standards, and the institutional set-up is insufficiently business-oriented. Finally, export capabilities rely on continued innovation – and thus policies supporting innovation and the provision of financing for innovative firms. These issues are discussed in greater detail in Chapters 7 and 8.

# 20%

Share of  
higher technology  
products in total  
manufacturing exports



## References

- R. Hausmann, J. Hwang and D. Rodrik** (2007), "What you export matters", *Journal of Economic Growth*, Vol. 12, No 1, pp. 1–25.
- R. Hausmann and B. Klinger** (2007), "The structure of the product space and the evolution of comparative advantage", CID Working Paper 146.
- C. Hidalgo, B. Klinger, A. Barabasi and R. Hausmann** (2007), "The product space conditions the development of nations", *Science*, Vol. 317, No 5837, pp. 482–487.
- M. Kuboniwa, S. Tabata and N. Ustinova** (2005), "How large is the oil and gas sector in Russia? A research report", *Eurasian Geography and Economics*, Vol. 46, No 1, pp. 68–76.
- OECD** (2011), *Review of Innovation Policy: Russian Federation*, Paris.
- H. Overman, S. Redding and A. Venables** (2001), "The economic geography of trade, production, and income: A survey of empirics", LSE Globalisation Programme research paper.
- N. Volchkova** (2011), "Russian regions and Russian firms: output and export diversification", Centre for Economic and Financial Research, mimeo.