

# Russian Federation Sugar sector review



FAO INVESTMENT CENTRE

COUNTRY HIGHLIGHTS





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## Sugar sector review

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### **COUNTRY HIGHLIGHTS**

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# FOREWORD

The joint sector reviews of the Food and Agriculture Organization of the United Nations (FAO) and European Bank for Reconstruction and Development (EBRD) aim at helping policy-makers and investors to make the right decisions towards more efficient and inclusive agricultural and food systems. This is the third report in a series of three sugar sector reviews carried out by FAO's Investment Centre Division at a request of EBRD. The two other sugar reviews, covering Serbia and Ukraine, are available in the Country Highlights Report Series area of FAO's Investment Centre Division website.<sup>1</sup>

Following privatization of the sugar sector in the early 1990s, the Russian Federation witnessed a revival of its sugar industry, as considerable investment has flowed into the farm and factory operations. Much of this investment has taken place within the last ten years and has taken the form of modernization and consolidation of factories, as well as investment in beet sugar farming by factories. As a result, the country has steadily reduced its reliance on imports.

However, increasing field productivity and factory performance will remain a long-term challenge for the industry. Its ability to maintain high levels of production in the future will depend on a number of factors, the most important of which is to ensure a stable supply of beets. This requires beet to be a profitable crop in the farm rotation, which means yield growth and prices must keep pace with other crops, especially sunflower seed, wheat and other cereal crops that are competitive internationally. So far, the country's tariff regime, which provides considerable support to local sugar prices, has been the key factor allowing for sector development shielding it from import competition; however, there are significant opportunities to improve productivity in the sector.

This sugar sector review provides background information on sugar production, consumption and trade in the Russian Federation with an ultimate objective to assess prospects for the sugar industry. It discusses the competition of sugar beet with other crops and the

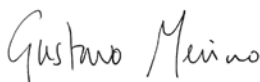
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1 [www.fao.org/investment/tci-publications/country-highlights/en/](http://www.fao.org/investment/tci-publications/country-highlights/en/)

profitability of sugar production and sector performance; provides comparison of domestic and international sugar prices; identifies main producers; discusses support and trade measures to inform interested policy-makers and investors. The readers interested in the mid-term prospects of the world sugar market are encouraged to read the latest global Agricultural Outlook produced jointly by the Organisation for Economic Co-operation and Development (OECD) and FAO.<sup>2</sup>



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<sup>2</sup> [www.oecd.org/site/oecd-faoagriculturaloutlook/](http://www.oecd.org/site/oecd-faoagriculturaloutlook/).



## ACKNOWLEDGEMENTS

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## ACRONYMS AND ABBREVIATIONS

AMS	aggregate measurement of support
BRL	Brazilian real
CIS	Commonwealth of Independent States
COMESA	Common Market for Eastern and Southern Africa
EBIT	earnings before interest and taxes
EBITDA	earnings before interest, taxes, depreciation and amortization
EBRD	European Bank for Reconstruction and Development
EU	European Union
EUR	Euros
FAO	Food and Agriculture Organization of the United Nations
FFV	flex-fuel vehicles
f.o.b	freight on board
GNI	gross national income
MPS	market price support
NAFTA	North American Free Trade Agreement
NPC	nominal protection coefficient
OECD	Organisation for Economic Co-operation and Development
PSE	producer support estimate
RUR	Russian rouble
SPS	sanitary and phytosanitary
TBD	tonnes of beet per day
USA	United States of America
USD	US dollars
VAT	value added tax
VHP	very high pol
WHO	World Health Organization
WTO	World Trade Organization



## EXECUTIVE SUMMARY

The Russian Federation's sugar industry has expanded output dramatically over the past ten years. As a result, the country has steadily reduced its reliance on imports. The stimulus for this expansion can be traced back to privatization of farms and factories in the early 1990s. However, sector development started only after the government has implemented the current system of variable import duties to protect local producers from volatile world market prices starting 2004.

High domestic sugar prices accelerated investment and the expansion of the sector in the Russian Federation, as local beet prices increased by more than those of alternative arable crops. With these foundations in place, the industry has been willing to invest heavily to develop the sector further, with these investments having been focussed in two areas in particular: (i) consolidation and modernization of the beet processing sector and (ii) intensify beet production and secure greater raw material supplies for their factories.

### **Sugar beet industry in need of modernization**

There are 77 operational beet factories in 21 regions (2011–2012) that provide jobs for nearly 200 000 employees in the entire sugar sector and produce 4.5–5 million tonnes of sugar. Although processors have invested heavily to modernize and expand beet factories, there have been no new factories built in the Russian Federation since 1985. About 34 factories started operation prior 1940s and require substantial modernization of equipment. Capacity of the existing Russian factories ranges from 2 000 to 10 000 metric tonnes of processed beet per day as compared with an average 6 000–20 000 tonnes of beets per day (TBD) of processing in Europe or the United States of America (USA).

Significant room for sugar factory modernization exists in the Russian Federation with the consideration of not only daily average processing capacity, but also energy efficiency, reduction of beet losses in storage, improved water-use efficiency and waste management.

## Industry consolidation

There are more than 2 000 farms growing sugar beets in the Russian Federation with very low level of industry consolidation at the farm level. In contrast, sugar production is more concentrated: five industry leaders – Prodimeks, Razgulyay, Dominant, Rusagro and Sucden – produced about 60 percent of beet sugar in 2011. The sugar production business is predominantly owned by local businesses. With an estimated share of independent sugar producers of about 40 percent, the sugar industry will likely undergo further consolidation.

## Profitability and competitiveness

Sugar beet farm margins in the Russian Federation would likely remaining positive even under conditions of significantly reduced prices and border protection with an exception of the Volga region. Beet farmers in the Central region appear to be most competitive. Their earnings before interest, tax, depreciation and amortizations (EBITDA) can decrease from 65 percent in our base-line scenario to 45 percent in case of a 25 percent price decrease. Farmers in this region are expected to still make a healthy 35 percent profit even if import tariffs were to be removed. In the long run, farmers in the Central region need to receive an estimated beet price of around USD 40 per tonne in order to incentivize them to grow beets – an equivalent of USD 310 per tonne of refined sugar price.

The Central region offers low beet production costs and good production perspectives. However, despite spending about USD 1 000 per hectare less on cultivating beet than in the Great Lakes region of the United States, the much lower beet yields in the Central region mean that profitability per tonne in the two regions is very similar. This once again stresses on the need to improve beet farm performance in the primary production regions of the Russian Federation.

The processing sector should be concerned of sugar market opening to import competition. It generally has lower margins than the farm sector, and it is more vulnerable to a reduction in sugar prices. The EBITDA of the processors in the Central region would decrease from 30 percent to 9 percent in case of a 25 percent sugar prices drop and its turns negative in a scenario of no import tariff protection. Again this highlights the need for factories to maximize capacity utilization by extending season length.

Under the existing level of domestic market protection, which largely has remained unchanged after country's accession to the WTO, the sugar industry faces a number of important challenges.

### **Short-term industry challenges**

The 2011/12 season highlighted two very important short term challenges facing the sugar sector: (i) inventory financing and (ii) beet storage issues.

#### **Inventory financing**

The first, and most important of these challenges, is the need for adequate capital to finance maintaining sugar stocks. Until 2011/12 season, domestic sugar production was sufficient to cover only about six to seven months of consumption. With the processing season lasting four to five months, the industry did not have to carry more than two to three months of stocks after the beet slicing campaign. However, in high sugar production years (when domestic production approaches self-sufficiency levels), the industry will have to carry sugar inventory throughout the year. This is a new challenge for the industry, which it will have to address in the near future.

In the absence of adequate and reasonably priced domestic finance, processors and growers will likely choose to liquidate stocks to generate cash during the processing season which will have negative impact on prices as it already happened when domestic sugar prices were trading about 25 percent below import parity values. The cost of failing to address this issue will be significant and it will be reflected in lower beet prices and will influence farmers' planting decisions.

#### **Beet storage**

Assuming the sector is adequately financed to maintain sugar (and beet prices) close to import parity, thereby encouraging farmers to retain beet within their farm rotation, the industry will face another challenge: beet storage. Installed capacity in the beet-processing sector was around 300 000 TBD in 2010–2011. If the Russian Federation were to reach self-sufficiency in sugar, it would have to process approximately 45 million tonnes of beets, which will require an average of 150 processing days per factory. However, climatic constraints mean that beets must be harvested in a period of 70–90 days to allow the maximum period for plant development and the onset of frost.

This means that beets will have to be stored for 60–80 days, with factories operating until the end of January/early February. As the USA beet industry demonstrates, this is possible; however, it requires investment and careful management of the harvest and post-harvest losses.

## **Longer term challenges and uncertainties**

The industry also faces the following long-term challenges: limited domestic consumption growth opportunities, farm management, factory efficiency and policy.

### **Consumption**

Sugar remains an important part of every-day diets of the Russian consumers as it the second most important source of food calories (contributing to 10 percent of all food calorie supply in 2009) after cereals and ahead of vegetable oils, milk and meat products. This largely explains the importance of sugar from an agricultural policy perspective in the Russian Federation. At the same time, the levels of per capita sugar consumption in the Russian Federation (about 40 kg per capita per year) are close to these in Brazil, the European Union (EU) and the United States of America. Further consumption growth opportunities will be limited and total consumption might decrease considering negative population growth.

### **Farm management**

The large beet processing companies currently grow 35-50 percent of their own beets on land that they own or lease. Even if this share does not increase, it poses a substantial challenge in terms of management and also requires large amounts of capital to be tied up in farming.

Beet production requires a substantial investment in capital and human resources – a challenge that has faced another major sugar industry, Brazil, where processors control 70-80 percent of their own raw material supply. Recognizing these challenges, Brazilian millers are increasingly outsourcing the management of their farms, thereby reducing the scale of the management challenge and financing needs. This course may not yet be open to Russian beet processors, as there is not yet a sufficiently well-developed contractor base in the agriculture sector. This business model will require a commitment on the part of beet factories and farmers to develop strong partnership and will unavoidably face another major challenge – poor contract enforcement.

## **Factory efficiency**

Even if the sector is able to extend season length to four to five months through improved management of beet storage, a comparison with other countries this report suggests that there is still considerable scope for increasing factory capacity utilization, as well as factory size, in the future. However, for this to be successful, it is important that factories develop a strong and committed supplier base, with farms growing beet on a relatively short rotation in order to minimize beet haulage distances.

This will require either that factories grow more of their own beets or that they can demonstrate to farmers that beets offer a better return than other crops in the long term. The relative competitiveness of sugar beet in the farm rotation in different regions suggests that it will be easiest to pursue this course in the Central beet-growing region.

## **Policy**

The orientation towards import substitution for sugar as well as other food and agricultural products has been stipulated by the Doctrine on Food Security of the Russian Federation. Meat and dairy producers appear to be main beneficiaries of the self-sufficiency policy.

Sugar producers accounted for RUR 12 billion of transfers (mostly through the market price support/tariff measures) in 2008–2010. This was about 2 percent of all transfers received by Russian farmers as compared 19 percent received by the milk, 9 percent by beef, 20 percent by pork and 19 percent by poultry meat producers in the Russian Federation according to OECD calculations.

The current policy environment – in particular the system of border protection for sugar – has been instrumental in supporting and stabilizing internal market prices. The Market Price Support averaged about USD 120/ per 1 tonne above the level of reference international prices since 2004. This level of market protection has already allowed the Russian Federation to approximate the 80 percent self-sufficiency target level.

The system of variable import tariff will remain after country's accession to the WTO; although, our analysis mentioned above indicates that the farming industry would be able to compete in a less protected market environment.

High domestic market protection also means that the policy-makers and the industry are now confronting new challenges, in particular market saturation in high production years when local beet sugar production will exceed domestic consumption. While modest surpluses could be absorbed in neighbouring high-priced markets, the Russian Federation is not well placed to export sugar further afield. Surpluses in excess of around 0.5 million tonnes could have damaging consequences for local prices. This suggests that it will be difficult for the country to sustain production in excess of 5.5-6.0 million tonnes in the foreseeable future.

Therefore, as sugar factory modernization continues, the government will need to consider reducing import tariff protection in order to allow domestic industry to stay competitive in the long-term perspective without government resorting to introducing domestic production quotas or using export subsidies to remove surpluses from the market.

# Chapter 1 - World sugar markets and the role of the Russian Federation

World sugar production is projected to increase by 1.9 percent per annum in response to growing demand, reaching nearly 212 tonnes by 2022.<sup>3</sup> This represents an increase of around 38 tonnes over the base period of 2010–2012. Moderate yield increases, lower than in the previous decade, will account for most of the additional production, rather than expansion of the area under sugar crops. Nearly all of the increase in sugar production is projected to originate from sugar cane rather than sugar beets. The developing countries of Brazil and India will remain the leading producers of sugar cane. Global consumption of sugar is also projected to grow at around 1.9 percent per annum, slightly slower than in the previous decade, to reach 204 tonnes in 2022/23. The sugar deficit regions of Asia and Africa are anticipated to retain their dominant share of world sugar use.

World sugar prices are expected to continue to drift downwards in 2013/14 from 2010–2012 (the period predominantly covered in this review) before commencing a turnaround and following a moderately upward trend, as sugar producers adjust production and consumption continues to grow in ensuing years. The world reference raw sugar price is projected at USD 439/tonne (USD 0.20/lb) in nominal terms for 2022/23.<sup>4</sup>

Larger production in Brazil and elsewhere will lead to additional stock replenishment and higher global stocks in the near term, adding to downward pressure on sugar prices. Cane sugar producers in developing countries, led by Brazil and Thailand, are expected to account for the majority of growth in sugar exports, with imports spread over a wider group of countries.

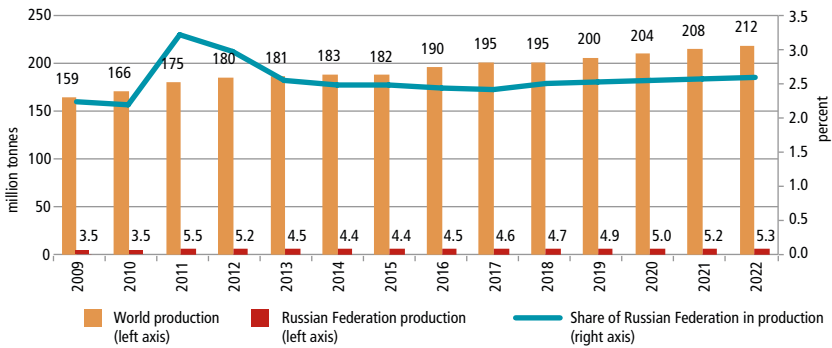
The most plausible scenario of market development suggests that the Russian Federation will likely maintain sugar production at the level of 5.3 million tonnes by 2022, accounting for 2.5 percent of global sugar production (see Figure 1).

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3 This chapter draws on data from the *OECD-FAO Agricultural Outlook 2013–2022*, available at: [www.oecd.org/site/oecefaagriculturaloutlook/](http://www.oecd.org/site/oecefaagriculturaloutlook/)

4 Intercontinental Exchange (ICE) Product Guide: Sugar No. 11 Futures.

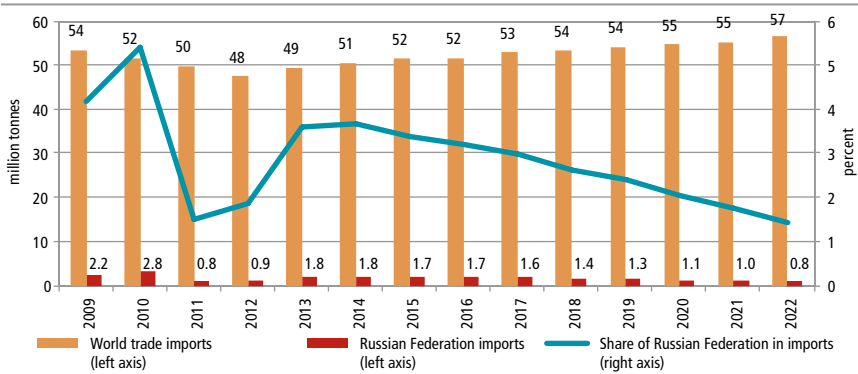
**Figure 1: World sugar production and share of the Russian Federation (raw sugar basis), 2009-2022**



Source: OECD-FAO Agricultural Outlook 2013–2022.

Global sugar imports are expected to recover after a short period of decline in 2010–2012 and increase to 57 million tonnes by 2022. As domestic sugar production in the Russian Federation is expected to increase from 2010–2012 levels, the country’s share in global sugar imports will decrease from more than 5 percent in 2010 to just about 1 percent in 2022.

**Figure 2: World sugar trade imports and share of the Russian Federation (raw sugar basis), 2009-2022**

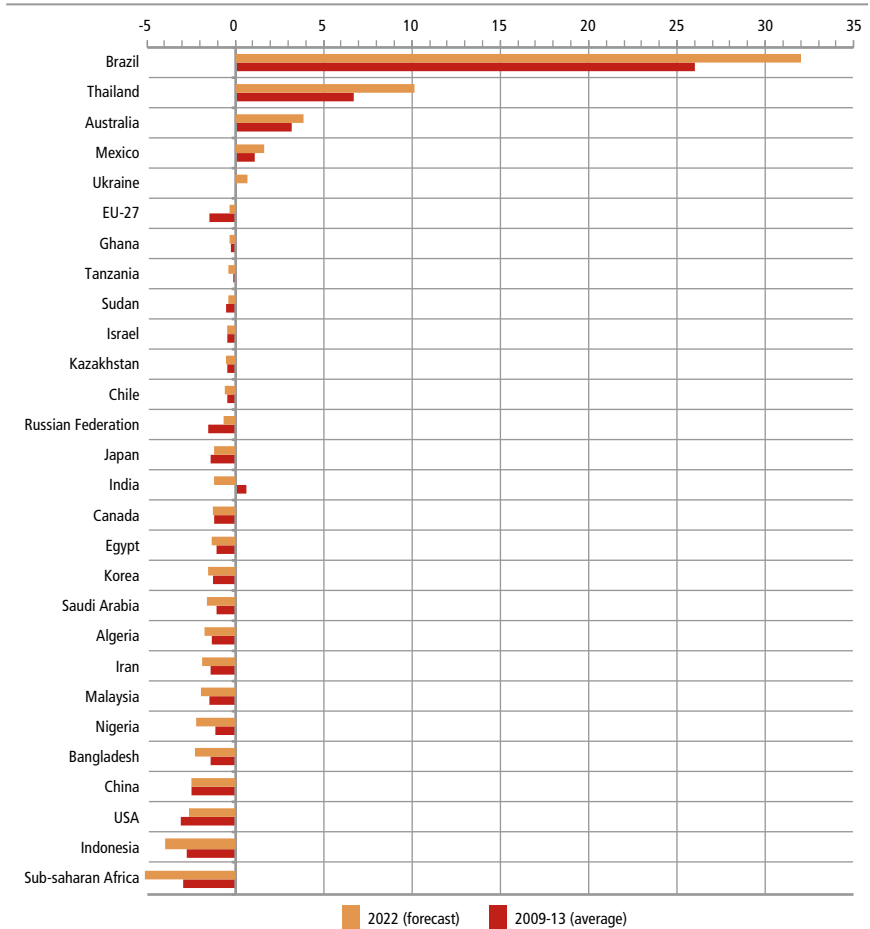


Source: OECD-FAO Agricultural Outlook 2013–2022.

As Figure 3 shows, Brazil, Thailand, Austria, Mexico and Ukraine are expected to increase exports of sugar. Countries in sub-Saharan Africa, Indonesia, the United States, China, Bangladesh,

Nigeria, Malaysia, Iran and Algeria will remain the main importers of sugar by 2022.

**Figure 3: World sugar trade and share of the Russian Federation (raw sugar basis)**



Source: OECD-FAO Agricultural Outlook 2013–2022.

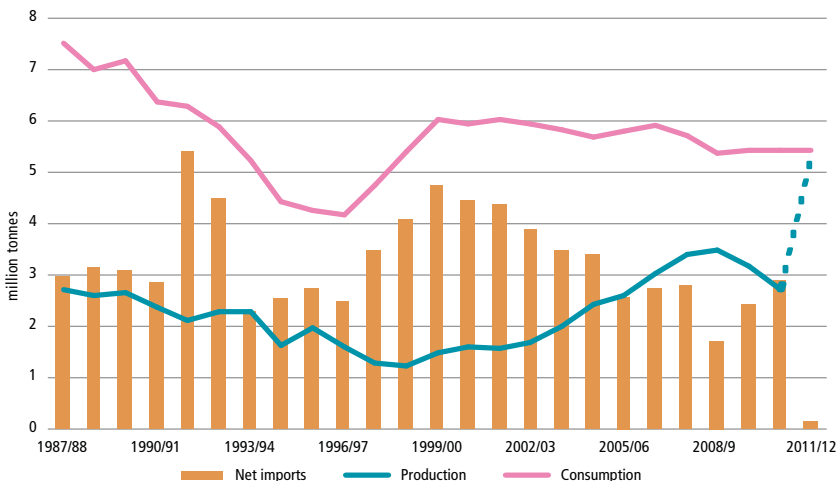
Considering the importance of global sugar market developments to sugar production in the Russian Federation, a more detailed perspective on the world sugar market, with a focus on Brazil and other main producers and exporters, is provided in Annex 1 of this report.

## Chapter 2 - Overview of the Russian sugar sector

During the Soviet era, the Soviet Union had a large beet sugar industry that produced around nine million tonnes of sugar annually. However, the collapse of the Soviet Union signalled a period of contraction, with Russian sugar production halving between the late 1980s and mid-1990s. However, following the privatization of farms and factories, and a period of rationalization and consolidation, production has recovered. The establishment of a stable sugar pricing policy in 2004 stimulated investment in the sector and more recently has been boosted further by high sugar prices. At the same time, the sector has also benefitted from subsidies to farmers. Although the rise in sugar output was interrupted by severe drought in 2010, production quickly recovered in 2011 and 2012 approaching the level of domestic consumption.

Figure 4 presents the evolution of Russian supply/demand balance in 1987–2012. It is clear that sugar production in the Russian Federation increased steadily over the last decade and was interrupted only by drought in 2010/11. At the same time, consumption eased as a result of population decline.

**Figure 4: Russian Federation's white sugar supply/demand balance, 1987/88-2011/12**



Source: LMC International.

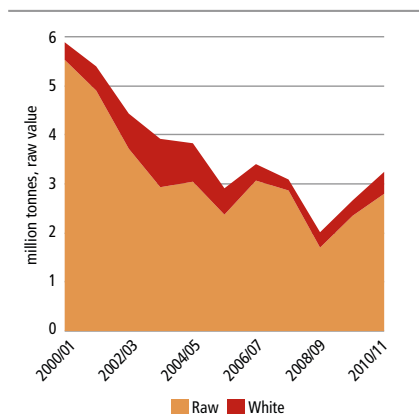
These developments mean that the Russian Federation's dependence on imports has declined with the country close to 60 percent self-sufficient in sugar, compared with less than 30 percent in early 2000. In 2011/12, the country was almost self-sufficient in sugar with less than 10 percent of total sugar demand coming from imports.

Around 90 percent of the sugar imported into the Russian Federation comes in the form of raw sugar, which is refined into white sugar (almost exclusively at beet factories) during the off-crop period. Refining of imported raw sugar is supported by a differential tariff on raw and white sugar, and is further encouraged by the Government through the lowering of the raw sugar import tariff when availability of locally produced beet sugar is low.

The decline of Cuba as the traditional large supplier to the Russian Federation means that 80–90 percent of raw sugar imports now come from Brazil. The main port for imports is Novorossiysk in the Black Sea, from which the sugar is transported by rail principally to beet factories in the Russian Federation's southern and central growing regions.

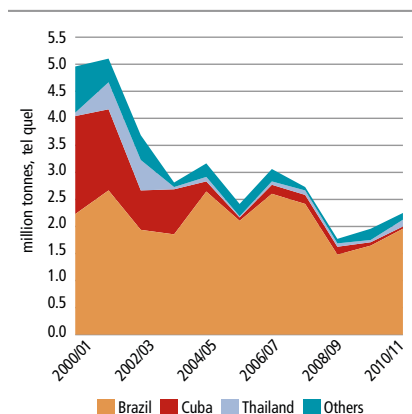
The quantity of white sugar that enters the country is small. This is due largely to the prohibitively high import tariffs. The main exception is Belarus, which ships most of its beet sugar production to the Russian Federation under the Customs Union, and supplies its internal needs by refining imported raw sugar.

**Figure 5: Breakdown of the Russian Federation's sugar imports, 2000/01-2010/11**



Source: LMC International.

**Figure 6: Source of the Russian Federation's raw sugar imports, 2000/01-2010/11**



Source: LMC International.

## Consumption

Increased consumer incomes in the Russian Federation have resulted in higher consumption of meat, dairy and other livestock products. Although this is not the case for sugar, it remains an important part of an everyday diet in the Russian Federation. This is especially true for consumers with low incomes. According to FAO Stat, sugar was the second most important source of food calories contributing to 10 percent of all food calorie supply in 2009 after cereals and ahead of vegetable oils, milk and meat products (see Table 1). This largely explains the importance of sugar from an agricultural policy perspective in the Russian Federation.

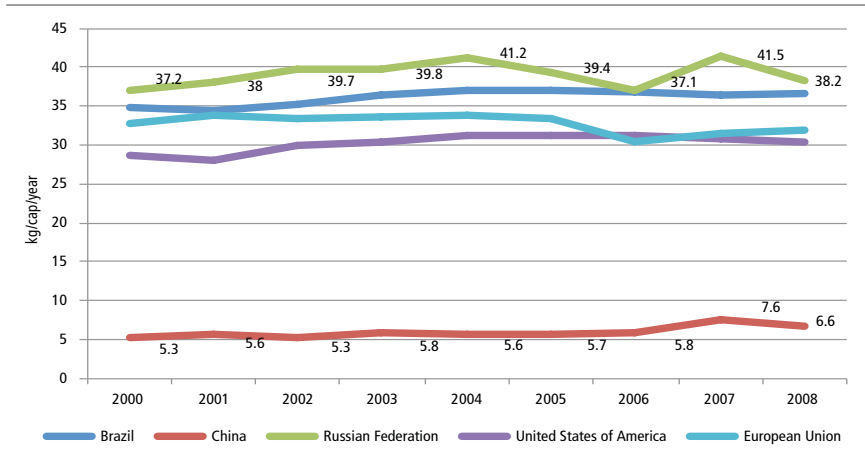
**Table 1: Food energy supply from different products in the Russian Federation in 2009**

Product	kcal/person/day	Share (%)
Cereals – excluding beer	1 163	37
<b>Sugar and sweeteners</b>	<b>314</b>	<b>10</b>
Vegetable oils	298	9
Milk – excluding butter	290	9
Meat	270	9
Starchy roots	209	7
Alcoholic beverages	194	6
Animal fats	93	3
Vegetables	85	3
Fruits – excluding wine	75	2
Eggs	56	2
Fish, seafood	54	2
Other products	71	2
<b>Grand total</b>	<b>3 172</b>	<b>100</b>

Source: FAO Stat.

The levels of per capita sugar consumption of 38 kg per person per year in the Russian Federation (2008, FAO Stat) are comparable to these in other leading sugar producing countries – Brazil, the European Union, the United States – but far exceed those of China, as shown in Figure 7.

**Figure 7: Per capita sugar supply in Brazil, China, the European Union, the United States and the Russian Federation, 2000-2008**



Source: FAO Stat, refined sugar equivalent.

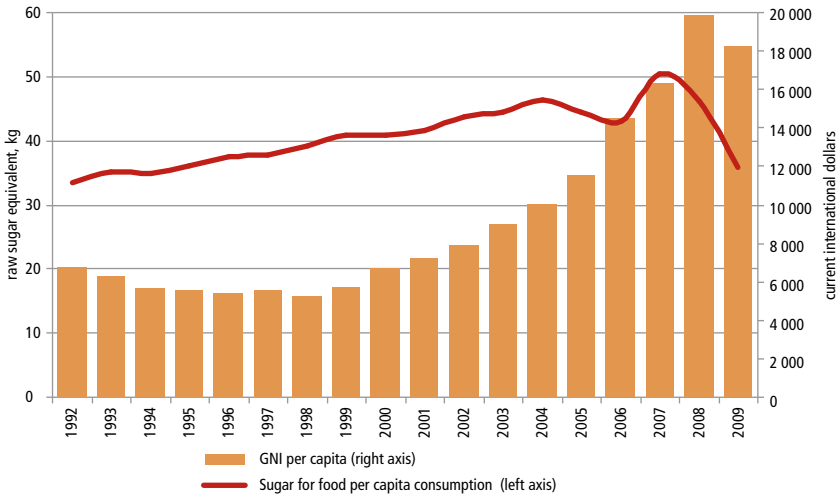
Direct human consumption of sugar constitutes about 55–57 percent of the total with confectionary, other food products and food service sectors accounting for the remaining 43–45 percent of sugar consumed.

It is likely that overall sugar consumption will decrease in the Russian Federation reflecting higher incomes, changing consumer preferences and healthier lifestyles, and negative population growth rates. The Russian Federation appears to have reached the maximum level of sugar consumption recommended by the 2002 Joint WHO/FAO Expert Consultation. The recommendation suggested that the consumption target of free sugars (all monosaccharides and disaccharides added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and fruit juices) should amount to less than 10 percent of the population total energy intake.<sup>5</sup>

As observed above, Russian consumers decreased per capita sugar consumption in recent years despite higher incomes in 2008–2009 (Figure 8).

<sup>5</sup> The Joint WHO/FAO Expert Consultation on diet, nutrition and the prevention of chronic diseases: process, product and policy implications, available at: [www.who.int/nutrition/publications/public\\_health\\_nut9.pdf](http://www.who.int/nutrition/publications/public_health_nut9.pdf).

**Figure 8: Per capita gross national income (GNI) and sugar consumption in the Russian Federation , 1992-2009**



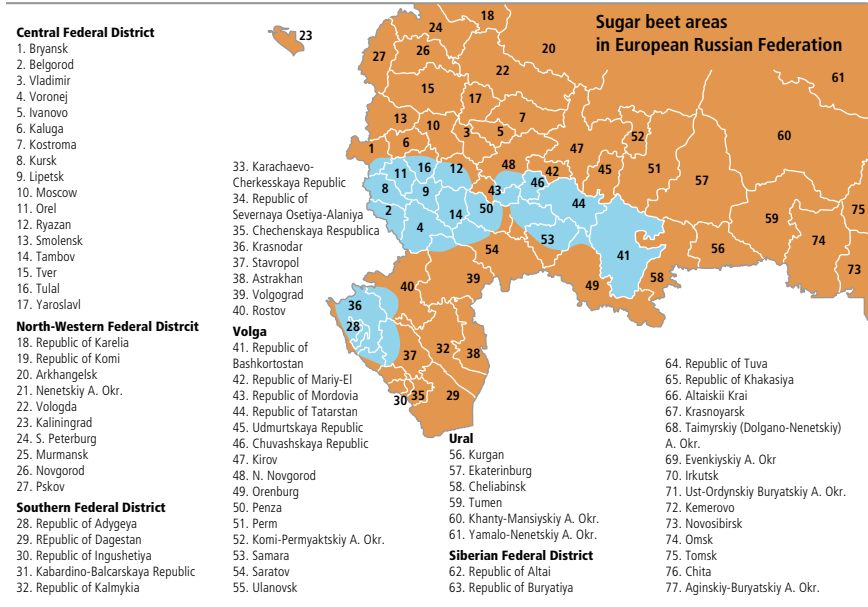
Source: Authors' calculations based on FaoStat and World Bank Data.

From this perspective, although per capita and total sugar consumption may decline in the future, the structure of sugar consumption will likely shift more towards the food processing industry, confectionary and other higher-value sugar products.

### Geographical distribution of the Russian Federation sugar industry

The sugar industry in the Russian Federation is located mainly in the west and south of the country. In the west, beet is grown in a belt that stretches from the Central region close to the border with Ukraine to the east towards the Volga River. In the south, production centres on Krasnodar oblast close to the Caucasus Mountains (Figure 9). There is also smaller production of sugar in Altay.

**Figure 9: Location of Russian Federation sugar industry**



Source: LMC International.

Figure 10 and Figure 11 present a breakdown of sugar production grouped into the three main production regions, differentiating between beet sugar and refined cane sugar. The industry is categorized into three broad regions: Central, South (including North Caucasus) and Volga (in which is included the small industry in Siberia).<sup>6</sup>

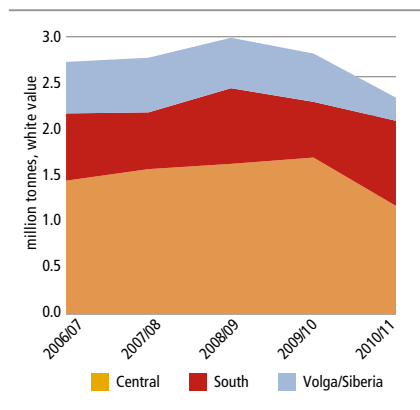
Over half the country’s beet sugar is produced in the Central region. The other major sugar-producing regions are the South, where the prime beet-growing area of Krasnodar is located, and Volga. On average, the South produces between 20–30 percent of Russia’s beet sugar each year, whereas Volga/Siberia produces around 20 percent.

When it comes to refining imported raw sugar, production is split mostly between the South and Central regions, which

6 As production in the North Caucasus and Siberia region is relatively small, for the purpose of this report, the North Caucasian Federal District is considered as part of the South, and Siberia is included in the analysis of Volga. This reflects not only the geographic proximity of these respective regions to each other, but also relatively similar climatic conditions.

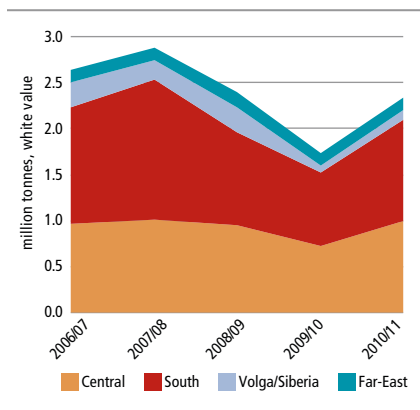
between them refine 80–90 percent of imported raw sugar. Volga undertakes very little refining and some refined sugar is produced at a stand-alone refinery in the Far-East region. The relatively higher concentration of refining activity in the South reflects the region's proximity to the Black Sea, making it easier and cheaper for refineries there to receive raw sugar from the world market.

**Figure 10: Geographical distribution of beet sugar production, 2006/07-2010/11**



Source: LMC International.

**Figure 11: Geographical distribution of sugar production from imported raw sugar, 2006/07-2010/11**



Source: LMC International.

The vastness of the country means that the main beet-growing regions are characterized by different agro-climatic conditions. Table 2 presents a comparison of some climatic indicators for the three main regions.

**Table 2: Key indicators of climate in Russian Federation's main beet-growing regions**

	Temperature		Rainfall
	Growing period April–September	Winter months November–March	Growing period April–September
South	18.5	1.4	346
Central	14.5	-5.6	322
Volga/Siberia	13.6	-9.7	291

The South experiences milder temperatures than the Central and Volga regions. Not only is the summer warmer and the beet-growing season longer, but the winters are less severe. The warmer climate

allows the region to achieve good beet yields, but high temperatures in summer impede sucrose formation. As freezing temperatures do not set in as early as elsewhere, the risk of frost-related harvest and post-harvest beet losses is lower in the South.

The beet-growing season is shorter and the winters are colder and longer in the Central region and especially in the Volga region. The shorter growing season means that beet yields are lower than in the South, although beet sucrose levels are higher. As temperatures drop below freezing as early as November, there is a shorter window for farms in these regions to harvest all their beets, and loss of beets in storage is a big risk.

The Volga region has noticeably less rainfall than the other regions, with rainfall being highest in the South. The lower rainfall during the summer months, when beets are growing, is a limiting factor for beet yields in the region. However, the drier conditions are beneficial to sucrose formation. Furthermore, the fact that temperatures fall so far below freezing means that it is possible to store beets frozen and to operate a long processing season, thereby boosting factory capacity utilization.

## Structure of the industry

The Russian sugar industry comprises two main sectors: beet growers and beet processors. There are important differences within these sectors.

- *Beet growers* comprise two main groups: large private farms (mainly collectives) and factory-owned/operated farms.
- *Beet processors* comprise factories that process only beet and those that also refine raw sugar during the off-crop period.

### Beet growers

In 2012, about 2 100 commercial farms grew sugar beets in 28 regions of the Russian Federation, including the Central (50–55 percent), South (18–20 percent), North Caucasus (4–5 percent), Volga (20–22 percent) and Altay (up to 2 percent) regions. The main producers of sugar beets were agricultural companies (corporate farms affiliated with sugar refineries and independent producers), representing 88 percent of sugar beet production. Small private farmers accounted for approximately 12 percent of production.

Beet producers have changed radically over the past decade. Following the privatization of state and collective farms in the

early 1990s, beet suppliers became independent producers the vast majority of which were newly created joint stock (corporate) farms. However, the transition period that followed privatization posed huge challenges for the farming sector and beet farmers in particular. Quality seeds, fertilizers or plant protection chemicals were in limited supply or farmers could not buy them.

A turnaround in production began in the late 1990s, however the supply of beets was slow to respond. This reflects, in part, the large investment required to farm sugar beet relative to other arable crops, in particular in terms of inputs (seed, fertilizer, chemical) and specialist harvesting equipment. Sugar beet is also seen as a risky crop, as it is harvested later than grains and is vulnerable to harvest and post-harvest losses from rains or frost.

An important consequence of the downturn in beet supply in the late 1980s and early 1990s was the massive under-utilization of beet-processing capacity. Following implementation of the variable import tariff in 2004, which compensated for the swings in world raw sugar prices and high import tariffs on white sugar tariff, beet factories responded by growing their own beets. To do this, factories either leased or bought land from struggling corporate farms. This allowed them to raise their beet supply in the following ways:

- factories could start growing beets on farms that did not previously produce them;
- factories could intensify beet production by altering crop rotation. Corporate farms typically grow a diverse set of crops, with beets typically making up 8–15 percent of arable area. However, factory-owned/operated farms chose to specialize in beet production and altered rotation to increase the area under beets to 25–33 percent.

This change helped to increase production of beets and encouraged factory owners to pursue modernization and expansion programmes. High world sugar prices from 2009–2012 also provided a further boost to production and underpinned the huge increase in sugar output in 2011.

Despite these changes, the beet sector still exhibits large differences in terms of farm performance, with factory-owned/operated farms and some corporate farms achieving high levels of efficiency, while others still have the potential to improve performance significantly.

Farmers in the Russian Federation plant beets in the second quarter of the year, allowing them to grow over the summer months. The beet harvest usually starts around the middle of August and continues until the end of November. In most years, the harvest has to be completed by this time of year due to the onset of winter, which causes the ground to freeze causing significant production losses.

**The grower-processor relationship.** Farmers are paid for sugar beets on a delivered factory basis and according to quality (sucrose content). The price of beets is determined as a share of the value of the products produced from them. In practice, the beet price is determined principally by the price of sugar.

Beet prices are determined on the basis that the supplier receives 69.5 percent of the value of the recoverable products: sugar, molasses and pulp. Farmers have the option to receive these products in return for beets or a cash-equivalent payment. In practice, wet pulp has little value because there is an extremely limited market for it as animal feed in the Russian Federation. As a result, the overwhelming majority of pulp is dried, pelleted and sold for export. This by-product is rarely calculated as part of the farmers' beet price.

The beet price is determined by the value of the sugar and molasses it yields. For the purpose of calculating the sugar beet price in the Russian Federation, it is assumed that 1 tonne of beets yields the following:

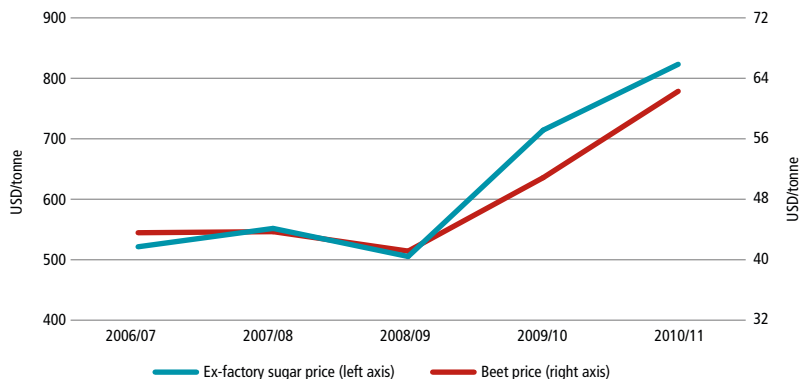
- 115 kg sugar (11.5 percent on beet) based on a sucrose content of 16 percent, assuming processing losses of 4.5 percent. If the quality of delivered beets is higher or lower, the yield is adjusted assuming constant industrial losses of 4.5 percent; and
- 40 kg molasses.

Applying the 69.5 percent share to these yields means that farmers receive 80 kg of sugar and 28 kg of molasses per tonne of beet with 16 percent sucrose. However, because sugar prices are typically around ten times higher than molasses prices, in practice, the beet price is determined principally by the value of its sugar yield.

Figure 12 charts the evolution of beet prices and sugar prices in USD since 2006/07. The prices presented are those found between the months of October and January, when the majority of domestic beet sugar is marketed. As one would expect, there is a very strong link between sugar price during this period, and the price received by

farmers for their beet (the axes of the figure have been set so that the beet axis represents 8 percent of the sugar price).

**Figure 12: Season average sugar and beet prices, 2006/07-2010/11**



Source: LMC International.

### Beet factories

During the 2011/12 season there were 77 operating factories. Of these, 31 could refine raw sugar. In addition, there were two factories that only process raw sugar.

Factories start processing beets in August/September and the length of the processing season depends on the size of the beet crop. Since the amount of beet processed in a day is constrained by installed slicing capacity, the slicing period generally runs through December and into January or even February if the crop is large.

During this period, beets are stored at the factory or in piles in the fields. Because a large proportion of beets are harvested around the start of winter, there are substantial risks of losses in harvesting (from rain and frost) and in particular processing (frost). This is because, if beets freeze either in the field or in storage, and then thaw, the sucrose is destroyed and cannot be recovered. This means that, once harvested, beets must be processed either fresh or frozen.

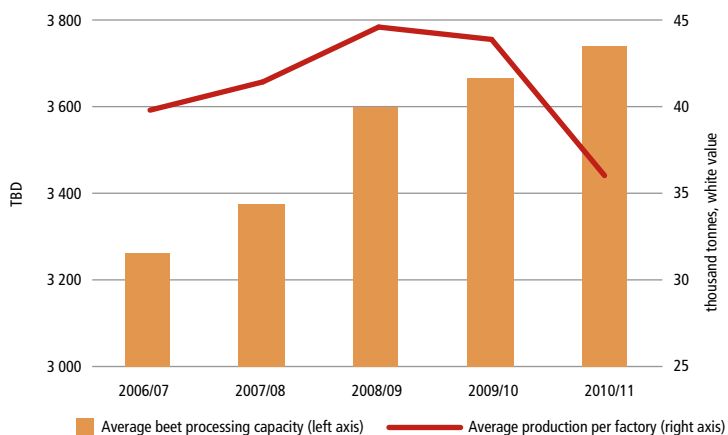
If the industry is to produce more sugar in the future without further substantial investment in factory capacity, it will have to improve management of beet harvesting and storage to minimize

harvest and post-harvest losses. The large 2011 crop, which experienced an early freeze, has highlighted the scale of this challenge for the industry.

Once processing is complete and stocks of domestic beet sugar crop are depleting, sugar refineries start refining imported raw sugar. The refining season traditionally takes place between May and August when the tariff on raw sugar imports is lowered. However, this timeline can change depending on the amount of beet sugar produced and the need for imports. For example, in 2010/11, when a severe drought reduced beet sugar output, the lower tariff was brought forward to allow the refining campaign to commence in March.

**Beet processing.** Although no new factories have been built in the Russian Federation for several decades, a huge programme of investment at existing factories has resulted in a substantial increase in installed capacity and greater processing efficiency. The increase in beet supply has exceeded the expansion of slicing capacity and average sugar production per factory has therefore risen. Figure 13 charts the trends in average factory capacity (measured in TBD and average sugar production per factory).

**Figure 13: Average capacity and sugar production per beet factory, 2006/07-2010/11**

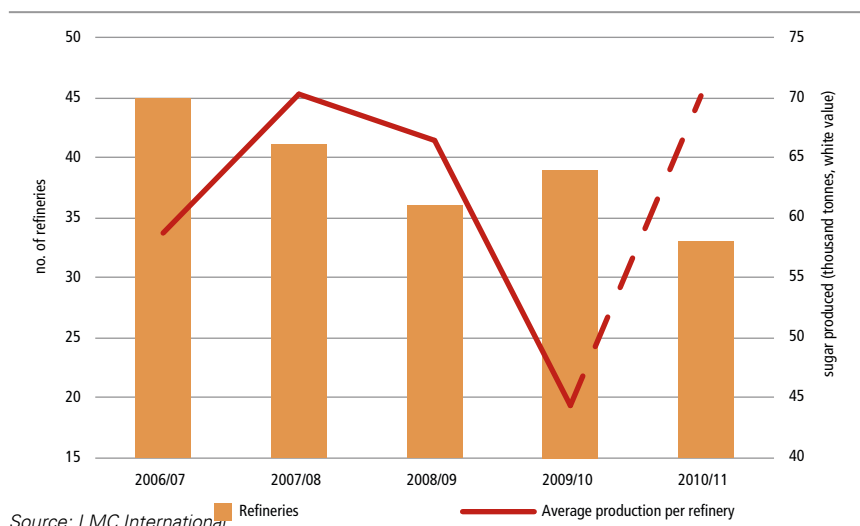


Source: LMC International.

**Raw sugar refining.** Figure 14 shows changes in the number of refineries in recent years, along with average sugar production per refinery.

Unlike the beet-processing sector, average sugar production per refinery has generally declined as output from beets has increased. This excludes the 2010/11 season when refining activity was unusually high in order to compensate for the poor domestic beet crop. Indeed, in the coming 2011/12 season, refining activity is set to be substantially reduced on the back of a strong beet crop. The much more rapid decline in the number of refineries than beet factories, along with declining average sugar production per refinery, reflects the trend towards greater self-sufficiency.

**Figure 14: Raw sugar refineries and average sugar production per refinery, 2006/07-2010/11**



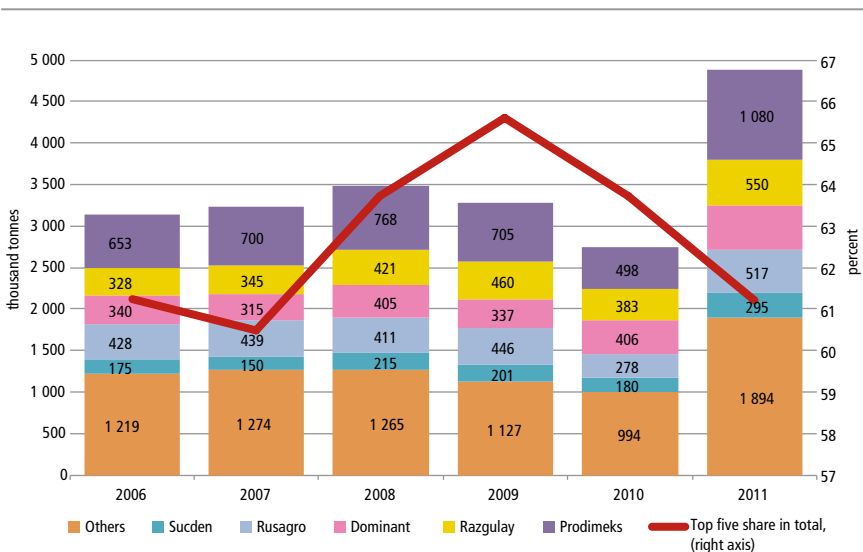
### Industry consolidation

Since the early 1990s, the Russian sugar industry has undergone considerable consolidation. In 2011, the following five industry leaders controlled about 60 percent of the entire beet sugar production in the Russian Federation: Dominant, Prodimeks, Razgulay, Rusagro and Sucden (Figure 15). The sugar production business is predominantly owned by local business people; only

one French-based producer and trader (Sucden) is present in the top-five leading sugar producers in the Russian Federation.

The estimated share of independent sugar producers (about 40 percent) remains high and suggests that the industry will further consolidate.

**Figure 15: Top five producers and their share in total beet sugar production (refined sugar basis), 2006–2011**



Source: Authors' estimates based on IKAR data on production and factory ownership or affiliation.

The same companies, in addition to Agroholding Kuban, have also been actively involved in refining raw cane sugar. However, this activity will likely diminish in the future if the country is able to sustain a high level of beet sugar production.

## Chapter 3 - Performance of the sugar beet sector

This chapter evaluates the performance of the beet sector, focusing on technical and cost performance, as well as the competitiveness of beets in crop rotation at a regional level. In addition to contrasting performance between regions within the Russian Federation, it compares the performance of each Russian region with industries elsewhere, where growing conditions are broadly similar.

Finally, the chapter presents future estimates of the supply price of sugar beets in each region. These represent the prices that independent farmers will likely have to earn to maintain sugar beet as part of their crop rotations.

### Field technical performance

During the period 2009–2012, sugar beets were grown on 1.1–1.4 percent of total arable land with areas planted ranging from 0.8 million to 1.2 million hectares per year. In terms of crop rotation of the main sugar beet-growing regions, sugar beet represents 5.8 percent of areas planted.

As explained above, there is marked difference in agro-climatic conditions among the three major beet-growing regions of the Russian Federation. The different conditions influence the technical performance of the beet sector in each region and, ultimately, the competitiveness of beets relative to alternatives, as well as the overall cost of production. The following analysis therefore presents the comparative performance of the different regions with a focus on the main producer category – corporate farms.

Table 3 presents an average of various technical indicators of field performance for 2009/10 and 2011/12. The 2010/11 crop year is excluded from the averages as the severe drought in the summer of 2010 devastated the crop across much of the country, and the resulting performance was out of line with long-term trends.

**Table 3: Key field performance indicators, average 2009/11 and 2011/12**

	<b>Beet area planted (ha)</b>	<b>Beet production (tonnes)</b>	<b>Beet yield (tonne/ha)</b>	<b>Sugar yield (tonne/ha)</b>
Central	570 100	20 639 122	36	4.5
South	229 400	9 607 201	42	4.3
Volga/Siberia	255 150	6 555 494	26	2.8
<b>Russian Federation</b>	<b>1 054 650</b>	<b>36 801 816</b>	<b>31</b>	<b>4.1</b>

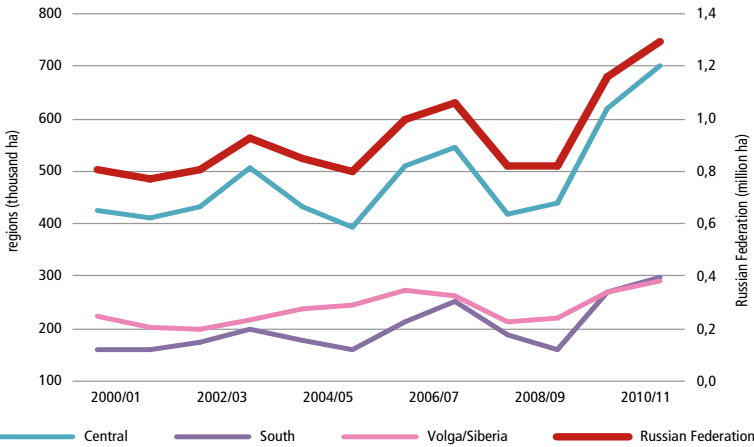
Beet production is concentrated in the Central region, which accounts for around half of the country's beet area and production. The region also achieves the highest sugar recovery rates, reflecting the cooler temperature and slightly drier conditions. The cooler summers help support sucrose formation, which in turn boosts the sugar yield.

The South region achieves the highest beet yields in the country, supported by the higher rainfall. However, hot summers mean that the sucrose content of beets is depressed relative to the Central and Volga regions. Even though beet yields are higher, farms in the South ultimately achieve a similar sugar yield per hectare to their counterparts in the Central region.

Performance in Volga is below the national average. Although it accounts for a quarter of the beet area, smaller beet yields mean that its share of overall beet production is much lower. The small yields reflect the short growing season and very dry conditions in the region, which constrain development of the crop, and also encourage the low-input-low-output nature of farming in the region. The winter begins early in Volga and temperatures drop to extremely low levels. This increases the risk of crop losses. As a result, farmers use fewer inputs to ensure that their losses are limited if such an eventuality arises. In other words, they accept a lower output as a trade off for a smaller loss in the event of adverse weather.

Figures 16 to 18 trace the evolution of performance over time. The upward trend in beet areas is evident over the long term. However, Figure 16 highlights a degree of cyclicity in planting decisions, especially in the Central and South regions. This reflects the way in which farmers switch in and out of growing beet depending on the relative returns of growing beet compared to alternatives.

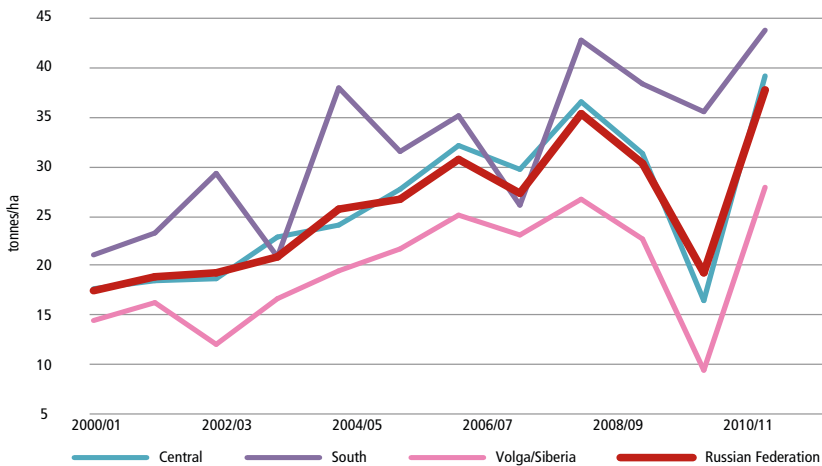
**Figure 16: Beet areas in the Russian Federation, 2000/01-2010/11**



Source: LMC International.

By 2009/10, beet yields had improved by around 75 percent from the start of the last decade. Although in 2010/11 yields were decimated by drought, they had already shown signs of rebounding in 2011/12. The improvement came as farms modernized and increased the use of inputs.

**Figure 17: Beet yields in the Russian Federation, 2000/01-2010/11**

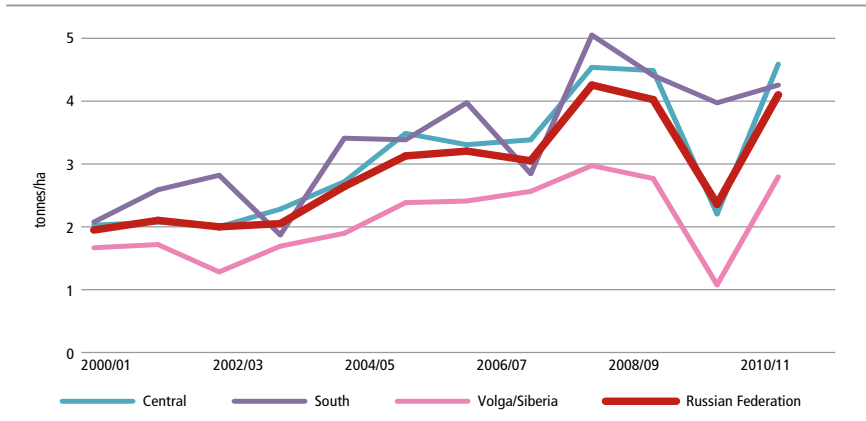


Source: LMC International.

In most years, yields are considerably higher in the South, reflecting the more favourable climatic conditions. In some of the factory-owned farms in the South, yields are reaching as high as 50–60 tonnes per hectare. However, it is notable that yields in the South are also the most volatile. The South was, however, relatively well shielded from the effects of the 2010 drought.

Although sucrose content is largely determined by weather conditions, there has been a gradual and noticeable improvement in the sugar recovered from beets. The combined effect of improving beet yields and sugar recovery meant that, by 2009/10, sugar yields had more than doubled in the Central and South regions, and for the Russian Federation as a whole (Figure 18).

**Figure 18: Sugar yields in the Russian Federation, 2000/01-2010/11**

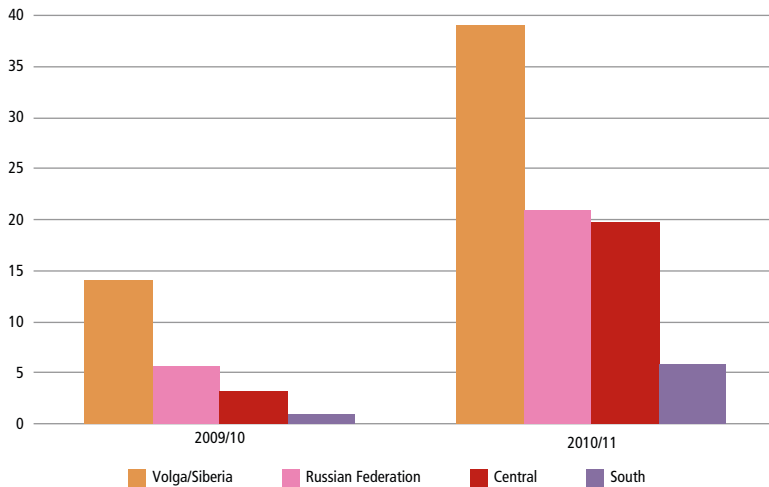


Source: LMC International.

It is worth noting that not all the area planted with beet is always harvested. If temperatures drop low enough to cause the ground to freeze earlier than expected, this can handicap harvesting. In addition, if the cold weather causes the unharvested beets to freeze, any subsequent return to milder temperatures could cause them to thaw, which would destroy the sucrose.

In 2009/10, for example, it is estimated that around 5 percent of planted area was abandoned at the national level. There is, however, much regional divergence: in Volga/Siberia, where the winter is severest, almost 15 percent of area was abandoned, whereas in the milder South, almost all the area was successfully harvested (Figure 19).

**Figure 19: Proportion of abandoned planted area, 2009/10-2010/11**



Source: LMC International.

In 2010/11, areas were abandoned for a different reason. As the severe drought decimated beet yields, it was unattractive for farmers to spend money on harvesting part of the planted area. Although, at the national level, around 20 percent of areas were abandoned, some regional differences are again evident as the drought was less severe in the South.

References to beet yields in this study indicate the quantity of beets harvested per hectare of land planted, not just the quantity harvested. This reflects the fact that any planted land that is abandoned is a cost to the farmer, who would have already invested in cultivation but would not receive any marketable output.

### **Benchmarking field performance**

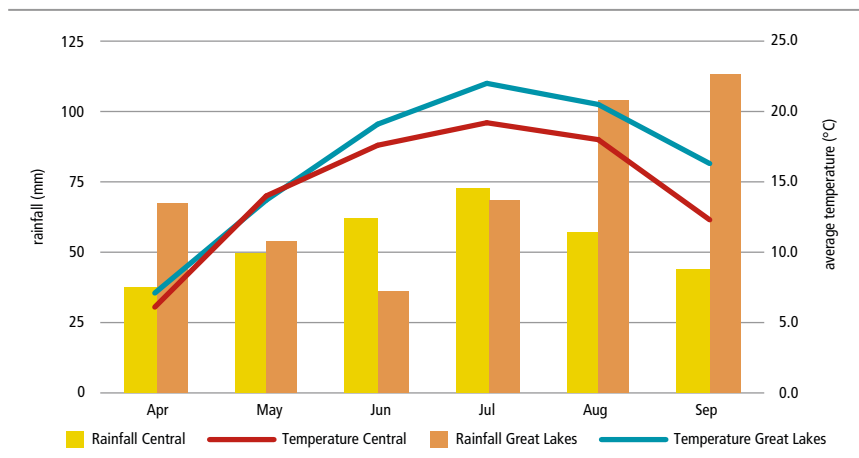
To put the performance of the Russian industry in perspective it is useful to compare it to leading global beet sugar industries. To allow a fair comparison, it is important to use industries with relatively similar weather conditions. Although it is very difficult to fully control for climate, as no two places have exactly the same weather and other factors, there are nevertheless some industries in the United States and the European Union against which the performance of the Russian industries can be meaningfully benchmarked.

## Central region

The Great Lakes region of the United States can be used as a benchmark for the industry in Russian Federation's Central region. Temperatures during the beet-growing season are only just slightly warmer in the Great Lakes. However, there is a noticeable difference in rainfall pattern with the Great Lakes receiving well over 100 mm more rainfall over the course of the growing season.

On average, farmers in the Great Lakes produce 25 tonnes of beet per hectare more than those in the Central region. The disparity in rainfall received is likely a significant factor in this regard (Figure 20).

**Figure 20: Climate during the beet-growing months, Central region and the Great Lakes**

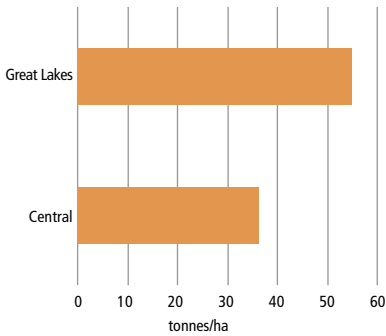


Source: LMC International.

Despite the cooler and drier weather in the Central region, which should otherwise be more conducive to sucrose formation, sugar recovery is also better in the Great Lakes. The higher yields and sugar recovery mean that farms in the Great Lakes produce almost 90 percent more sugar from each hectare than those in the Central region.

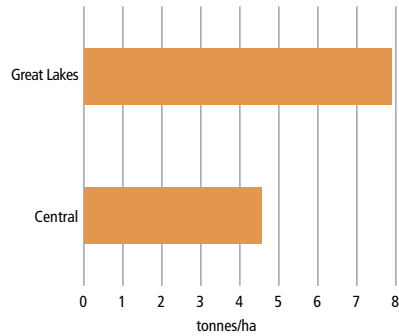
Figure 21 and Figure 22 compare the key field performance indicators of beet and sugar yield.

**Figure 21: Beet yields, average 2009/10 and 2011/12**



Source: LMC International.

**Figure 22: Sugar yields, average 2009/10 and 2011/12**



Source: LMC International.

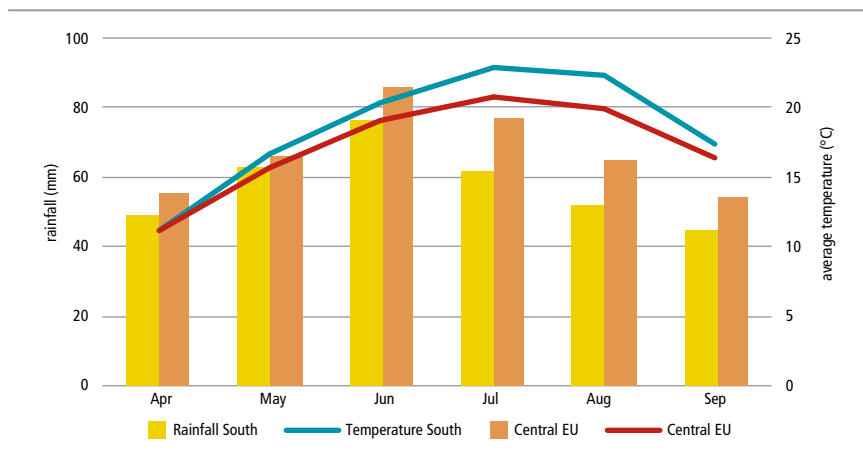
A major reason for the lower recovery rates, despite weather conditions that should boost sucrose formation, is post-harvest losses.

### **South region**

The milder climate of the South region means that the beet industries of Central Europe represent a more appropriate comparison. As Figure 23 shows, the South has very similar temperatures during the beet-growing season to those found in Hungary, while the total rainfall received is only slightly less than in Austria.

Despite being home to the highest beet yields in the Russian Federation, the South still achieves, on average, yields that are 20 to 30 tonnes per hectare lower than in the Central EU. This difference is a function of lower rainfall and the different farming techniques employed. Industries in the EU make more intensive use of inputs, because the risks associated with extreme weather conditions are greater than in the Russian Federation. In Austria, farmers in some areas use irrigation to moderate the risk. As a consequence, sugar yields in the South are less than half of those found in Austria.

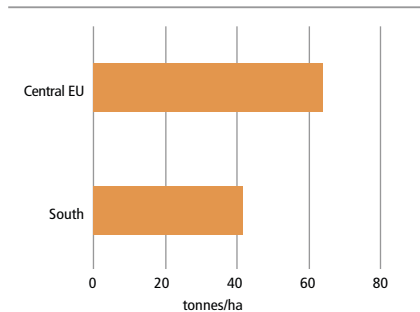
**Figure 23: Climate during the beet-growing months, South and Central EU**



Source: LMC International.

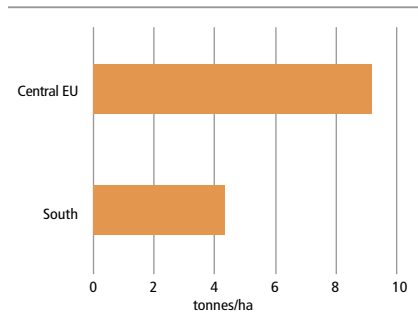
Figure 24 and Figure 25 benchmark the South’s performance against the Central EU for beet and sugar yields.

**Figure 24: Beet yields, average 2009/10 and 2011/12**



Source: LMC International.

**Figure 25: Sugar yields, average 2009/10 and 2011/12**



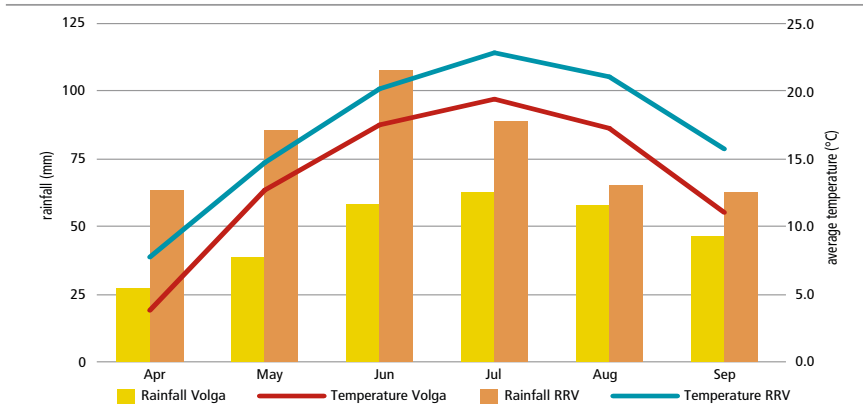
Source: LMC International.

### Volga and Siberia regions

The much colder temperatures found in the Volga/Siberia region, particularly during the winter months, mean that the Red River Valley beet industry in the United States is a more appropriate comparison. The Red River Valley also faces a severely cold winter and provides an import benchmark for performance at the factory level. However,

during the beet-growing season, like its neighbouring Central region, Volga/Siberia is handicapped by very low rainfall (Figure 26). Temperatures are also somewhat cooler during the growing season in the Red River Valley.

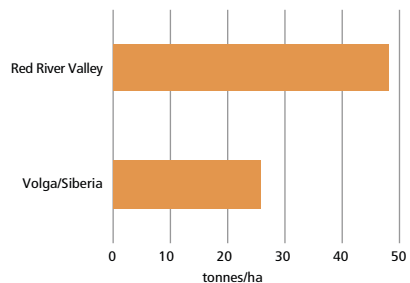
**Figure 26: Climate during the beet-growing months, Volga/Siberia and Red River Valley**



Source: LMC International.

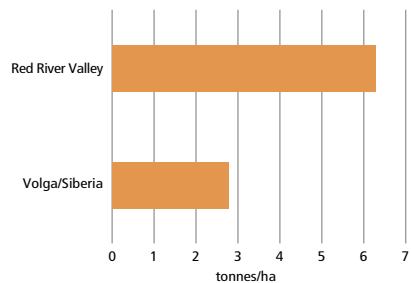
The beet yields in Volga/Siberia are less than half of those achieved by farmers in the Red River Valley, who follow a similar low-input-low-output style of farming. However, the big difference in rainfall received by the two regions is likely to have a significant influence on this divergence in yields. Sugar yields fare even worse and are, again, affected by lower sugar recovery. Figures 27 and 28 compare performance indicators for the two regions.

**Figure 27: Beet yields, average 2009/10 and 2011/12**



Source: LMC International.

**Figure 28: Sugar yields average 2009/10 and 2011/12**



Source: LMC International.

## Cost of beet production

Table 4 presents the cost of producing beet in the different regions of the Russian Federation.

**Table 4: Costs of producing beet, average 2009/10 and 2011/12, USD/tonne beets**

	Labour	Capital	Direct costs	Total field
Central	1	8	28	37
South	2	8	24	33
Volga/Siberia	2	9	38	48

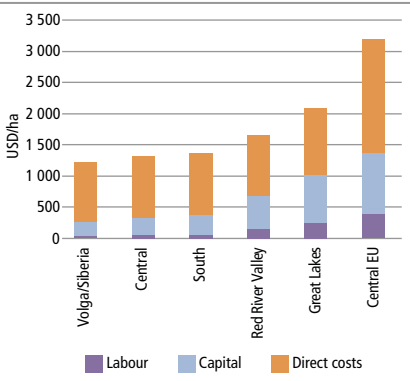
Figure 29 and Figure 30 compare these costs per hectare and per tonne of sugar based on the above benchmarks. Costs are summarized in terms of three categories:

- direct costs, which include seed, fertilizer, chemicals and fuel;
- capital (machinery), which includes allowances for depreciation of farm equipment; and
- labour, which is associated primarily with the use of machine operations.

The analysis reveals a number of import issues:

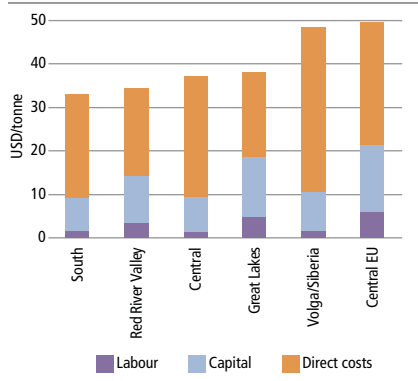
- labour costs in the Russian Federation are low, reflecting lower farm salaries than those paid in the European Union and the United States;
- when looking at the cost of cultivating a hectare of beet (Figure 29), the costs in the Russian Federation are substantially lower than those in the European Union and the United States. In fact, farms in the South of the Russian Federation spend less than half of those in the benchmark industries of Central EU. As well as lower salaries, the lower costs reflect, in particular, lower land, direct and other costs. American industries in the Great Lakes and Red River Valley regions, which also follow the low-input-low-output technique of farming, face lower direct costs, but these are still higher than those in the Russian Federation.

**Figure 29: Cost of producing beet per hectare, average 2009/10 and 2011/12**



Source: LMC International.

**Figure 30: Cost of producing beet per tonne, average 2009/10 and 2011/12**



Source: LMC International.

Within the Russian Federation, farmers in Volga/Siberia spend the least on cultivating each hectare of beet. This reflects the lower salaries in the regions, as well as the particularly low use of inputs, even compared to other parts of the Russian Federation. As mentioned above, this is because of the high risk of crop failure in the region resulting from the dry conditions and the early onset of a severe winter.

However, what ultimately matters is the cost of producing 1 tonne of beet. In this respect, Russian industries are let down by their low beet yields (Figure 30). The issue is exemplified by the case of the Central region. Despite spending over USD 1 000 per hectare less on cultivating beet than in the Great Lakes, the much lower beet yields in the Central region mean that these costs are spread over a smaller output. Therefore, the final cost of producing a tonne of beet in the two regions is ultimately very similar.

The very poor yields in Volga/Siberia mean that the region fares particularly poorly. It is estimated that, for the period 2007/08 to 2009/10, it costs around USD 15 more to produce a tonne of beet in Volga/Siberia than in the benchmark industry of the Red River Valley.

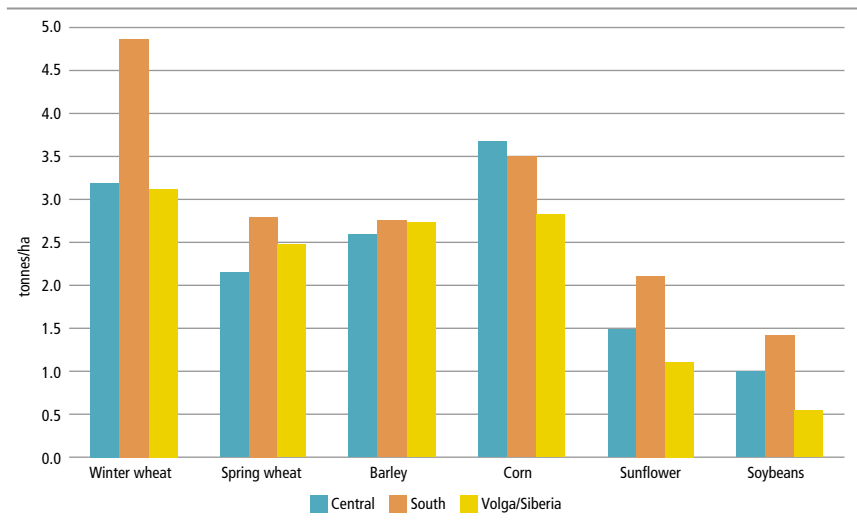
As the most competitive beet producer in the Russian Federation, the South, however, is an exception in this regard with higher beet yields. When combined with its low per hectare costs, the region is in fact a far more competitive producer of beets than elsewhere, although the region is penalized by low sucrose content in beets.

## The competitiveness of sugar beet with other crops

An important determinant of the success of a sugar industry is the competitiveness of sugar beet in relation to alternative crops available for planting. In an environment where beet is relatively uncompetitive, farmers are likely to switch to growing alternatives and therefore threaten the supply of beets needed by factories for processing into sugar. As a result, factories need to be able to offer higher beet prices to provide sufficient incentives for farmers to grow beets. In the Russian Federation, the beet price is determined by a revenue-sharing formula. This, in turn, means that the sugar price itself needs to be high enough for farmers to receive a sufficiently high beet price.

A range of different crops compete with beet in the Russian Federation, and the diversity of conditions across the country means that the competitiveness of individual crops can vary considerably in different regions. Crop competitiveness is influenced by the prices received by the respective crops, as well as by their yields. Figure 31 presents three-year average yields achieved by a number of crops in the three beet-growing regions of the Russian Federation. As above, the 2010/11 crop year is excluded from the average because of the severe drought which affected crops that year. Also, in the absence of comprehensive data for 2011 harvests, averages are presented for the period 2007/08 to 2009/10. From the figure, it is evident that the South achieves a higher yield for the majority of competing crops, which means that sugar beet could potentially face greater competition for planting decisions here than in other parts of country.

**Figure 31: Yields of competing crops by region, average 2009/10 and 2011/12**



*Note: In analysis of alternative crops yields in the South, explicit reference is made to the yields achieved in the Krasnodar area where beet is primarily grown. Similarly, for Volga/Siberia, reference is made to the yields achieved by competing crops in the Bashkortostan and Tatarstan regions.*

Source: LMC International.

Another major determinant of how much beet is planted by farmers is the form of crop rotation employed. Sugar beet can be planted on a particular piece of land every three to four years and therefore has to be rotated with other crops over a cycle of at least three to four years. However, the actual length of beet rotations varies from farm to farm. In this regard, farms can be grouped into two broad categories:

- Independent farms - Whereas beet can be planted every three to four years, some other crops, notably sunflower, should generally be grown every six to seven years. This is because shorter rotations of sunflower can result in increased pressure from diseases, as well as act as a stress on soil nutrients. Sunflower is a relatively profitable crop that requires relatively few inputs as compared with sugar beets.
- Farms owned by sugar beet factories - As factories farm land specifically to grow beets, they use shorter rotations of three to four years. As a result, these farms tend to have greater portion of their land under beet than independent farms.

## Analysis of farm margins

To better understand the financial incentives that farmers are faced with when making planting decisions, this study carried out an analysis of farm margins for the production of various crops. From this, the supply price of beets (referred to as the profit-equalizing price) was estimated. In theory, this represents the minimum beet price that factories will likely offer farmers to ensure that they grow beet.

In order to determine the margins available to farmers, both the gross and net margins associated with growing different crops have been analysed. The gross margin equals the total revenue from crop minus the direct costs of growing the crop. The net margin equals the gross margin minus capital and labour costs.

These margins are estimated for past years on an *ex-ante* and an *ex-post* basis, as well as for the long-run future outlook. The *ex-ante* margins represent the amount farmers anticipate they will achieve at the time of planting, while the *ex-post* margins show what they actually earned each year. The analysis was also based on the following assumptions:

### Prices

- The *ex-ante* analysis uses the prices of the respective crop in the fourth quarter of the previous year and the first quarter of current year of planting. This is when farmers make planting decisions and purchase inputs for the coming crop.
- The *ex-post* analysis uses the actual prices received for the crop in the three months following the start of its harvest.
- The long-run analysis takes a view on the future trend price of the commodity in the respective region. This is based on its relationship with world and regional prices. The methodology used to determine this is outlined in more detail below.

### Yields

- The *ex-ante* analysis uses trend yields of each crop in that year. In other words, this is the yield that a farmer would expect the crop to deliver based on past performance.
- The *ex-post* analysis uses the actual yield achieved by the respective crop in a given year.
- The long run analysis uses current trend yields.

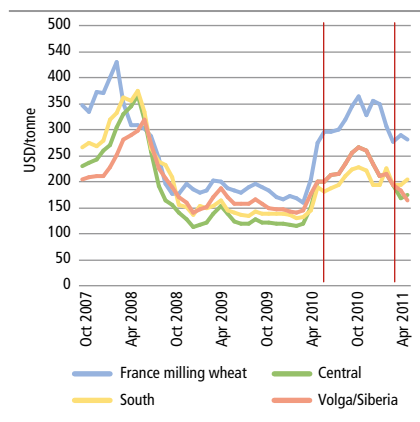
## Costs

- The estimate of the cost of production is used for each crop in a specific year. Direct costs refer to the cost of the inputs used to cultivate the crop, while indirect costs used to calculate the net margins refer to the costs of labour and capital depreciation. When comparing the margins of different crops, the cost of land is removed from the analysis, as it is assumed to be equal across crops.
- The analysis of the long-run supply price of beets is based on today's costs.

## Outlook for the prices of competing crops in future

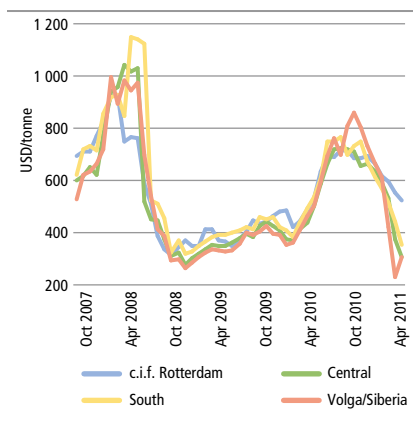
The future level of beet prices will depend largely on the future course of the prices offered by alternative crops. Figures 32 to 35 chart the way in which the Russian prices of these crops varied in relation to the world price in 2007–2011.

**Figure 32: Russian Federation and world wheat prices, 2007-2011**

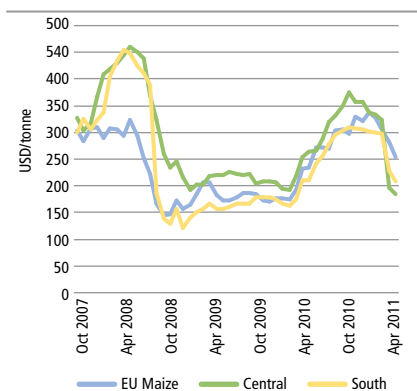


Source: LMC International.

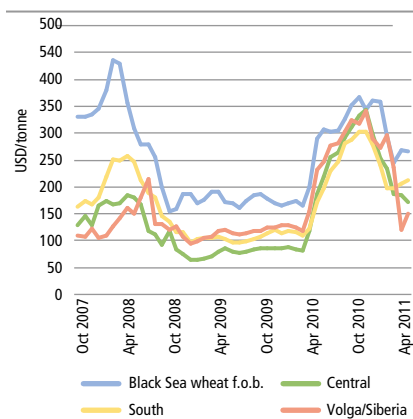
**Figure 33: Russian Federation and world sunflower prices, 2007-2011**



Source: LMC International.

**Figure 34: Russian Federation and world corn prices, 2007-2011**

Source: LMC International.

**Figure 35: Russian Federation feed barley and wheat prices, 2007-2011**

Source: LMC International.

As a large-scale exporter of the commodity, Russian Federation wheat prices reflect export parity and therefore trade at a discount to world prices. In most years, prices in the South trade at a premium to those in the Central region, reflecting the fact that wheat from the Central region is located further from the port and is therefore subject to additional transports costs. However, in 2010/11 a ban on wheat exports was instituted to protect domestic consumers after the crop was devastated by the drought. Therefore, wheat prices during the period of the ban (shown between the brown lines in Figure 32) were higher in the Central region than in the South, where the crop was less affected by the drought. Prices in Volga/Siberia swing between trading at a premium and at a discount to the South. However, in the long run, they trade on average at a small discount to those in the South.

Russian Federation sunflower prices also closely follow the world price. As in the case of wheat, prices in the South offer a premium to those in the Central and Volga/Siberia regions. Furthermore, over time, sunflower prices in the South have on average traded at a premium even compared to the world price, despite sometimes dropping below world prices.

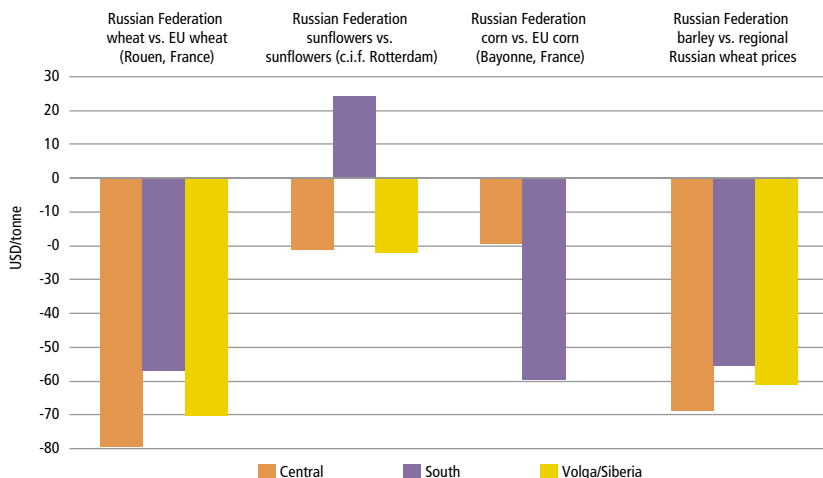
As not much corn is produced in Volga/Siberia, it is of less relevance to this region. In the South, the Russian Federation's status as a net exporter of grains means that corn trades at a discount to the world price. However, unlike with wheat, corn

fetches higher prices in the Central region than in the South. This is because corn is not widely grown in the Central region, whereas the warmer climate in the South is better suited to corn cultivation.

Feed barley prices in the Russian Federation track wheat prices. However, as a lower quality grain, barley fetches a lower price. Barley prices typically trade at around 60 percent to 70 percent of the wheat price in the respective region.

Based on these relationships, Figure 36 and Table 5 present estimates for the long-run differential between the prices of these crops for each region, along with their benchmark prices. These differentials are used to present the estimated long-run trend prices of each competing crop. In the case of barley, long-run prices in the Russian Federation are estimated using the historical relationship with the wheat price in each region.

**Figure 36: Estimated long-run price differentials of alternative crops in relation to long-run benchmark prices**



Source: LMC International.

**Table 5: Estimated long-run trend prices**

	Benchmark world/regional price	Central	South	Volga/Siberia
Wheat	260	180	200	190
Sunflower	430	410	450	410
Corn	240	220	180	
Barley		110	140	120

Taking into account these prices and trend yields, the same methodology was used to conduct a gross margin analysis for each of the competing crops, to identify the most attractive crop for each region. Based on the gross-margins offered by the most attractive competing crop, the costs of producing beet and beet yield achieved, long-run beet supply prices have been derived. These prices reflect the minimum prices that sugar factories are likely to pay farmers to incentivize them to grow beet instead of alternatives. The prices not only cover farmers' cost of beet production, but also the profit they forgo if they grow beet ahead of the next best alternative.

### Central region

Table 6 presents the areas planted with beet and alternative crops in the Central region.

**Table 6: Planted area by crop in the Central region, 2005/06 - 2010/11, thousand ha**

	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Winter wheat	2 350	1 860	2 303	3 034	3 368	2 973
Spring barley	2 278	2 531	2 414	2 551	2 360	1 629
Sunflower	826	836	717	881	1 020	1 321
Sugar beet	393	510	544	418	440	620

Winter wheat and spring barley are the most widely grown crops, whereas sunflower is a more direct competitor to beet in farmers' crop rotations.

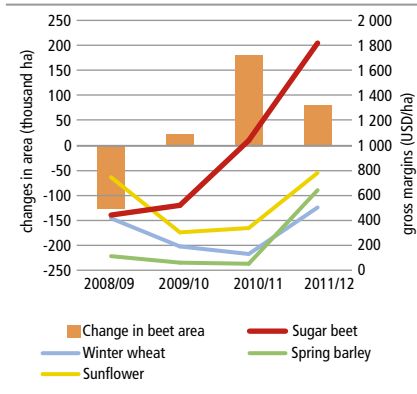
Despite offering attractive prices in the region, corn is not widely grown, as the cold and dry climate is not ideal for its cultivation. Typically, the area under corn is less than half of that under sugar beet.

Figures 37 to 40 present the results of the historic farm margins analysis and allow one to see how area planted with beet has responded to the changing attractiveness of beet. In 2008/09, when farmers expected sunflower to bring in better returns than beet, there was a fall in beet area. Since then, beet has become more attractive on a gross margin basis than the alternatives, and beet areas have been increasing.

However, as beet requires a great deal of investment in specialist harvesting machinery, it faces higher capital costs, making it harder for beets to compete on a net margins basis. In 2010/11, beet was more adversely affected by the drought than the other crops and farmers

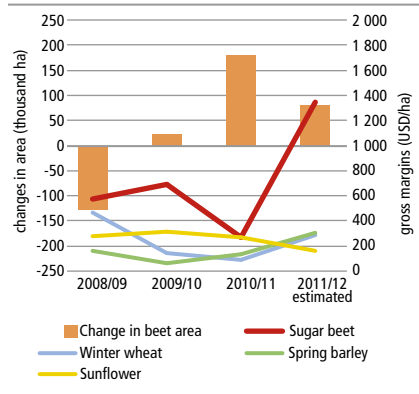
made a loss in terms of net margins. This is because beet requires much more water than the other crops, and so its yields are more susceptible to the adverse effects of unexpected dry weather. This is an example of why farmers consider beet a relatively risky crop.

**Figure 37: Anticipated gross margins in the Central region at the time of planting, 2008/09-2011/12**



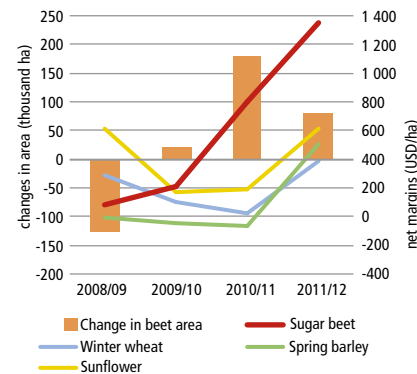
Source: LMC International.

**Figure 38: Actual gross margins realized in the Central region after the harvest, 2008/09-2011/12**



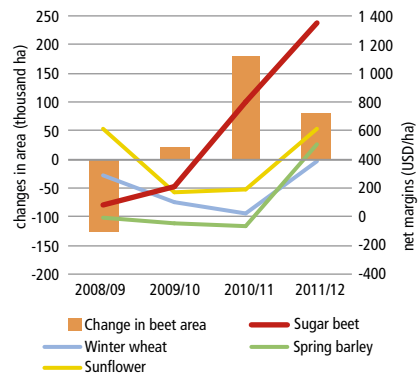
Source: LMC International.

**Figure 39: Anticipated net margins in the Central region at the time of planting, 2008/09-2011/12**



Source: LMC International.

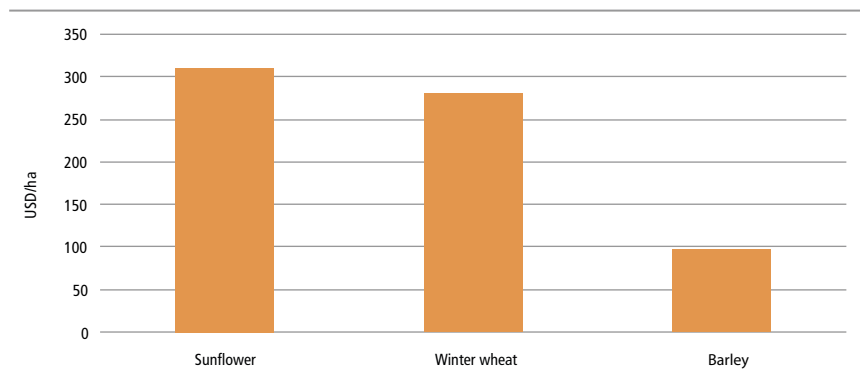
**Figure 40: Actual net margins realized in the Central region after the harvest, 2008/09-2011/12**



Source: LMC International.

Looking at prospects for the future, sunflower is the most attractive competing crop, although winter wheat is not far behind (Figure 41). Table 7 indicates the long-run supply price that farmers will need to be paid in order to plant beet over alternatives.

**Figure 41: Outlook for gross margins of competing crops in the Central region**



Source: LMC International.

**Table 7: Derivation of supply price of beet in the Central region, 2008/09-2011/12, USD/ha, unless otherwise stated**

	2008/09	2009/10	2010/11	2011/12	Trend
Next best alternative crop	Sunflower	Sunflower	Sunflower	Sunflower	<i>Sunflower</i>
A. Gross margin of next best alternative	746	299	335	778	310
B. Direct cost of beet	1 112	905	897	1 056	1 056
C. Anticipated beet yield at 16% sucrose content (tonne/ha)	34	37	37	39	39
<b>D. Gross margin profit-equalizing price (USD/tonne beet) [(A+B)/C]</b>	<b>55</b>	<b>33</b>	<b>33</b>	<b>47</b>	<b>35</b>
E. Additional capital and labour cost of beet	158	147	63	228	228
<b>F. Profit-equalizing price (USD/tonne beet) [(A+B+E)/C]</b>	<b>60</b>	<b>36</b>	<b>35</b>	<b>53</b>	<b>41</b>
G. Tonnes sugar to tonnes beet ratio	8.0	7.0	7.4	8.6	7.6
<b>H. Profit-equalizing price (USD/tonne sugar) [F*G]</b>	<b>482</b>	<b>255</b>	<b>259</b>	<b>451</b>	<b>307</b>

Given trend prices and yields, it is estimated that farmers in the Central region will, in the long run, need to receive a beet price of around USD 40 per tonne to incentivize them to grow beets. This amounts to a beet cost of close to USD 310 per tonne of sugar.

However, in years when crops such as sunflower are offering higher prices, as was the case in 2008/09 and at the time of planting for the 2011/12 crop, a higher beet and sugar prices will be needed.

### **The South region**

Table 8 presents the area planted with beet and alternative crops in the Krasnodar, where the vast majority of sugar production in the South is located.

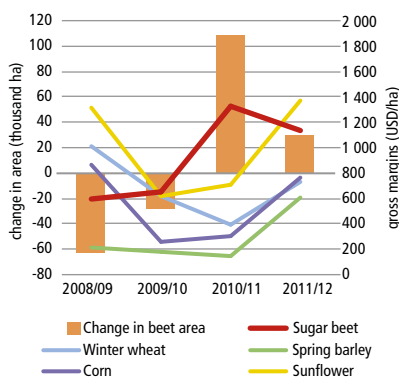
Winter wheat is the most widely grown crop. Sunflower is also common and is a more direct competitor to beet in farmers' rotations. The milder climate in the South also means that the region is more ideal for corn cultivation than elsewhere in the country making corn an additional competitor to beet.

**Table 8: Planted area by crop in Krasnodar, 2005/06-2010/11, thousand ha**

	<b>2005/06</b>	<b>2006/07</b>	<b>2007/08</b>	<b>2008/09</b>	<b>2009/10</b>	<b>2010/11</b>
Winter wheat	1 096	1 077	1 110	1 223	1 297	1 310
Corn	327	383	476	485	426	413
Spring barley	107	102	85	65	65	53
Sunflower	584	557	458	546	551	494
Sugar beet	126	162	193	140	117	196

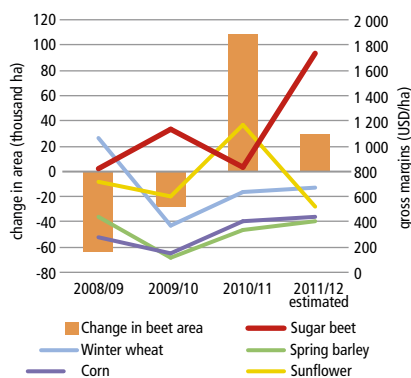
Figure 42 to 45 present the results of our historic farm margins analysis and allow us to see area planted with beet has responded to the changing attractiveness of beet.

**Figure 42: Anticipated gross margins in the South at the time of planting, 2008/09-2011/12**



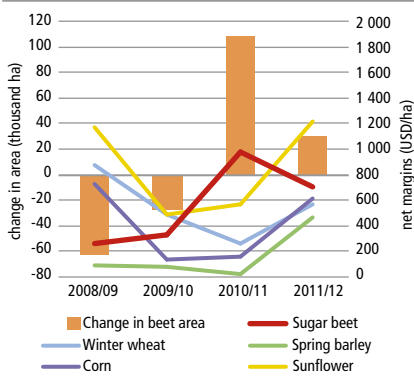
Source: LMC International.

**Figure 43: Actual gross margins realized in the South after the harvest, 2008/09-2011/12**



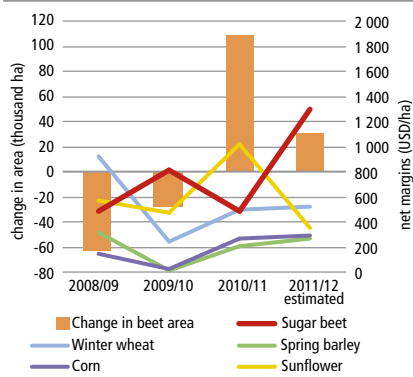
Source: LMC International.

**Figure 44: Anticipated net margins in the South at the time of planting, 2008/09-2011/12**



Source: LMC International.

**Figure 45: Actual net margins realized in the South after the harvest, 2008/09-2011/12**



Source: LMC International.

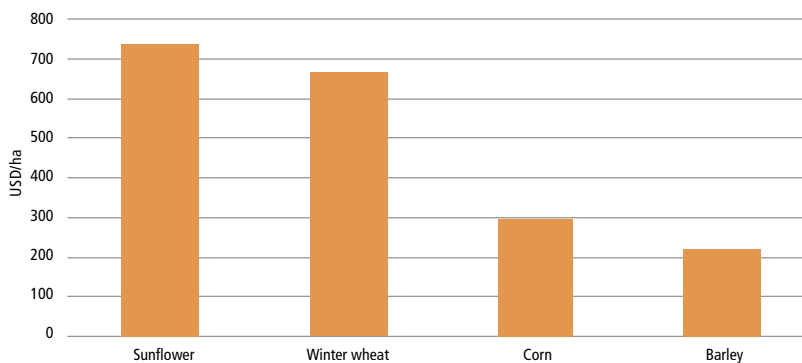
While farmers in the South have realized much higher margins from planting beet than in the Central regions, better agro-climatic conditions mean that this is also the case with the competing crops. Whereas in the Central regions, alternative crops have delivered gross margins of up USD 400 per hectare and net margins of up to USD 200 per hectare, higher yields and better prices means that sunflower has delivered margins well above USD 400 per hectare. As a result, 2009/10 did not see an increase

in beet area in the South, as it did in the Central region. When the high capital costs of beet are taken into account in the net margin analysis, beet often experiences difficulty in competing against sunflower and winter wheat.

It is also noticeable that, unlike in the Central region, the margins realized after the harvest have generally not declined from those anticipated at planting. Therefore, it can be argued that beet is a less risky crop in the South than in the Central region.

Looking at prospects for the future, one can see that, as in the Central region, sunflower and winter wheat are the most competitive alternative crops (Figure 46). However, the higher yields and prices mean that margins for these crops in the Central region are more than double those in the South. Table 9 derives the long-run supply price that farmers will need to be paid to plant beet over alternatives.

**Figure 46: Outlook for gross margins of competing crops in the South**



Source: LMC International.

**Table 9: Derivation of supply price of beet in the South, 2008/09-2011/12, USD/ha, unless otherwise stated**

	2008/09	2009/10	2010/11	2011/12	Trend
Next best alternative crop	Sunflower	Sunflower	Sunflower	Sunflower	Sunflower
A. Gross margin of next best alternative	1 313	621	712	1 376	738
B. Direct cost of beet	1 117	910	936	1 056	1 056
C. Anticipated beet yield at 16% sucrose content (tonne/ha)	40	40	41	43	43
<b>D. GM profit-equalizing price (USD/tonne beet) [(A+B)/C]</b>	<b>61</b>	<b>39</b>	<b>40</b>	<b>56</b>	<b>42</b>
E. Additional capital and labour cost of beet	188	192	198	272	272
<b>F. Profit-equalizing price (USD/tonne beet) [(A+B+E)/C]</b>	<b>66</b>	<b>43</b>	<b>45</b>	<b>63</b>	<b>48</b>
G. Tonnes sugar to tonnes beet ratio	8.5	8.7	8.9	10.3	8.5
<b>H. Profit-equalizing price (USD/tonne sugar) [F*G]</b>	<b>560</b>	<b>378</b>	<b>400</b>	<b>647</b>	<b>409</b>

Although beet yields are higher, the stronger performance of alternative crops means that, in the South, a higher beet price of just over USD 40 per tonne will, on average, need to be offered to farmers.

Furthermore, the lower sucrose content of beet means that the beet cost per tonne of sugar rises to almost USD 410 per tonne. This is because a greater quantity of beet will need to be processed for each tonne of sugar produced.

### Volga region/Siberia

Most of Volga/Siberia's sugar production is concentrated in the areas of Tatarstan and Bashkortostan. Table 10 presents the total areas planted with beet and alternative crops in these two areas.

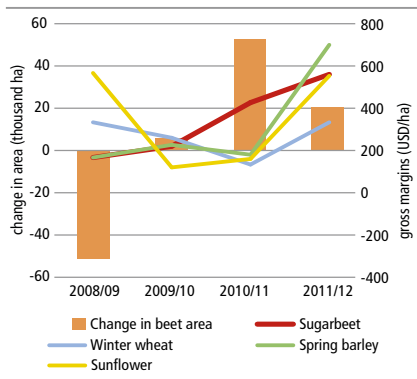
**Table 10: Planted area by crop in Tatarstan and Bashkortostan, 2005/06-2010/11, thousand ha**

	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Spring wheat	1 319	1 347	1 255	1 231	1 292	1 375
Spring barley	710	842	784	791	822	672
Sunflower	119	126	103	131	115	169
Sugar beet	138	151	145	114	128	150

The long and severe winter in the region means that spring wheat, and not winter wheat, is the most widely grown crop. This is important, as spring wheat achieves lower yields. The cold and dry climate also means that farmers give greater importance to barley than sunflower and corn.

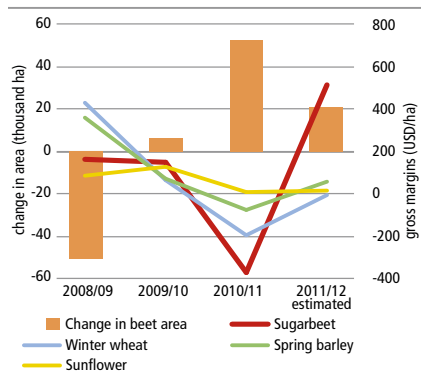
Figures 47 to 50 present the results of the historic farm margins analysis and show how the area planted with beet has responded to the changing attractiveness of the crop.

**Figure 47: Anticipated gross margins in Volga/Siberia at the time of planting, 2008/09-2011/12**



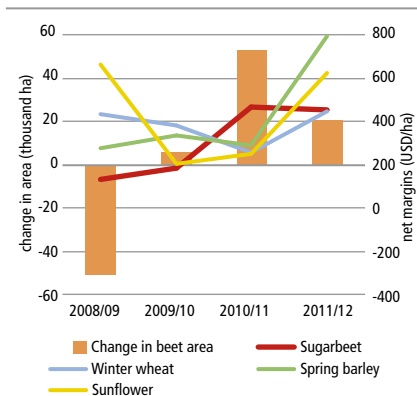
Source: LMC International.

**Figure 48: Actual gross margins realized in Volga/Siberia after the harvest, 2008/09-2011/12**



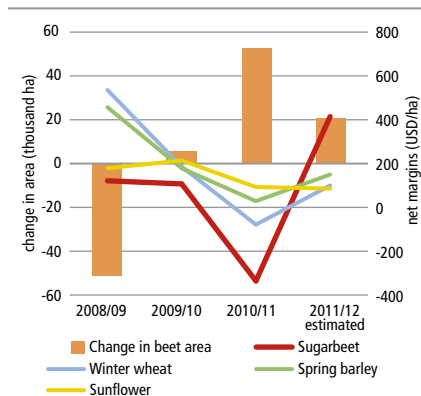
Source: LMC International.

**Figure 49: Anticipated net margins in Volga/Siberia at the time of planting, 2008/09-2011/12**



Source: LMC International.

**Figure 50: Actual net margins realized in Volga/Siberia after the harvest, 2008/09-2011/12**



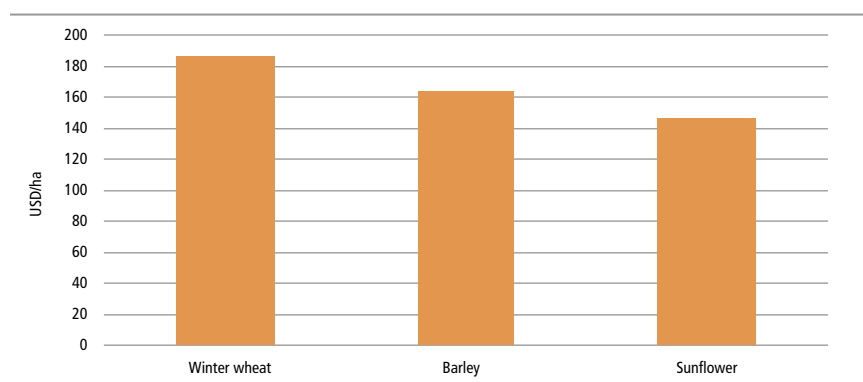
Source: LMC International.

The low yields in the region mean that many crops struggle to deliver good returns for farmers. Even on a gross margin basis, farmers made a loss on most crops during the drought-affected 2010/11 crop. On a net margin basis, the higher capital costs of beet mean that farmers have faced negative returns for each of the last three seasons, with only higher prices motivating recent improvements in returns.

For the most part, beet has struggled to remain profitable against alternative crops. In 2010/11, there was a surge in beet area as high returns were anticipated at the time of planting. However, the drought meant that, by the time of harvest, the situation had dramatically changed. This highlights the high degree of risk involved in cultivating beet in the Volga/Siberia region.

Looking at prospects for the future, spring wheat is the most competitive crop in Volga/Siberia (Figure 51). Due to very low yields, sunflower is not as competitive as in the other regions and all alternatives yield similar returns. Table 11 derives the long-supply price that farmers will need to be paid in order to plant beet ahead of alternatives.

**Figure 51: Outlook for gross margins of competing crops in Volga/Siberia**



Source: LMC International.

**Table 11: Derivation of supply price of beet in Volga/Siberia, 2008/09-2011/12, USD/hectare, unless otherwise stated**

	2008/09	2009/10	2010/11	2011/12	Trend
Next best alternative crop	Sunflower	Spring wheat	Spring barley	Spring barley	<i>Spring wheat</i>
A. Gross margin of next best alternative	566	262	180	701	186
B. Direct cost of beet	1 070	883	878	1 020	1 020
C. Anticipated beet yield at 16% sucrose content (tonne/ha)	26	28	27	29	29
<b>D. GM profit-equalizing price (USD/tonne beet) [(A+B)/C]</b>	<b>63</b>	<b>41</b>	<b>39</b>	<b>60</b>	<b>42</b>
E. Additional capital and labour cost of beet	129	158	66	197	212
<b>F. Profit-equalizing price (USD/tonne beet) [(A+B+E)/C]</b>	<b>68</b>	<b>47</b>	<b>41</b>	<b>67</b>	<b>49</b>
G. Tonnes sugar to tonnes beet ratio	9.0	8.2	8.7	10.0	8.8
<b>H. Profit-equalizing price (USD/tonne sugar) [F*G]</b>	<b>615</b>	<b>382</b>	<b>356</b>	<b>668</b>	<b>435</b>

The low beet yields in the region mean that farmers in Volga/Siberia will need to be paid a beet price of USD 49 per tonne to incentivize them to grow beets. Despite the fact that competing crops offer relative low margins, this is the highest of the three regions, and therefore highlights the problem of low yields.

The high ratio of beet needed per tonne of sugar means that beet costs per tonne of sugar amount to approximately USD 435 per tonne, also the highest in the country.

## Chapter 4 - Factory performance

This chapter assesses the performance of the beet-processing sector. In particular, it focuses on technical and cost performance. The analysis is carried out at a regional level with performance contrasted among regions within the Russian Federation, as well as with industries elsewhere where climatic conditions influencing season length are broadly similar. The final section of the chapter presents a brief assessment of refining costs.

In 2011–2012, there were 77 beet factories operating in 21 regions. Between them they provided jobs for nearly 200 000 employees across the entire sugar sector. Although processors have invested heavily in modernizing and expanding beet factories, no new factories have been built in the Russian Federation since 1985. An estimated 34 factories began operation prior to the 1940s. Most of the important equipment at these factories has been in operation for more than 20 years, and only about one-third of all equipment can be considered modern. The capacity of existing factories ranges from 2 000 to 10 000 metric tonnes of processed beet per day, as compared to an average of 6 000 to 20 000 tonnes in Europe or the United States. As such, there remains significant room for modernization.

### Factory technical performance

There have been tremendous changes in beet-processing sector of the Russian Federation since the late 1990s. At the beginning of this period, a number of companies acquired factories, resulting in considerable consolidation within the sector. As mentioned earlier, five companies now produce approximately 60–70 percent of the country's beet sugar.

Beet processors started to buy or lease land in the early part of the last decade. As discussed in Chapter 2, this strategy was designed to grant factories access to larger and more secure supplies of beet. The large companies now control 35–50 percent of their beet supply.

Table 12 summarizes key data for the factory sector by region, focusing on the production of sugar from beets. The data are based on an average of the last three years and include provisional estimates for the 2011/12 season, for which processing was not complete at the time of writing.

**Table 12: Key factory performance indicators, average 2009/10-2011/12**

	<b>No. factories</b>	<b>Average capacity</b> (tonnes of beets per day)	<b>Net operating days</b>	<b>Sugar produced</b> (thousand tonnes)	<b>Sugar per factory</b> (thousand tonnes)
Central	45	3 500	100	2 170	48
South	20	4 800	93	1 010	51
Volga/Siberia	12	4 100	96	580	47
<b>Russian Federation</b>	<b>77</b>	<b>3 900</b>	<b>97</b>	<b>3 770</b>	<b>49</b>

*Note: Net operating days excludes downtime and is calculated as beets processed divided by installed daily beet-slicing capacity.*

The table shows that production is concentrated in the Central region followed by the South and Volga/Siberia regions. Average factory size is small by international standards, and only a handful of factories have a capacity in excess of 5 000 tonnes of beet per day. Although this limits the ability of factories to exploit economies of scale in processing, the industry has the potential to increase sugar output per factory by operating long slicing campaigns.

As discussed below, cold winter temperatures enable the storage of beets for long periods during the winter months, and for factories to operate for considerably longer than 100 days per year. This was the case in 2011/12, during which some factories operated during January–February 2012 and ran for 120–150 days (net of downtime) processing a very large beet crop.

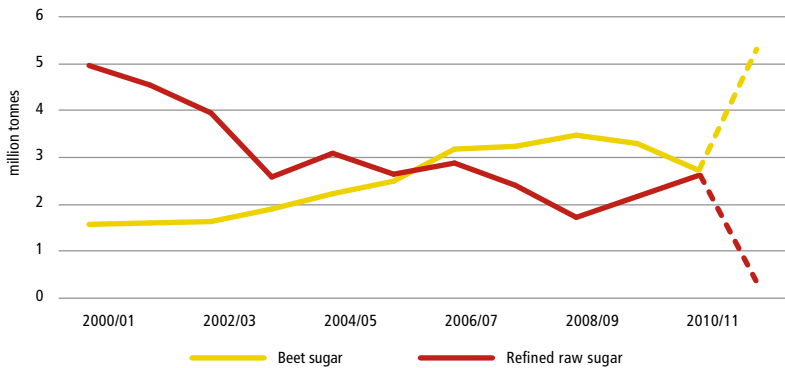
Many factories (more than 30) have extended their processing seasons by refining raw sugar during the off-crop period. However, raw sugar refining is omitted from Table 12 for two reasons:

- raw sugar refining is in decline owing to the rise in beet sugar production;
- raw sugar refining is not a major contributor to the profitability of the processing sector, because tolling margins are very competitive. Furthermore, now that raw sugar imports have declined, there is a considerable excess of refining capacity.

Figure 52 charts the national output of sugar produced from locally grown beets and imported cane raw sugar. The figure highlights opposing trends as the production of sugar beet increased. The

increase in beet sugar output was interrupted in 2010 when beet production in the Central and Volga regions was devastated by drought.

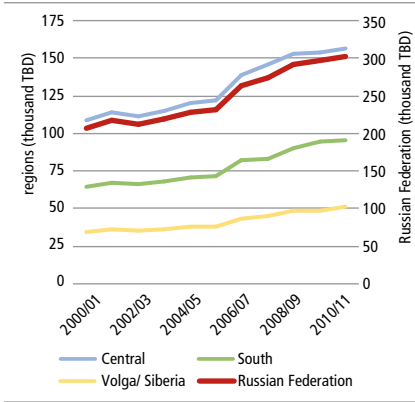
**Figure 52: Russian Federation production of beet sugar and refined raw sugar, 2000/01-2010/11**



Source: LMC International.

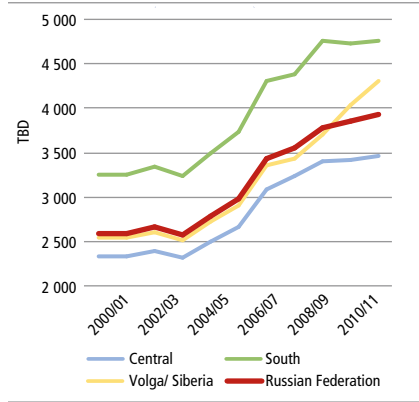
Figures 53 and 54 depict the evolution of beet-slicing capacity over the past decade and highlight the huge investment in the sector over this period. Total installed capacity has increased by around 50 percent, from 200 000 to 300 000 per day, with investment flowing into all regions (Figure 53). Officially registered daily processing capacity was 316 000 tonnes as of 1 January 2012. The draft State Target Programme for Sugar sub-sector Development in 2013–2015 (published by the Ministry of Agriculture of the Russian Federation in May 2013) suggests that the Government will facilitate the increase of daily processing to 357 000 tonnes.

**Figure 53: Installed beet-slicing capacity, 2000/01-2010/11**



Source: LMC International.

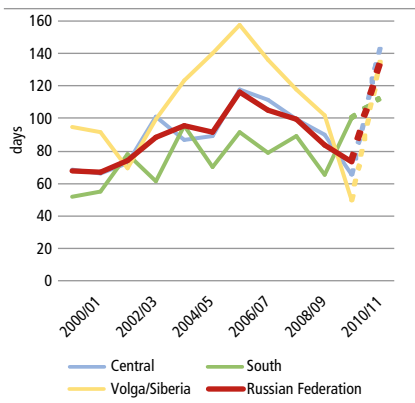
**Figure 54: Average beet-slicing capacity, 2000/01-2010/11**



Source: LMC International.

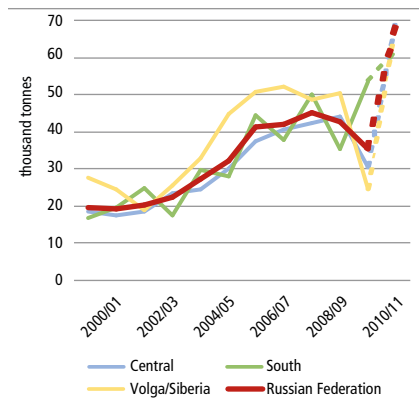
A small decline in the number of factories means that there has been a slightly larger increase in average factory size, with factory capacity remaining consistently higher in the South than elsewhere (Figure 54). Figures 55 and 56 illustrate how utilization of factory capacity has evolved since 2000/01 using two different measures: net number of operating days (defined as beets processed divided by installed daily slicing capacity) and beet sugar output per factory per season.

**Figure 55: Net operating days, 2000/01-2010/11**



Source: LMC International.

**Figure 56: Sugar output per factory, 2000/01-2010/11**



Source: LMC International.

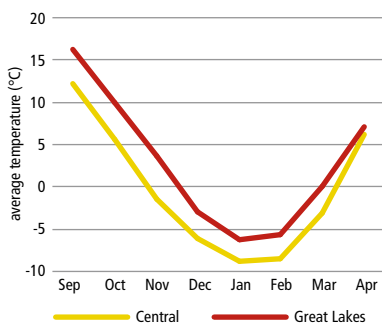
## Benchmarking factory performance

Direct comparisons of factory performance are difficult as there are many determining factors in any particular region; however, they nevertheless highlight areas of strength or weakness. For this study, three areas have been chosen: for the Central region of the Russian Federation, performance is benchmarked against the USA “Great Lakes” (Michigan/Ohio states); for the Volga/Siberia regions, the USA “Red River Valley” (Minnesota/North Dakota states) was selected; and for the South region, performance is compared against the Central EU (Austria/Hungary).

### Central region

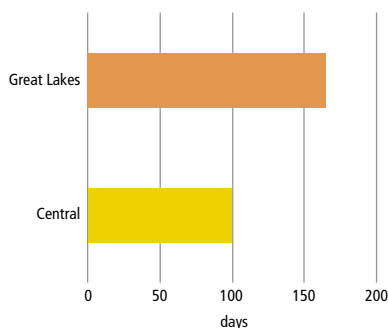
Winter temperatures during the beet-processing season are slightly warmer in the Great Lakes than in the Central region. Yet, the industry is consistently able to process beets for around 160–170 days per year by storing them at a low temperature, but without deep-freezing (Figures 57 and 58).

**Figure 57: Temperature during the beet-processing months, Central region and the Great Lakes**



Source: LMC International.

**Figure 58: Net number of operating days, Central region and the Great Lakes**

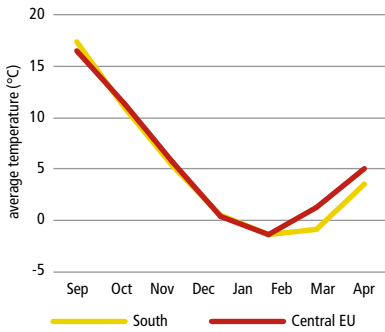


Source: LMC International.

### South region

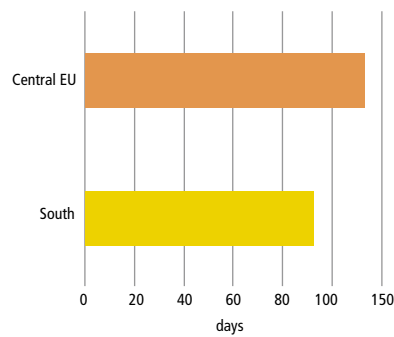
Temperatures during the processing season are similar in the South of the Russian Federation and in Central Europe. However, they are considerably milder than in the Central or Volga/Siberia. This limits the ability to store beets, since temperatures cannot be relied upon to be consistently below freezing. Nevertheless, processors in Austria and Hungary have been able to operate for 110–120 days per year, with operations running into January (Figures 59 and 60).

**Figure 59: Temperature during the beet-processing months, the South and Central EU**



Source: LMC International.

**Figure 60: Net number of operating days, South and Central EU**

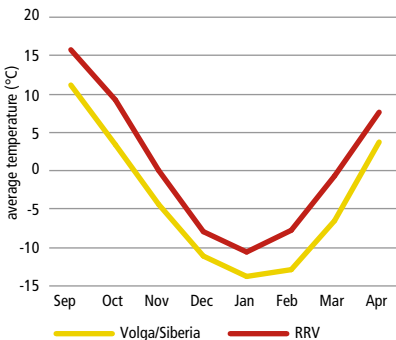


Source: LMC International.

**Volga/Siberia**

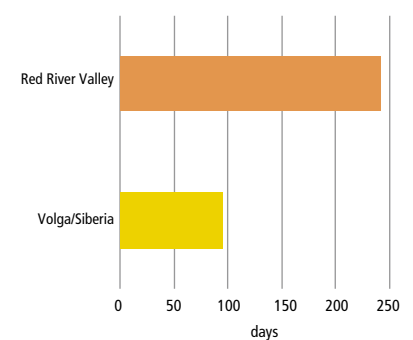
The exceptionally low temperatures in the Volga/Siberia regions are colder even than the continental temperatures reached in the Red River Valley region of the northern United States. These extreme conditions have allowed the USA industry to develop storage systems that allow beets to be stored close to zero for part of the processing season and deep frozen for the coldest period of the year. The industry has also developed sheds that allow deep-frozen beets to be stored into early spring, thereby allowing beets to be processed as late as April and even May (Figures 61 and 62).

**Figure 61: Temperature during the beet-processing months, Volga/Siberia and Red River Valley**



Source: LMC International.

**Figure 62: Net number of operating days, Volga/Siberia and Red River Valley**

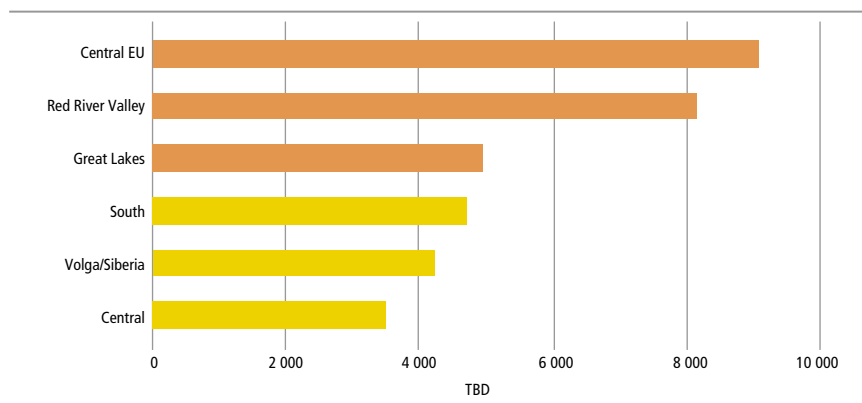


Source: LMC International.

This simple comparison highlights the fact that the Russian Federation's beet industry has the potential to lengthen its season to process large beet crops. This will depend in part on the climate and, in particular, on whether the regions experience periods of mild (>5°C temperatures) during December to February, which poses a major risk to the quality of beets in storage.

For the country to become self-sufficient and even export sugar to neighbouring countries, the industry will have to harvest beet crops of 40–50 million tonnes on a regular basis. This will necessitate investment to improve storage. This does not require a large capital outlay, but growers and processors will have to develop suitable storage/loading platforms, protective covering, and efficient management systems to deal with variable weather conditions from year to year. The alternative is to expand factory capacity to process beets over a shorter period; however, this would require massive investment in additional factory capacity (Figure 63).

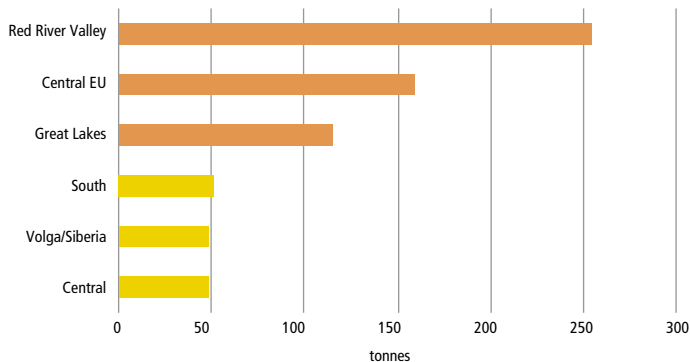
**Figure 63: Average factory capacity**



Source: LMC International.

Figure 64 illustrates the differences in sugar output per factory in the Russian Federation and the selected benchmark industries. Part of the difference in performance levels is explained by the longer seasons that these other industries achieve. However, these higher capacity utilization figures are due in part also to factories mostly being larger.

**Figure 64: Sugar output per factory**



Larger factories and longer seasons mean that factories process much more beet. The USA processing industry – which is almost entirely cooperatively owned – is able to moderate the impact of this on haulage distances by having higher beet yields per hectare. They also benefit from the fact that farmers in the United States typically grow beets on a three to four-year rotation. However, in the Russian Federation, lower beet yields and longer rotations for beets grown on non factory-owned farms mean that haulage distances would lengthen significantly if factories were to achieve the kind of utilization rates seen elsewhere.

This highlights another benefit to the Russian industry of improving beet yields. It also explains why factories are keen to grow their own beets on farms where they can shorten the beet rotation to three to four years.

### Cost of beet processing

Table 13 contains estimates of the cost of processing sugar beets in the Russian Federation. It comprises costs from beet reception to bulk sugar production and includes the cost of drying beet pulp. Costs are summarized in three categories and are presented excluding and including the value of by-products (molasses and beet pulp):

- *Labour* refers to employees in the production process only (from beet reception to bulk sugar). These costs exclude labour associated with bagging/packaging, as well as sales and administration.

- *Capital (machinery)* includes allowances for depreciation of factory equipment and supplies for repairs and maintenance. Factory depreciation is calculated based on estimates of the full replacement cost of capital and an average depreciation period of 22.5 years.

**Table 13: Costs of beet processing, average 2009/10 and 2011/12, USD/tonne sugar**

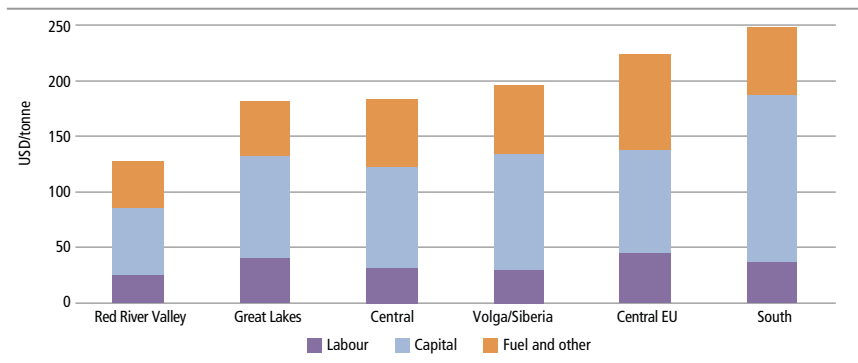
	Labour	Capital	Fuel and other	Total	By-product value	Total (net of by-products)
Central	31	92	61	<b>184</b>	(70)	<b>114</b>
South	37	151	61	<b>249</b>	(81)	<b>167</b>
Volga/Siberia	30	104	61	<b>195</b>	(71)	<b>124</b>

In preparing costs, the same level of energy prices and use at factories is assumed for all three regions, although there are significant differences between factories according to the level of investment made over the past decade.

The table shows that the main differences in costs are attributable to capital costs and are explained by differences in capacity utilization rates (sugar output per tonne of installed processing capacity). This is the reason why factories in the Central region are estimated to have lower costs than in Volga/Siberia, and in the South in particular. In this respect, factories in the South are disadvantaged in two ways: they have a shorted processing season and produce less sugar for each tonne of beets sliced (owing to the lower sugar content of delivered beets).

Figure 65 contrasts the estimates of processing costs in the Russian Federation with the selected benchmark industries (without allowing for the value of by-products). It shows that costs in the Central and Volga/Siberia regions compare reasonably well with all but the Red River Valley region, where factories benefit from extremely high levels of capacity utilization and access to cheap coal.

**Figure 65: Cost of beet processing, average 2009/10 and 2011/12**



Source: LMC International.

### The cost of raw sugar refining

By far the largest cost of refining raw sugar is the raw material itself. Processing costs are modest when compared to processing beets, reflecting the fact that the degree of transformation from raw to white sugar is significantly less than that of sugar beet to white sugar.

As a result, energy costs are lower, largely because there is no need to extract sugar from the beets or to dry beet pulp. Moreover, there is substantial competition between beet factories to process raw cane sugar. Consequently, this activity is carried out on a variable cost basis, whereby factories seek to cover their input costs (energy, chemicals, bags, etc.), the loss of raw sugar that occurs during refining (approximately 2 percent), and labour. As a result, the minimum fees that factories charge for refining have typically ranged from USD 45 per tonne to USD 60 per tonne over the past couple of years.

Table 14 presents indicative estimates of refining costs across a range of raw sugar prices and using current input prices (for energy, wages, etc.). The table presents a breakdown of costs, including the sugar loss that occurs during refining, which itself is a function of the delivered cost of raw sugar at the factory. In practice, costs will differ between factories and regions, reflecting differences in factory efficiency, wages, and costs associated with raw sugar logistics.

**Table 14: Indicative cost of refining raw sugar in the Russian Federation**

<b>World raw sugar price</b>	<b>cents/lb</b>	<b>10</b>	<b>15</b>	<b>20</b>	<b>25</b>
World raw sugar price	USD/tonne	220	331	441	551
Polarization premium	USD/tonne	9	13	17	21
Ocean freight and other on-costs	USD/tonne	75	75	75	75
Port discharge and transport to factory	USD/tonne	40	40	40	40
Import duty	USD/tonne	250	200	140	140
VAT (at 10%)	USD/tonne	59	66	71	83
<b>Delivered cost of raw sugar</b>	USD/tonne	<b>653</b>	<b>724</b>	<b>784</b>	<b>910</b>
<b>Refining costs</b>					
Raw sugar losses in refining (at 2%)	USD/tonne	13	14	16	18
Energy	USD/tonne	17	17	17	17
Chemicals	USD/tonne	2	2	2	2
Bags	USD/tonne	10	10	10	10
Labour	USD/tonne	8	8	8	8
<b>Total variable refining costs</b>	USD/tonne	<b>50</b>	<b>51</b>	<b>53</b>	<b>55</b>

Note: VAT signifies value added tax.

## Chapter 5 - Policy

### Overall policy context

Following the collapse of the Soviet Union the economic structure of the Russian Federation underwent a transformation, which had a marked effect on the evolution of agricultural policy. Serova and Shick<sup>7</sup> identify three periods with distinct agricultural policy frameworks.

The first, between 1991 and 1994, was characterized by the crumbling of the planned economy with rapid market liberalization in all areas, including the agricultural sector. This implied the dismantling of virtually all forms of state support. During this period the Government relied on trade policy to guarantee sufficient supplies by subsidizing imports and restricting exports.

During the second stage, between 1994 and 1998, the focus on liberalization of agricultural markets was replaced by inward looking and protectionist policies with minimum guaranteed prices to producers, import barriers and export subsidies. A state entity for regulating agricultural markets (FAP) was established. As the economic situation in the Russian Federation stabilized and agricultural producers gained experience in operating under market conditions – becoming increasingly more focused and organized – agricultural policy once again became more protectionist and agriculture received a larger share of the state budget. The orientation towards import substitution was reinforced by the adaptation of a *Doctrine on Food Security* in the wake of the 2007–2008 spike in food prices, setting self-sufficiency targets for the main food products consumed in the Russian Federation.<sup>8</sup>

Currently, the agricultural policy of the Russian Federation is an integral part of the state's socio-economic policy.<sup>9</sup> Its principal focus is the sustainable development of agriculture and rural areas. The main objectives of the agrarian policy are to:

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7 E. Serova and O. Shick (2007) *World agricultural policy*. Moscow (in Russian).

8 Russian Federation Agriculture and Trade Policy Background Note, Trade and Markets Division of FAO, January 2013.

9 The Federal Law on Agricultural Development <http://base.consultant.ru/cons/cgi/online.cgi?req=doc;base=LAW;n=126592> (in Russian).

- increase the competitiveness of Russian agriculture and agricultural producers, and improve the quality of food products;
- ensure the sustainable development of rural areas and rural employment, and improve living standards in rural areas;
- preserve and reproduce natural resources used in agricultural production;
- create a well-functioning market for agricultural products, raw materials and food, and increased profitability of agricultural producers;
- create a favourable investment climate and increased investment in agriculture; and
- maintain price parity between agricultural products and industrial inputs used in agriculture.

In order to implement national agricultural policy goals, the Government develops sectoral and sub-sector development programmes, such as the State Programme for the Development of Agriculture and Markets of Agricultural Products, Raw Materials and Food for 2008–2012<sup>10</sup> or 2013–2020,<sup>11</sup> or the State Target Programme for Sugar sub-sector development in 2013–2015, which was still under discussion at the time of writing.

Overall agricultural policy objectives have been pursued at a relatively high cost to Russian taxpayers and consumers, as the majority of support is provided through market price support, variable input use and fixed capital formation in agriculture (investment subsidies and interest rates),<sup>12</sup> which are among the most distorting support measures. According to the OECD, the producer support estimate (PSE), which measures annual monetary transfers from consumers and taxpayers to farmers (arising from policy measures that support agriculture regardless of their nature, objective and impact), equalled RUR 501 billion or 22 percent out of almost RUR 2.1 trillion total value of agricultural production in the Russian Federation in 2008–2010 (on average per year).

Within the PSE, transfers to producers of sugar accounted for RUR 12 billion, or about 2 percent of all transfers to farmers,

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10 [www.mcx.ru/documents/document/v7\\_show/1348.145.htm](http://www.mcx.ru/documents/document/v7_show/1348.145.htm) (in Russian).

11 [www.mcx.ru/navigation/docfeeder/show/342.htm](http://www.mcx.ru/navigation/docfeeder/show/342.htm) (in Russian).

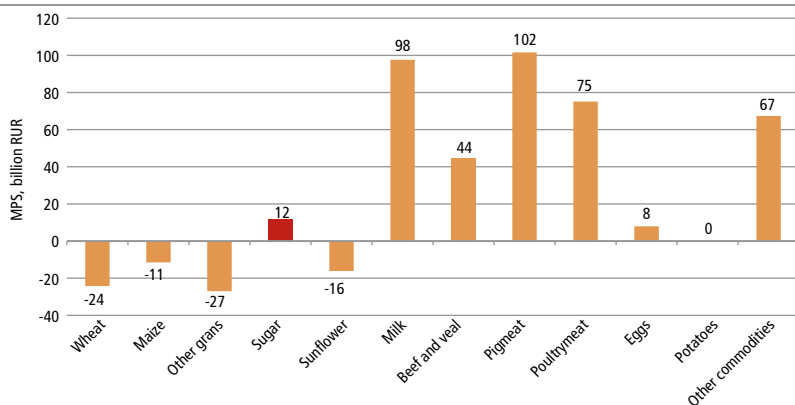
12 Please refer to the OECD *Producer Support Estimate Manual* ([www.oecd.org/tad/agricultural-policies/psmanual.htm](http://www.oecd.org/tad/agricultural-policies/psmanual.htm)) for specific definitions and classifications of support programmes.

while producers of milk accounted for 19 percent, beef and veal 9 percent, pork 20 percent, and poultry 19 percent of all transfers to farmers, as measured by OECD.<sup>13</sup>

Nearly all support to sugar producers in the Russian Federation is provided in the form of market price support (MPS) through import tariff measures, as opposed to agricultural input or outputs subsidies. As a result, the MPS is a key indicator in assessing support levels to farmers that result from the difference between domestic and international reference prices estimated at the farm-gate level in the Russian Federation. Figure 66 shows the MPS for key agricultural commodities in 2008–2010.

The negative price support of wheat, maize, sunflower seeds and other grains indicates that producers of these commodities are “taxes” in the Russian Federation, as consumers pay lower prices compared with the international reference prices for these commodities. Sugar, in contrast, is a commodity “supported” by consumers because domestic prices are higher than the international parity prices. The domestic prices for beef, pork and poultry are much higher as compared with international reference prices; therefore, poultry and livestock farmers receive the bulk of transfers from consumers as compared with sugar producers.

**Figure 66. Market price support of specific products in the Russian Federation, 2008–2010 (average annual)**



Source: authors' presentation based on OECD PSE Database.

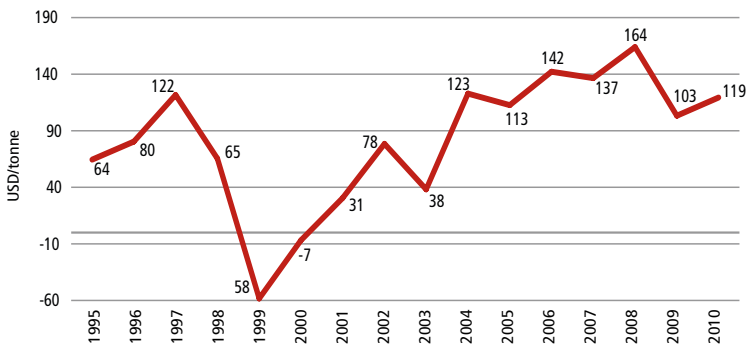
13 OECD PSE Database for the Russian Federation Producer and Consumer Support Estimates database, available at: [www.oecd.org/agriculture/agricultural-policies/producerandconsumersupportestimatesdatabase.htm#country](http://www.oecd.org/agriculture/agricultural-policies/producerandconsumersupportestimatesdatabase.htm#country).

## Sugar market price support: a historical perspective

The MPS indicator reflects the gap between domestic and international parity prices. As such, it reflects the competitiveness of domestic products with imported products of comparable quality<sup>14</sup> under conditions of no import protection (import duties, SPS measures, etc.). Because improving the competitiveness of domestic industry is one of the major goals of agricultural policy in the Russian Federation, the study calculated the MPS per tonne of refined sugar, using OECD information on MPS in 1995–2010, to illustrate its evolution (Figure 67).

Improving competitiveness with imports means bridging the gap between domestic and import parity prices (MPS = 0). However, it is evident from Figure 67 that the gap between domestic and international raw cane sugar prices has increased considerably since 2000.

**Figure 67: Market price support for refined sugar in the Russian Federation in 1995–2010**



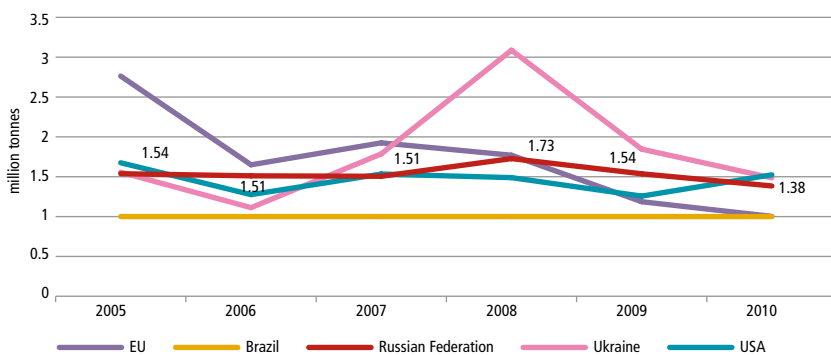
Source: authors' calculations based on OECD PSE Database.

<sup>14</sup> While the OECD methodology for MPS calculation is comprehensive, it still uses assumptions of quality for various products, and thus may require quality adjustments. These adjustments, for instance, are needed to compare the price of domestic chilled chicken breasts with imported frozen chicken leg quarters. Investors are advised to make their own calculations of import price parities based on specific products and their competition with imports.

To illustrate the level of sugar producer protection in different countries, the study used the producer nominal protection coefficient (NPC)<sup>15</sup> as reported by OECD for the Russian Federation, Brazil, the European Union, Ukraine and the United States. Figure 68 indicates that the level of domestic market protection has been very stable since 2005, following the introduction of the variable import tariff in the Russian Federation. It is also clear that Ukraine, one of the main sugar suppliers in the Soviet era, has significantly reduced its level of sugar market protection since the country's accession to the WTO in 2008. Overall, the level of Russian sugar producer protection was comparable to that of the United States and Ukraine in 2010. The European Union substantially decreased its level of its producer protection from as high as 2.7 (270 percent of the international reference price) in 2005 to almost 1 (100 percent of the international reference price).

It should be noted that NPC does not reflect a market access perspective for a specific market. It is, rather, a comparison of domestic and international prices for comparable quality products.

**Figure 68: Sugar producer nominal protection coefficient in selected countries, 2005-2010**



Source: OECD.

<sup>15</sup> The Producer NPC is the ratio between the average price received by producers at the farm gate (including payments per tonne) and the border price, measured at the farm gate. NPC shows the level of domestic market protection. A producer NPC of 1.2 for a country indicates that domestic producer prices are on average 20 percent above border prices for the same commodity. A producer NPC of 1 indicates that prices received by producers are on average the same as border prices

The Government has set a target of 80 percent self-sufficiency in sugar production by 2020. As mentioned above, the key policy used by the Government to achieve this target is the import tariff regime. There are also a number of support measures in place, targeting the wider agricultural sector, which also have an influence on the sugar industry. These include: direct payments per hectares of sugar beets planted, investment grants and subsidized credit rates.

### **The import tariff regime**

The government introduced the current tariff regime in 2004. Its main characteristic are a high tariff on white sugar and two sets of flexible sugar tariffs on imports of raw sugar. The system is designed to support domestic producers when world prices are low, but also to offer consumers lower prices when the country relies on imports and protect them when world prices are high. The higher band, within which tariffs range between USD 140 and USD 270 per tonne, operates when domestic beet sugar is being marketed. The lower band, in which tariffs range from USD 50 to USD 250 per tonne, is used during the off-crop, when raw sugar imports are refined to fill the domestic deficit. (For detailed information on how the variable import tariff functions see Chapter 6.)

The tariff on white sugar imports is set at USD 340 per tonne for all origins, including Ukraine despite the Commonwealth of Independent States (CIS) free trade agreement.

As sugar factory modernization continues, the Government will need to consider reducing import tariff protection to allow domestic industry to stay competitive in the long-term future without introducing domestic production quotas or resorting to export subsidies to remove surpluses from the market.

### **General agricultural support**

Historically, the Russian Government has used a number of policies to support agriculture. Although these measures tend to favour meat, dairy and other livestock product, government support has inevitably spilt over into the sugar sector.

While in-kind credits (e.g. for seed, fertilizer and other inputs) have declined with time, subsidized credit has helped to improve access to quality seeds, plant-protection products and machinery, as capital turnover in sugar beet production (from the time of deep ploughing to the time of beet sale) may reach 18 months. Banks also require compliance with certain farm management practices and minimum levels of input use before they grant loans. This has in turn improved efficiency levels.

**State programme of development of agriculture and market regulation.** In December 2006, the State Duma passed a law requiring a state programme for investment in agriculture to be passed every five years, in accordance with Russian Federal Law. The State Programme of Development of Agriculture and Market Regulation for 2008–2012 has funds of RUR 107.6 billion (EUR 2.7 billion), which include subsidies and direct federal investments into the development of certain agricultural industries. The programme has a number of components:

- *Interest rate subsidies:* These account for the lion's share at 74 percent of the total allocated to the State Programme, and are seen as the main tool in developing priority agricultural projects in 2010. Subsidized credit is available for short, medium and long-term loans, with subsidies available for 80–100 percent of the interest rate of bank's loans. Of the total allocated under the State Programme, RUR 79.4 billion (EUR 2 billion) is allocated to this area, to provide capital for new projects, including the much-needed construction and modernization of sugar refineries, which have inhibited processing capacity. Of the total, RUR 3.5 billion (EUR 0.1 billion) is allocated for the acquisition of agricultural machinery and equipment.
- *Agricultural inputs:* Subsidized leasing agreements are available to provide domestically produced machinery.
- *Fertilizer subsidies:* Subsidized fertilizers are reported to be available if domestically produced products are used. Sugar beet growers can access these subsidies, although the bureaucratic procedure is reported to be complicated.
- *Other subsidies:* RUR 8.7 billion (EUR 0.2 billion) is also allocated to preserving and restoring soil fertility, while funding is made available to support other areas of agricultural production, including rural development and agricultural insurance.

## WTO Accession: overall commitments and sugar tariffs

The Russian Federation joined the WTO on 22 August 2012, adopting commitments on market access, domestic support and export subsidies. On domestic support, the commitments regarding trade-distorting subsidies in the “amber box”,<sup>16</sup> as measured by the aggregate measurements of support (AMS) under the WTO Agreement on Agriculture, were set at USD 9 billion in 2012 to correspond to the Russia Federation’s annual average total AMS for the base period 2006–2008. The AMS will need to gradually decline to USD 4.4 billion by 2018. The largest component of the baseline AMS was soft loans to agriculture of USD 1.6 billion.

On market access, the tariff schedule establishes gradual reduction or elimination of tariffs on a number of agricultural products, although the tariff rate quotas and high out-of-quota tariffs are maintained for meats.

In the case of sugar, the Russian Federation managed to maintain the variable import tariff, although this is not a generally allowed practice in the WTO. The upper variable tariff rate will be reduced from USD 270 per tonne to USD 250 per tonne. Another important change is the significant adjustment of the price band downwards from the previously applied range of USD 286.6–396.8 tonnes. The new reference price for calculation of the import duty sets the lower limit at USD 100 per tonne and the upper limit at USD 198 per tonne for raw sugar. Assuming international sugar prices well above USD 400 per tonne, the Russian import tariff for sugar will remain at their lower level of USD 140 per tonne – or over 30 percent in *ad-valorem* tariff.<sup>17</sup>

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16 According to the WTO, all domestic support measures considered to distort production and trade (with some exceptions) fall into the so-called “amber box”. These include measures to support prices, or subsidies directly related to production quantities. The reduction commitments for these types of subsidies are expressed in terms of total aggregate measurement of support (Total AMS) ([www.wto.org/english/tratop\\_e/agric\\_e/agboxes\\_e.htm](http://www.wto.org/english/tratop_e/agric_e/agboxes_e.htm)). The AMS calculation of market price support is based on fixed, historical world reference prices, rather than current world prices.

17 Russian Federation Agriculture and Trade Policy Background Note, Trade and Markets Division of FAO, January 2013.

## Chapter 6 - Markets, prices and revenues

The Russian sugar industry sells most of its sugar on the domestic market. A very small amount is exported each year to neighbouring countries. This chapter outlines the size of these markets and explains the dynamics of prices in each, as well as the prices the industry can expect to earn in them in the foreseeable future.

### Destination of sales

Table 15 provides a breakdown of sales of Russian Federation sugar in 2006–2011.

**Table 15: Distribution of sales of Russian sugar, 2006/07 to 2010/11, thousand tonnes, white value, unless otherwise stated**

	2006/07	2007/08	2008/09	2009/10	2010/11 Estimate
Domestic consumption	5 911	5 999	5 127	5 381	5 400
White sugar imports	311	203	281	302	400
Domestic sales <sup>1</sup>	5 601	5 797	4 846	5 078	5 000
Exports	346	56	148	31	150
<i>Caucasus</i>	24	13	4	0	
<i>Central Asia</i>	321	42	139	30	
<i>Others</i>	1	1	5	1	
<b>Total sales (beet sugar and refined cane sugar)</b>	<b>5 947</b>	<b>5 853</b>	<b>4 994</b>	<b>5 110</b>	5 150
Raw sugar imports ( <i>tel quel</i> )	3 071	2 724	1 763	1 949	2 609
Implied sales of refined cane sugar <sup>2</sup>	2 843	2 523	1 632	1 804	2 415
<b>Total Sales (beet sugar only)<sup>3</sup></b>	<b>3 103</b>	<b>3 330</b>	<b>3 362</b>	<b>3 305</b>	2 734

Notes: 1. Total domestic sales are estimated by deducting white sugar imports from estimated consumption. 2. When deriving sales of refined cane sugar, the figures allow for sugar lost in the refining process, as it takes more than 1 tonne of raw sugar to produce 1 tonne of refined sugar. 3. As raw sugar is imported to fill the supply deficit, sales of refined cane sugar are deducted when estimating sales of beet sugar.

Source: LMC International.

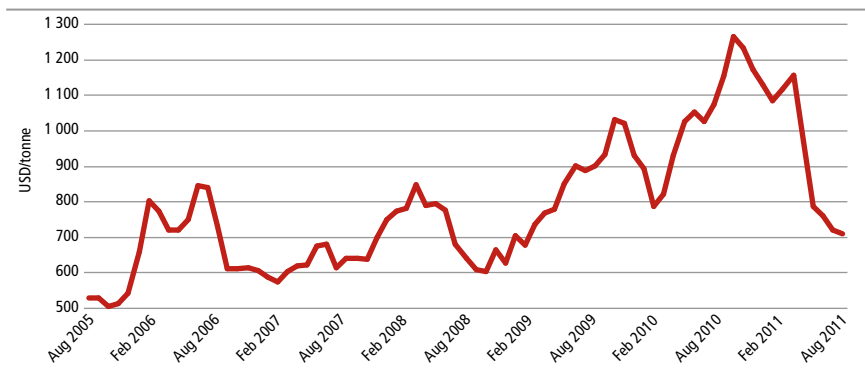
Total sales in the domestic market have declined over the past decade, reflecting the country's shrinking population. They currently stand at close to 5.5 million tonnes, refined white sugar equivalent. In recent years, imports have accounted for a declining share of these sales as beet sugar production has increased. Most imports are in the form of raw sugar, although the country also imports approximately 0.3 million tonnes of white sugar, mainly from Belarus under the free trade agreement. The exact split between imports and locally produced sugar varies from year to year depending on the size of the domestic beet crop.

The Russian Federation exports sugar to countries in Central Asia, many of whom the country enjoys a free trade agreement with as part of the CIS. Among the central Asian countries, Kazakhstan, Tajikistan and Uzbekistan are the main buyers of Russian sugar. Between them, the three countries account for around 75 percent of total Russian sugar exports in most years. A very small amount of sugar is sold to countries in the Caucasus region that neighbour the South sugar-producing region.

### Domestic prices

Figure 69 charts the evolution of the wholesale sugar price in Moscow in 2005–2011. This reveals that, from a level of around USD 600–800 per tonne, including 10 percent VAT, prices soared to over USD 1 000 in 2011 when the Russian Federation's beet crop was devastated by drought and world sugar prices were extremely high. They have since fallen sharply on the back of a strong beet crop.

**Figure 69: Wholesale sugar price in Moscow, 2005-2011**



Source: LMC International.

## **Relationship with the world price**

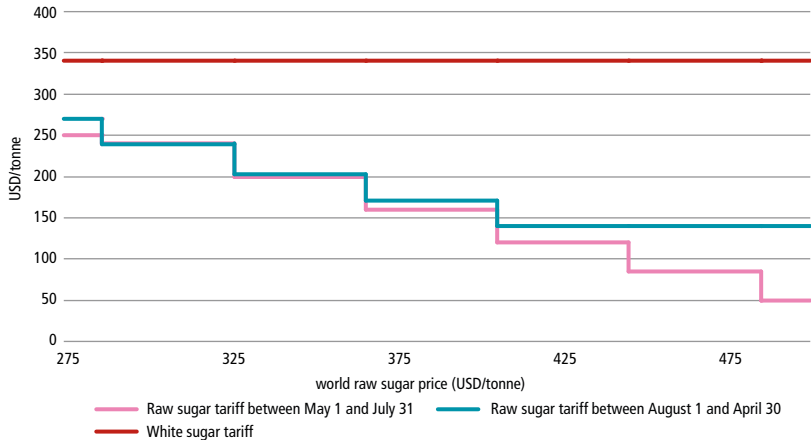
This section explains the dynamics of Russian sugar prices, focusing on the relationship between prices in the Russian Federation and the world market, and on the intra-seasonal pattern in the domestic price.

The Russian Federation is a structural importer of sugar and, as such, its sugar prices trade at a premium over world market values. The relationship between the domestic and world prices depends on the logistical costs associated with importing sugar from the world market and, more importantly, on the Russian Federation's tariff regime.

The Government operates a tariff regime designed to stabilize domestic prices and, at the same time, support higher prices during periods when locally produced beet sugar is being marketed than when the country requires imports. There are several key features of the tariff regime:

- a stable and prohibitively high white sugar tariff that is applied throughout the year;
- an applied tariff on raw sugar that varies inversely with world sugar prices; and
- a higher set of tariffs that are applied when producers are marketing domestic beet sugar than when the country needs to import sugar to meet its domestic production shortfall. By applying a lower tariff on raw sugar, the government encourages the import of raw sugar and, at the same time, limits the price impact on consumers.

Figure 70 illustrates the Russian Federation's tariff schedule for white and raw sugar (as of 2012), and shows how the raw sugar tariff changes in relation to world price levels and differs when the country is marketing sugar produced from locally grown beets and imported raw sugar.

**Figure 70: Schedule of import tariff for raw and white sugar**

Source: LMC International.

The higher schedule of duties prevails when producers are marketing beet sugar. This occurs from 1 August until supplies begin to run low, generally in the second or third quarter of the year depending on the size of the beet crop. The schedule has upper and lower limits of USD 270 per tonne and USD 140 per tonne. Within this range there is a series of tariffs that correspond to different levels of the world sugar price. The rate is set each month and is pegged to the average New York futures price for the preceding month: the higher the world price, the lower the tariff.

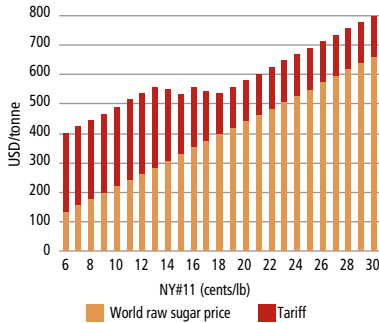
When producers are marketing sugar refined from imported raw cane sugar, the lower band of duties applies. The schedule has upper and lower limits of USD 250 per tonne and USD 50 per tonne, and is applied in the same way as the higher duty schedule.

The benefits of the higher tariff schedule, applied when domestic beet sugar is being sold, are shared between growers and processors according to the terms of the beet payment system. This stipulates that beet processors must pay farmers the equivalent of approximately 8 percent of the sugar price to farms for each tonne of beet supplied.

**The influence of the tariff on the domestic price.** The impact of the import tariff on Russian sugar prices depends on the level of the world raw sugar price. To illustrate the implications of the current regime for Russian sugar prices, Figures 71 and 72 present

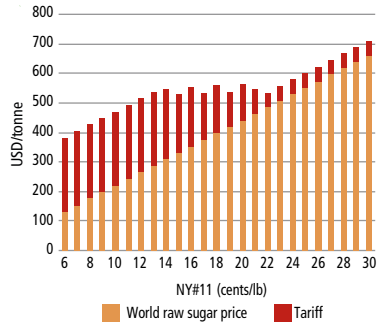
the sum of the world raw sugar price and the Russian tariff across a range of world sugar prices from USD 150 to around USD 650. This analysis excludes logistics, refining costs and taxes.

**Figure 71: Sum of world sugar price and Russian tariff in the beet-marketing season**



Source: LMC International.

**Figure 72: Sum of world sugar price and Russian tariff during the raw sugar-refining season**



Source: LMC International.

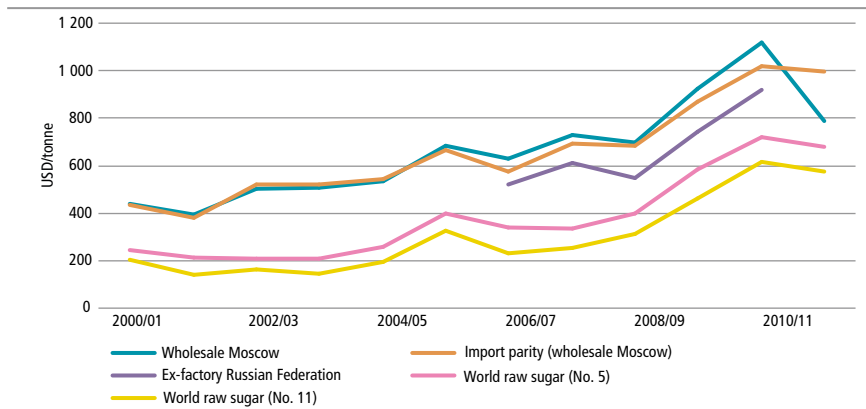
In practice, sugar prices in the Russian Federation are affected not just by the level of world sugar prices and the applied tariff, but by two other factors:

- the costs of logistics, refining and taxes associated with importing sugar; and
- the Russian Federation’s market balance, which determine whether prices trade above or below the tariff-inclusive cost of making imports (“import parity”). When measured over the course of a whole season, the Russian Federation is a structural importer; however, within each season, the market is over-supplied for a period during and after the production season and is under-supplied thereafter. (The impact of this on the season pattern of prices is discussed later in the chapter.)

Figure 73 illustrates the average price of sugar each season in relation to import parity based on a delivered Moscow basis, including VAT. The figure also contains world prices of white and raw sugar. The import parity price includes indicative costs associated with importing and refining raw sugar and transporting it to the Moscow market. Specifically, it includes:

- the world price of raw sugar (New York. 11 contract) and a pol premium that is paid for the Brazilian very high pol (VHP) sugar that makes up the bulk of the Russian Federation's imports;
- the logistical costs of transporting raw sugar from Brazil to refineries in the Russian Federation;
- the prevailing import tariff on raw sugar and VAT (10 percent);
- the cost of refining, including the pol losses during the refining process; and<sup>18</sup>
- the cost of transporting refined sugar from the refinery to Moscow.

**Figure 73. Russian sugar price in relation to world prices, 2000/01-2010/11**



Source: LMC International.

This analysis supplements the MPS analysis provided in Chapter 5 from a business perspective. It shows that sugar prices in the Russian Federation usually trade at a substantial premium to the world market values. It also reveals that domestic prices have a close relationship with the import parity price and have typically traded at a modest premium to import parity. The divergence between domestic and world prices was particularly noticeable in 2010/11, when domestic prices on average traded at a large premium to import parity as a result of the shortage of sugar brought on by the severe drought in the summer of 2010. The divergence was also visible early in the 2011/12 season, when domestic prices fell to a large discount of close to 25 percent

<sup>18</sup> Pol loss refers to the fact that more than tonne of raw sugar is required to produce one tonne of refined sugar.

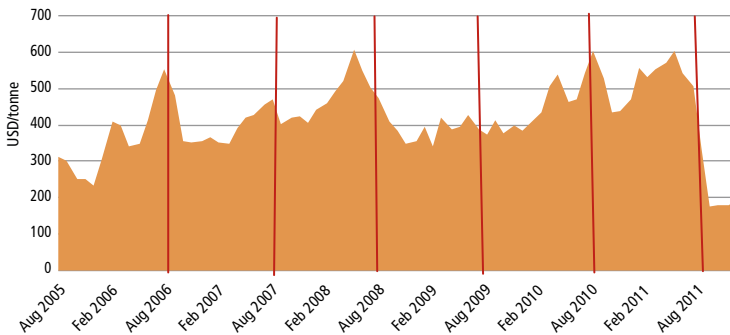
below import parity. This reflected the expected strong beet sugar crop and the fact that prices to date are for the harvest period, when local prices are weakest because domestic supply is greatest.

### Short-term seasonal drivers of the domestic price

A deeper understanding of domestic price dynamics can be gained from Figures 74 and 75.

Figure 74 charts the monthly premium that the domestic price commands over the world price of raw sugar. The blue vertical lines mark the start of the beet harvest each year. The figure illustrates how the premium fluctuates within each crop year. This is to be expected as the tariff regime ensures that a higher tariff applies when locally produced sugar is being marketed than when raw sugar is being imported. However, on close scrutiny, the premium over the world price is visibly highest just before each new season starts. In theory, the premium should actually be lower at this time of year, as this is when the lower tariff band is in place.

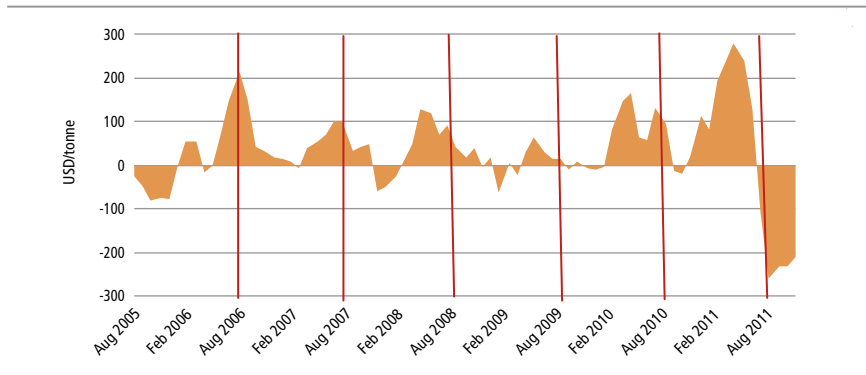
**Figure 74: Domestic price premium over the world raw sugar price, 2005-2011**



Source: LMC International.

Figure 75 carries out a similar analysis, but instead depicts the domestic price premium/discount to import parity on a monthly basis. This shows that local prices trade at close to (and sometimes below) import parity when domestic supplies are plentiful, rising to a premium (sometimes a substantial one) when the country has to rely on imports to meet its needs.

**Figure 75: The differential between the domestic and import parity price, 2005-2011**



Source: LMC International.

These observations indicate that, while the import parity price acts as support to domestic prices in the long run, the domestic supply/demand balance within each season determines whether prices trade at a premium or discount to import parity in the short term. This means that prices typically trade at a much larger premium to both the world price and to import parity when the country is reliant on imports, even though there is a lower tariff in place.

The substantial discount to which sugar prices have fallen since the start of the 2011/12 season reveals a new challenge facing the Russian sugar industry. If it is to sustain sugar production at a level close to self-sufficiency, large surpluses during and immediately after the production season will weigh heavily on prices as producers liquidate stocks to generate cash. This problem will exist unless there is adequate financing at reasonable interest rates to finance the storage of these surpluses, thereby allowing producers to market sugar evenly during the course of the year.

**Price dynamics in target exports markets.** A small number of exports are made to neighbouring countries each year. The main export destination is Kazakhstan, to which sugar is exported from the Volga region due to its geographic proximity. From Kazakhstan, Russian sugar is then distributed onwards to other central Asian countries such as Tajikistan and Turkmenistan. Similarly, a small amount of sugar from the South finds its way across the border to countries in the Caucasus that neighbour that part of the Russian Federation.

The price received for these exports is similar to the price in the Russian Federation. However, there is no VAT, and the cost of transporting the sugar to the border is also added. In recent years, the volume of exports has rarely exceeded 2–3 percent of overall beet sugar sales, and the price received has been similar to the Russian price.

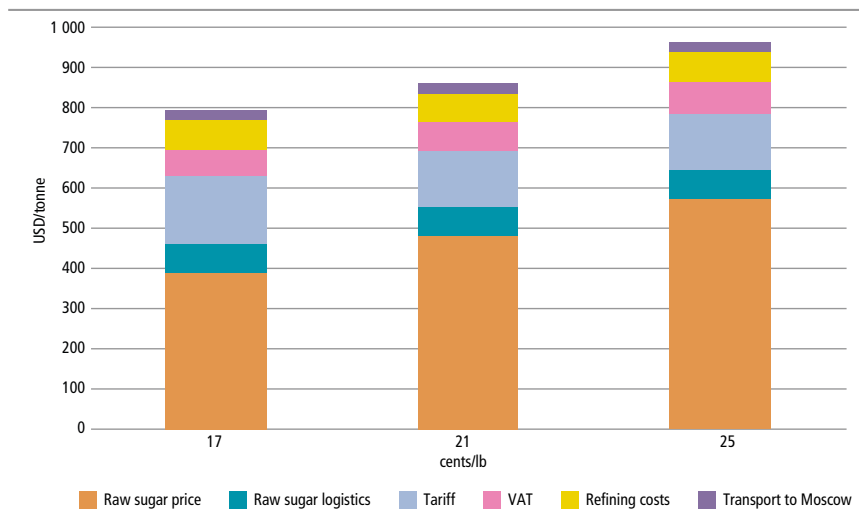
### **Outlook for domestic prices**

The first part of this chapter shows how the long-run prospects for sugar prices in the Russian Federation will be heavily dependent on the following:

- the outlook for world sugar prices;
- Russian Federation's import tariff regime;
- the country's supply/demand balance; and
- the availability of credit to finance stocks of domestically produced sugar.

A detailed analysis of the outlook for world sugar prices, as well as some of the risks to this outlook, can be found in Annex 1.

Assuming that the current tariff regime is maintained for the next five to ten years, it is possible to calculate the import parity price of sugar. This is done here for three levels of the world raw sugar price with a baseline projection of USD 0.21/lb, and high and low prices of USD 0.17/lb and USD 0.25/lb. Figure 76 shows the import parity prices associated with each of these world prices, and presents prices on a delivered Moscow basis including VAT. The higher band of tariffs is used in the analysis, as this is more relevant for domestic beet sugar producers.

**Figure 76: Derivation of import parity wholesale price of sugar**

Source: LMC International.

Note: The chart refers to three levels of world raw sugar prices upon delivery to Moscow.

This analysis suggests that wholesale prices in Moscow can be expected to range between around USD 800 and USD 950 per tonne, as long as the world price averages between USD 0.17–0.25/lb and as long as local prices trade at import parity.

If the industry is to achieve production levels that are close to self-sufficiency, it will only be possible to keep prices at import parity if there is adequate short-term financing of sugar stocks to ensure orderly marketing of sugar over the course of the season. Otherwise, prices could fall well below import parity levels and jeopardize the ability of the industry to achieve production levels close to self-sufficiency.

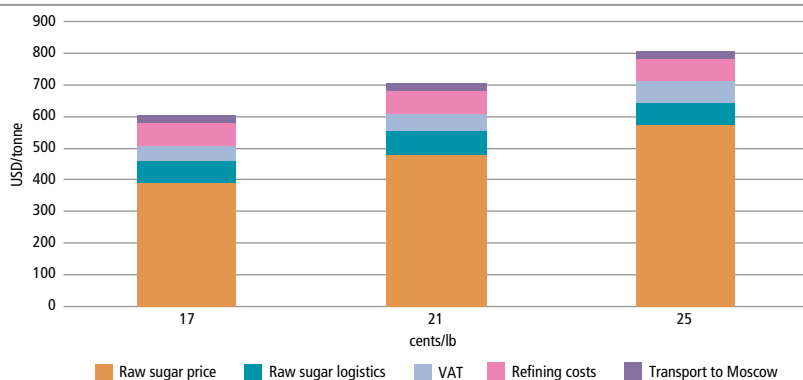
The challenge facing the industry will be even greater if it produces surpluses over local consumption. Modest surpluses could be absorbed in neighbouring high-priced markets, but the Russian Federation is not well placed to export sugar further afield. This means that surpluses in excess of around 0.5 million tonnes could have very damaging consequences for local prices. This suggests that it will be difficult for the country to sustain production in excess of 5.5–6.0 million tonnes in the foreseeable future.

## Impact of duty removal

Figure 77 illustrates the outlook for the price of sugar in the Russian Federation in the unlikely event of complete removal of the import tariff, that is, in a completely free market. Assuming that sugar prices reflect import parity, this suggests that prices will range between USD 600 and USD 800 per tonne on a delivered Moscow basis including VAT.

However, there is a risk that sugar prices could trade below this level if the country is close to self-sufficiency and there is insufficient credit to allow sugar to be sold in an orderly manner throughout the year.

**Figure 77: Derivation of the duty-free import parity wholesale price of sugar**



Source: LMC International.

Note: The chart refers to three levels of world raw sugar prices upon delivery to Moscow.

## Regional ex-factory sugar prices

Table 16 translates the forecasts of the wholesale sugar price in Moscow into regional ex-factory values as well as corresponding beet prices. Calculate of these prices has:

- excluded VAT (10 percent);
- allowed for regional price differences vis-à-vis the Moscow prices, which reflect local supply/demand factors, market opportunities and logistics costs; and
- derived prices for beets on a 16 percent sucrose basis, assuming farmers receive the value of 80 kg of sugar and 28 kg of molasses<sup>19</sup> for 1 tonne of beet.

<sup>19</sup> The price of molasses is assumed to be around 10% of the ex-factory sugar price.

The results are summarized in Table 16.

**Table 16: Long-run ex-factory prices, USD/tonne, unless otherwise stated**

	Central			South			Volga/Siberia		
	Low price	Base case	High price	Low price	Base case	High price	Low price	Base case	High price
World raw sugar price (USD/lb)	0.17	0.21	0.25	0.17	0.21	0.25	0.17	0.21	0.25
Wholesale price in Moscow	793	860	962	793	860	962	793	860	962
<b>Ex-factory sugar price</b>	<b>696</b>	<b>757</b>	<b>849</b>	<b>696</b>	<b>757</b>	<b>849</b>	<b>730</b>	<b>792</b>	<b>884</b>
<b>Beet price (16% sucrose)</b>	<b>58</b>	<b>63</b>	<b>71</b>	<b>58</b>	<b>63</b>	<b>71</b>	<b>60</b>	<b>66</b>	<b>73</b>

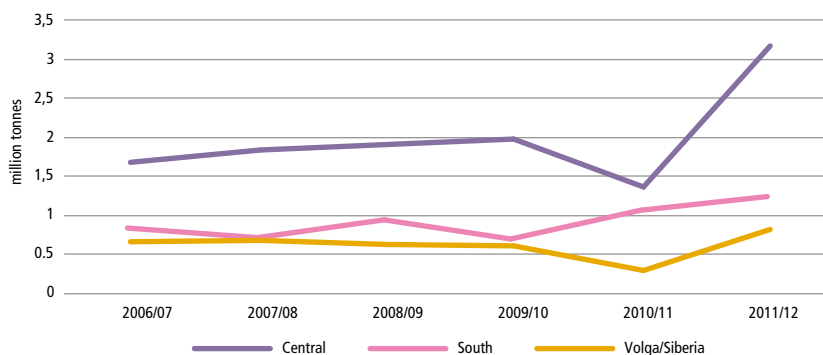
## Chapter 7 - Viability of the industry

This chapter presents an assessment of the future viability of the Russian sugar industry. It draws together the analysis presented in earlier chapters to evaluate the profitability of sugar beet growing and processing in the main producing regions of the country.

### Past profitability

Before presenting projections of industry viability, this section presents estimates of the profitability of the sector over the past four seasons, including provisional estimates for the 2011/12 crop year. With the exception of the drought-affected crop in 2010/11, sugar production has increased during this period in all but the Volga/Siberia region (Figure 78).

**Figure 78: Regional sugar output, 2006/07-2011/12**



Source: LMC International.

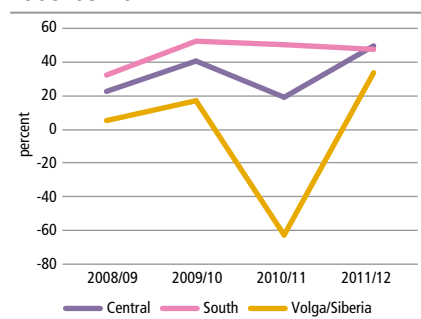
Estimates are presented of profits at farm and factory level. To allow for differences in farm ownership structure, the viability of beet farming is assessed in two ways:

- the price of beet is assessed against the cost of growing beet. This is arguably more relevant for factory-operated farms;
- the price of beet is assessed against the supply price of beet. This is arguably the appropriate measure for independent farms, as it determines whether returns from beet farming match those from other crops.

## Farm profitability

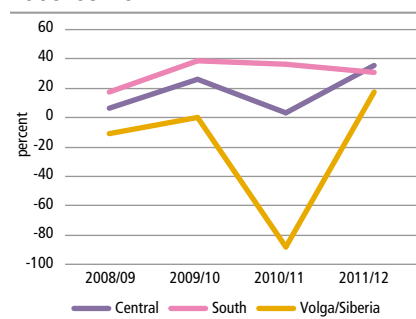
The profitability of farming varies greatly between the different regions of the country and is greatest in the South, followed by the Central region and Volga/Siberia. Figures 79 and 80 summarize the estimates of EBITDA and earnings before interest and taxes (EBIT) margins, respectively, in each region for the past four seasons. The data underpinning these figures are summarized in Table 17.

**Figure 79: Farm EBITDA margins, 2008/09-2011/12**



Source: LMC International.

**Figure 80: Factory EBIT margins, 2008/09-2011/12**



Source: LMC International.

The figures show consistently positive margins in the South and Central regions, although net margins in the Central region were severely squeezed in 2010/11, when production was reduced by drought.

Margins in Volga/Siberia are noticeably lower, and are barely positive in most years when depreciation of farm machinery is taken into account. This reflects the impact of the cool and dry climate on yields. The impact of the 2010 drought was especially severe in this region and is reflected clearly in the figures.

These differences in farm profitability apply to all crops and are reflected in higher land rents in the South than in the other two beet-growing regions. Land rent from costs are excluded to highlight the underlying differences in profitability between the regions.

**Table 17: Derivation of farm margins by region, 2008/09-2011/12**

			2008/09	2009/10	2010/11	2011/12
Central	Beet price	USD/tonne beet	41.1	50.9	70.0	56.9
	Cash costs	USD/tonne beet	31.9	30.2	56.6	28.5
	EBITDA	USD/tonne beet	9.1	20.7	13.3	28.4
	EBITDA margin	%	22	41	19	50
	Depreciation	USD/tonne beet	6.4	7.5	10.9	8.3
	EBIT	USD/tonne beet	2.7	13.2	2.5	20.0
	EBIT margin	%	7	26	4	35
	South	Beet price	USD/tonne beet	41.0	52.4	56.6
Cash costs		USD/tonne beet	27.7	25.0	28.1	26.0
EBITDA		USD/tonne beet	13.3	27.4	28.5	23.4
EBITDA margin		%	32	52	50	47
Depreciation		USD/tonne beet	6.1	7.0	7.9	8.1
EBIT		USD/tonne beet	7.2	20.4	20.6	15.3
EBIT margin		%	18	39	36	31
Volga/Siberia		Beet price	USD/tonne beet	44.2	49.6	58.6
	Cash costs	USD/tonne beet	41.7	41.1	95.5	37.9
	EBITDA	USD/tonne beet	2.5	8.5	-36.8	19.2
	EBITDA margin	%	6	17	-63	34
	Depreciation	USD/tonne beet	7.2	8.5	14.9	9.3
	EBIT	USD/tonne beet	-4.7	0.0	-51.8	9.8
	EBIT margin	%	-11	0	-88	17

Cash costs include all direct costs associated with growing beets, including inputs (seed, fertilizers, chemicals and fuel) and labour (but excluding land rent). Depreciation refers to all farm machinery associated with beet production, harvesting, loading and transport to the factory.

**Attractiveness of sugar beet in farm rotation.** A very different picture emerges when the profitability of beet production is assessed by comparing the price of beet with the supply price of beet. The supply price of beet represents the price farmers need to receive as a return from beets to equal that of the next best alternative crop.

The supply prices used here refer those anticipated by farmers each year at the time of planting. The assessment differentiates

between the supply prices needed to match the profit from the next best crop and those required to cover the variable and full costs of growing beet.

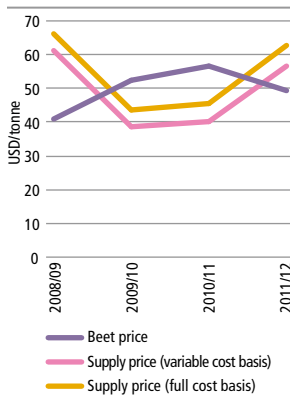
The beet prices shown in the figures refer to actual beet prices in each region in each season (based on an average for the months of October to January). Figures 81 to 83 summarize the results of this analysis for each region and show beet prices exceeding supply prices by a greater margin in the Central region than in either of the other regions. In other words, sugar beet is an attractive crop in this region in most years. However, beet is less attractive in the other regions, where the margins between beet prices and supply prices are similar. Supply prices exceeded beet prices in all regions in 2007/08, reflecting very high alternative crop prices and relatively low sugar (and beet) prices

**Figure 81: Central: actual beet price vs. beet supply price at the time of planting, 2008/09-2011/12**



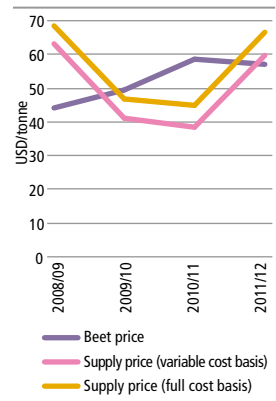
Source: LMC International.

**Figure 82: South: actual beet price vs. beet supply price at the time of planting, 2008/09-2011/12**



Source: LMC International.

**Figure 83: Volga/Siberia: actual beet price vs. beet supply price at the time of planting, 2008/09-2011/12**



Source: LMC International.

These findings imply that beet is competitive in crop rotations in the Central region, and that farmers can be expected to devote a greater share of their arable farm land to beet in this region than elsewhere.

In the South, the place of beet in crop rotations is challenged by the high returns producers can expect to earn from alternative

crops. This is a reflection of the warmer climate, which allows farmers to achieve higher yields for all crops. As a result, farmers must be incentivized with higher prices to encourage them to include beet in their rotations.

The similar result for Volga/Siberia reflects the harsh growing conditions in these regions. While the yields of all crops suffer as a result, beet suffers more owing to the very dry climate and the fact that the crop requires moisture to grow throughout the summer months.

### **Factory profitability**

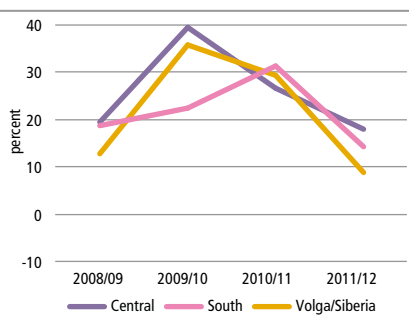
To assess the profitability of sugar beet processing, the following cost items have been deducted from regional sugar prices (for which the average price prevailing between October and January is used on the basis that the majority of sugar is sold during this period):

- cost of beets in each region, calculated as the local beet price and sugar extraction rate per tonne of beet;
- cash-processing costs (labour, fuel and other inputs); and
- depreciation.

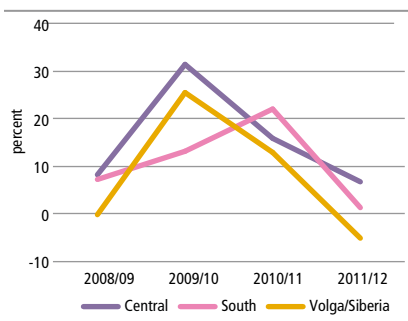
The analysis is carried out for the past four seasons and for each region. Figures 84 and 85 summarize the estimates of EBITDA and EBIT margins, respectively, and the data underpinning these figures are summarized in Table 18.

The figures show broadly similar margins in all three regions. They also reveal lower margins for factories than farms.

This highlights the need for factories to maximize capacity utilization by extending season length. However, it should be noted that a steep decline in sugar prices is likely to depress processors' margins considerably, despite much greater factory throughput.

**Figure 84: Factory EBITDA margins add years to both figures, 2008/09-2011/12**

Source: LMC International.

**Figure 85: Factory EBIT margins add years to both figures, 2008/09-2011/12**

Source: LMC International.

**Table 18: Derivation of factory margins by region**

			2008/09	2009/10	2010/11	2011/12
Central	Sugar price	USD/tonne sugar	459	650	749	641
	Beet cost	USD/tonne sugar	330	355	519	487
	Cash costs	USD/tonne sugar	40	38	31	40
	EBITDA	USD/tonne sugar	90	256	200	115
	EBITDA margin	%	20	39	27	18
	Depreciation	USD/tonne sugar	51	52	80	71
	EBIT	USD/tonne sugar	38	204	119	43
	EBIT margin	%	8	31	16	7
South	Sugar price	USD/tonne sugar	459	650	749	641
	Beet cost	USD/tonne sugar	348	456	505	508
	Cash costs	USD/tonne sugar	26	48	9	41
	EBITDA	USD/tonne sugar	86	146	235	92
	EBITDA margin	%	19	23	31	14
	Depreciation	USD/tonne sugar	52	61	70	83
	EBIT	USD/tonne sugar	34	85	164	9
	EBIT margin	%	7	13	22	1
Volga/Siberia	Sugar price	USD/tonne sugar	494	684	783	675
	Beet cost	USD/tonne sugar	397	405	509	573
	Cash costs	USD/tonne sugar	33	35	44	44
	EBITDA	USD/tonne sugar	63	244	230	59
	EBITDA margin	%	13	36	29	9
	Depreciation	USD/tonne sugar	64	69	130	94
	EBIT	USD/tonne sugar	-1	175	100	-34
	EBIT margin	%	0	26	13	-5

## Future viability of the sector

This final section assesses the future viability of the industry under a number of policy and market scenarios. Sugar and beet prices are derived on an estimate of the long-run trend price of sugar, which is based on a world raw sugar price of USD 0.21/lb. To allow for possible future changes in Russian Federation's tariff regime, as well as the weakness of domestic prices relative to import parity as a result of disorderly marketing of sugar when production is large, the viability of the sector is evaluated under four different outcomes:

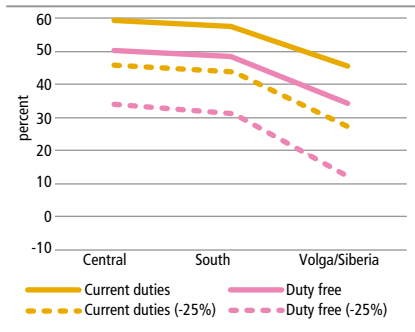
- current duties: sugar prices reflect import parity with the 2012 schedule of import tariffs remaining in place;
- duty free: sugar prices reflect import parity without any import tariffs;
- current duties (-25 percent): sugar prices trade at a substantial discount to the import parity under the 2012 tariffs owing to disorderly marketing of sugar; and
- duty free (-25 percent): sugar prices trade at a substantial discount to the import parity under the duty free outcome owing to disorderly marketing of sugar.

## Outlook for the viability of beet farming

To assess the outlook for the future viability of beet farming in the Russian Federation, separate analyses of farm margins (beet price minus beet farming costs) and competitiveness of beet in the farm rotation (beet prices minus beet supply price) were conducted. The analyses assumed constant beet farming costs at the 2011/12 season levels.

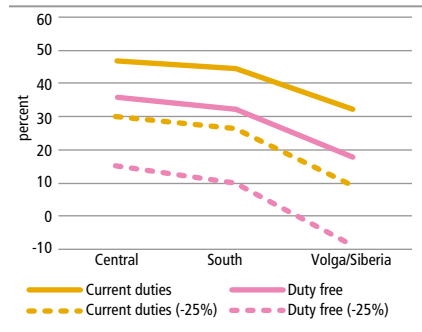
The results of the analysis are summarized in Figure 86 and 87 and are expressed in terms of farms' EBITDA and EBIT margins. The results illustrate the sensitivity of margins to changes in sugar (and beet) prices under each outcome. However, they show farm margins remaining positive under all outcomes, except in the Volga/Siberia regions if prices were to trade at a 25 percent discount to import parity without any duties. In other words, beet farming is expected to remain a profitable activity. The data underpinning these figures are presented in Table 19.

**Figure 86: Future farm EBITDA margins**



Source: LMC International.

**Figure 87: Future farm EBIT margins**



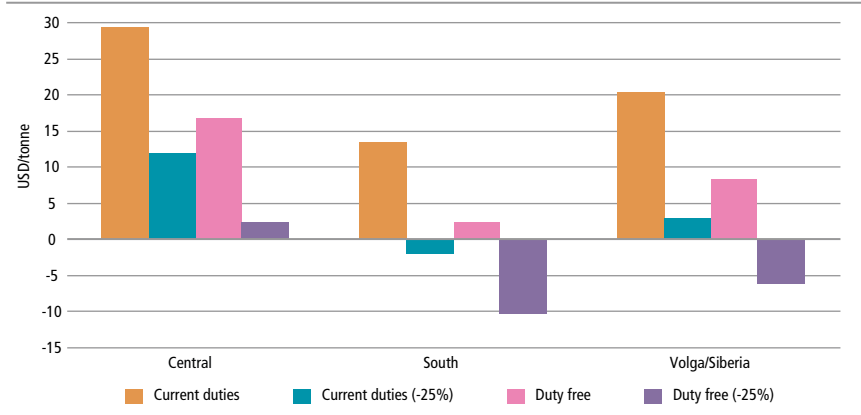
Source: LMC International.

While farm margins determine whether farms operated by factories will remain profitable, they do not indicate whether independent farms will retain beets within their farm rotation and therefore continue to supply beets to factories. To answer this question, beet prices are compared (under each of the market outcomes discussed above) with farmers' beet supply prices (based on trend prices for alternative crops and the full costs of beet production). The results are summarized in Figure 88.

**Table 19: Derivation of future farm margins by region under different outcomes for sugar and beet prices**

			Central	South	Volga/Siberia
Current duties	Beet price	USD/tonne beet	70.2	61.3	69.6
	Cash costs	USD/tonne beet	28.5	26.0	37.9
	EBITDA	USD/tonne beet	41.6	35.3	31.7
	EBITDA margin	%	59	58	46
	Depreciation	USD/tonne beet	8.3	8.1	9.3
	EBIT	USD/tonne beet	33.3	27.3	22.4
	EBIT margin	%	47	44	32
Duty free	Beet price	USD/tonne beet	57.5	50.3	57.5
	Cash costs	USD/tonne beet	28.5	26.0	37.9
	EBITDA	USD/tonne beet	28.9	24.3	19.6
	EBITDA margin	%	50	48	34
	Depreciation	USD/tonne beet	8.3	8.1	9.3
	EBIT	USD/tonne beet	20.6	16.3	10.3
	EBIT margin	%	36	32	18
Current duties (-25%)	Beet price	USD/tonne beet	52.6	46.0	52.2
	Cash costs	USD/tonne beet	28.5	26.0	37.9
	EBITDA	USD/tonne beet	24.1	20.0	14.3
	EBITDA margin	%	46	44	27
	Depreciation	USD/tonne beet	8.3	8.1	9.3
	EBIT	USD/tonne beet	15.8	11.9	5.0
	EBIT margin	%	30	26	10
Duty free (-25%)	Beet price	USD/tonne beet	43.1	37.7	43.1
	Cash costs	USD/tonne beet	28.5	26.0	37.9
	EBITDA	USD/tonne beet	14.6	11.8	5.3
	EBITDA margin	%	34	31	12
	Depreciation	USD/tonne beet	8.3	8.1	9.3
	EBIT	USD/tonne beet	6.2	3.7	-4.1
	EBIT margin	%	14	10	-9

**Figure 88: Margin between beet prices and beet supply prices under different market outcomes**



Source: LMC International.

This analysis suggests that beets will remain an attractive crop in the Central region in all market outcomes. The same is true for Volga/Siberia, except if sugar prices were to fall to a large discount to import parity in the absence of duties. However, beets appear not to retain a clear advantage over other crops in the South once sugar trades at a large discount to import parity values, with or without the current duty structure.

There are several clear conclusions that can be drawn from this assessment.

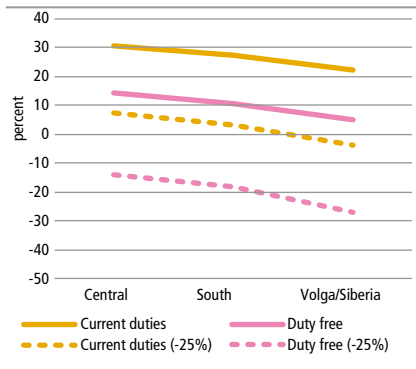
- If disorderly marketing of sugar results in prices trading at a large discount to import parity values for a prolonged period of time, the industry will struggle to retain beet in the rotation in all regions and sugar production will fall. This in turn means that the country will return again to a substantial deficit and prices will again reflect import parity levels.
- If the country is to achieve self-sufficiency, the industry must have adequate access to finance to be able to carry the large stocks necessary to ensure that sugar is marketed throughout the year without depressing prices during and shortly after the beet-processing season.
- It will not be possible for the country to sustain a substantial surplus production of sugar over and above the requirements of the domestic market and that of some neighbouring markets in Central Asia. In other words, production in the

Russian Federation is unlikely to consistently exceed 5.5–6.0 million tonnes unless there is growth in the size of the domestic market.

### Outlook for the viability of beet processing

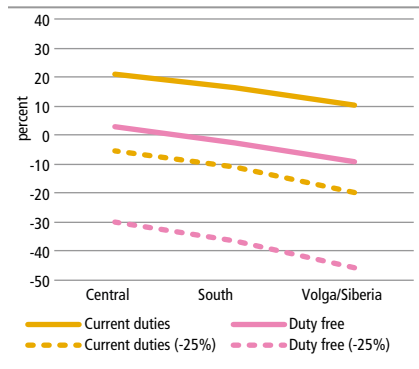
The same methodology used to evaluate the farm sector was used to evaluate the outlook for the factory sector. Figures 89 and 90 summarize the estimates of EBITDA and EBIT margins, respectively, and the data underpinning these figures are summarized in Table 20.

**Figure 89: Future factory EBITDA margins**



Source: LMC International.

**Figure 90: Future factory EBIT margins**



Source: LMC International.

The figures again show broadly similar factory margins in all three regions, with the Central region performing best and Volga/Siberia performing worst.

However, because the factory sector has lower margins than the farm sector, it is more vulnerable to a reduction in sugar prices. Again, this highlights the need for factories to maximize capacity utilization by extending season length.

**Table 20: Derivation of future factory margins by region**

			Central	South	Volga/Siberia
Current duties	Sugar price	USD/tonne sugar	757	757	792
	Beet cost	USD/tonne sugar	487	508	573
	Cash costs	USD/tonne sugar	40	41	44
	EBITDA	USD/tonne sugar	231	208	175
	EBITDA margin	%	30	27	22
	Depreciation	USD/tonne sugar	71	83	94
	EBIT	USD/tonne sugar	159	125	82
	EBIT margin	%	21	17	10
Duty free	Sugar price	USD/tonne sugar	615	615	650
	Beet cost	USD/tonne sugar	487	508	573
	Cash costs	USD/tonne sugar	40	41	44
	EBITDA	USD/tonne sugar	89	66	33
	EBITDA margin	%	14	11	5
	Depreciation	USD/tonne sugar	71	83	94
	EBIT	USD/tonne sugar	17	-17	-60
	EBIT margin	%	3	-3	-9
Current duties (-25%)	Sugar price	USD/tonne sugar	568	568	594
	Beet cost	USD/tonne sugar	487	508	573
	Cash costs	USD/tonne sugar	40	41	44
	EBITDA	USD/tonne sugar	41	19	-23
	EBITDA margin	%	7	3	-4
	Depreciation	USD/tonne sugar	71	83	94
	EBIT	USD/tonne sugar	-30	-64	-116
	EBIT margin	%	-5	-11	-20
Duty free (-25%)	Sugar price	USD/tonne sugar	461	461	487
	Beet cost	USD/tonne sugar	487	508	573
	Cash costs	USD/tonne sugar	40	41	44
	EBITDA	USD/tonne sugar	-65	-88	-129
	EBITDA margin	%	-14	-19	-26
	Depreciation	USD/tonne sugar	71	83	94
	EBIT	USD/tonne sugar	-136	-171	-223
	EBIT margin	%	-30	-37	-46

# ■ ■ ■ ■ ■ Annex 1 - Historical development of the world sugar market with a focus on Brazil

The future of the Russian sugar sector depends in large part on the prospects for the world sugar market. These prospects are the subject of this Annex.

## Summary

- The world sugar market has undergone a profound structural change in recent years, including a steep rise in the cost of producing sugar in Brazil, the world's leading producer and exporter.
- These developments mean that world raw sugar prices will likely stay above USD 0.20/lb, f.o.b (freight on board). This translates into world white sugar prices of USD 500–600 per tonne, f.o.b. (EUR 380–410).<sup>20</sup>
- This price may increase the price competitiveness of sugar producers around the world vis-à-vis Brazil and could result in a period of renewed investment in many sugar industries, as countries look to supply more of their own consumption and rely less on imports.

## Prospects for the world sugar market

The past 20 years have unquestionably been the “Brazil years”. During this period, the country has contributed half of the expansion in world sugar production and all of the growth in world sugar trade. At the same time, it has expanded massively its ethanol output to supply surging demand from its fast-growing fleet of flex-fuel vehicles.

Today, Brazil accounts for approximately 25 percent of global production and 50 percent of world trade (Figure A1). Brazil has been able to crowd out other producers for two reasons:

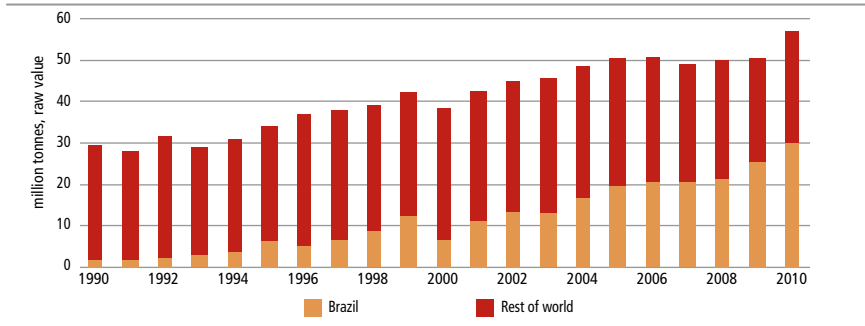
- the country has large amounts of land that it has been able to convert to growing sugar cane;

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<sup>20</sup> Based on the prevailing exchange rate of USD 1.45/EUR exchange rate as of the time of writing (June 2011)

- it has very favourable agro-climatic conditions for low-cost cane and sugar production, and its competitiveness received a substantial boost at the beginning of the last decade from the depreciation of its currency, which dramatically lowered its costs in dollars terms.

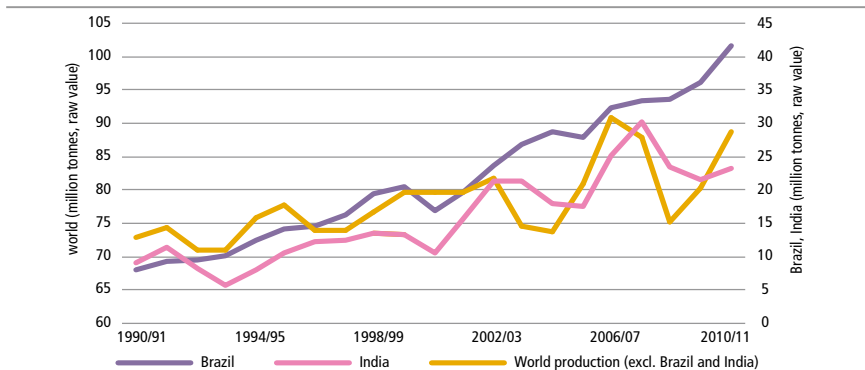
**Figure 91: Brazil exports as a percentage of total exports, 1990-2010**



Source: LMC International.

Figure 92 illustrates the huge impact of Brazil on the global sugar sector. Over the last 20 years, Brazilian production has increased by around 30–35 million tonnes, raw sugar value. In contrast, production in India increased by around 10–15 million tonnes, with similar increases in the rest of the world. In short, Brazilian production expanded by more than the rest of the world combined, and more than twice as much as the rest of the world excluding India.

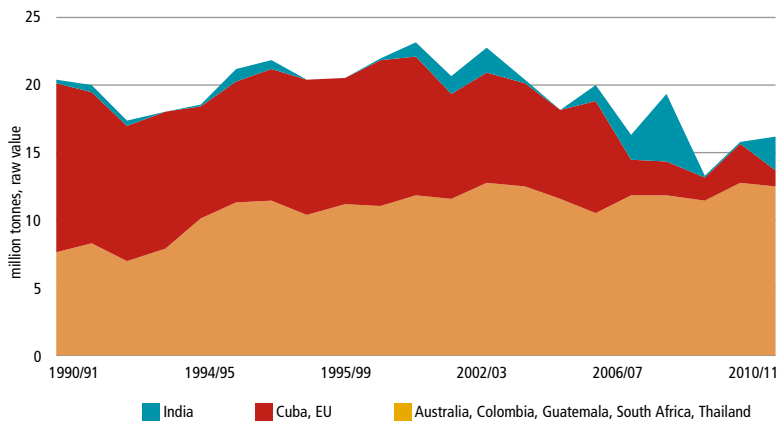
**Figure 92: Evolution of global output – Brazil vs. rest of the world, 1990/91-2010/11**



Source: LMC International.

Figure 93 illustrates the limited contribution to global trade made by other major exporters, and shows that exports from the rest of the world have actually declined over this period. This was a result principally of declining exports from Cuba and the European Union, which, for different reasons, experienced a contraction in output. However, exports from other major exporters (Australia, Guatemala, South Africa and Thailand) have increased only slightly over the period. This reflects the difficulties that these countries have experienced when competing with Brazil in the global market place over the last decade.

**Figure 93: Exports from the rest of the world, 1990/91-2010/11**



Source: LMC International.

However, over the last few years a number of developments have dramatically altered the market environment facing the Brazilian industry. Each of these has acted to raise world sugar prices. The most important of these developments have been:

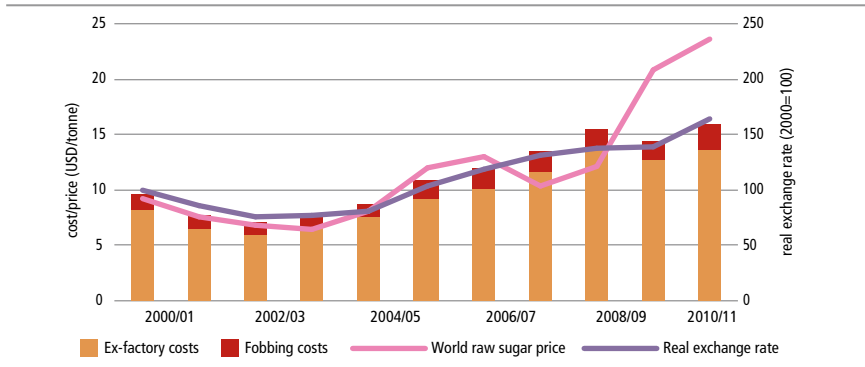
- the appreciation of the Brazilian *real*, which has significantly increased Brazil's production costs;
- the growing popularity of flex-fuel cars, which have transformed the domestic ethanol market and the way in which ethanol prices are determined; and
- a dramatic slowdown in the pace of expansion of the Brazilian industry.

### Brazil's rising costs of production

Brazil's rise to prominence during the 1990s propelled it into an influential position in the world sugar market, making it an important driver of world sugar prices. As a result, the relationship between Brazilian costs of production and global sugar prices has grown gradually stronger.

Figure 94 compares the costs of sugar production in Centre/South Brazil with the global raw sugar price. As a result of Brazil's importance, the world sugar market has effectively had to "pay" Brazil to continue to expand to meet growing global import demand. Therefore, world sugar prices have largely followed Brazil's dollar-denominated production costs over the long term. As the figure suggests, these are strongly influenced by the BRL/USD exchange rate. Brazil's costs have risen sharply in USD terms over the last few years as its currency appreciated. This has had a significant impact on Brazilian production costs when expressed in USD.

**Figure 94: Brazil's raw sugar production costs vs. world raw sugar price, 2000/01-2010/11**



Source: LMC International.

Between 2001/02 and 2003/04, the weakness of the Brazilian *real* meant that sugar producers were able to export profitably at world prices of USD 0.6–0.8/lb. This gave Brazil a huge cost advantage over its competitors.

However, the recovering investment climate in Brazil has resulted in the strong appreciation of the *real* over the last five years. Together with domestic inflation, this has significantly pushed up the cost of producing sugar in Brazil when measured in USD terms.

Although Brazil remains one of the world's lowest cost sugar producers, due to its favourable agro-climatic conditions for growing sugar cane and the scale of its milling operations, the appreciation of its currency has reduced its competitive advantage over the rest of the world.

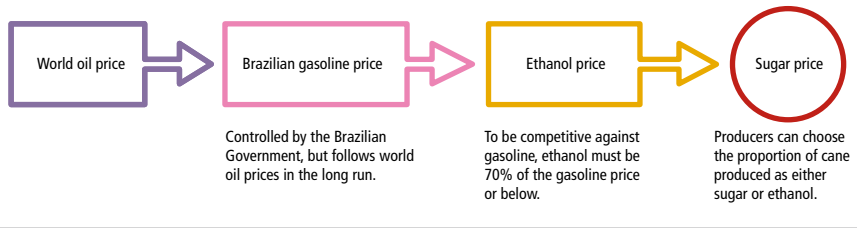
- In 2010/11, the cost of producing sugar in the heartland of Brazil's cane industry – São Paulo – was around USD 0.16/lb on an ICE No. 11 equivalent basis.
- However, a price of around USD 0.25s/lb would be required to encourage further expansion in the industry in the new frontiers of Brazil (Goiás and Mato Grosso do Sul).

### **The growing importance of ethanol**

However, Brazilian production costs are not the sole factor influencing global prices. The other factor is the domestic ethanol market. Until a few years ago, demand for ethanol was determined overwhelmingly by a government mandate, as gasoline sold in Brazil must be blended with 18–25 percent ethanol. However, the situation today is very different. The introduction and rapid up-take of flex-fuel vehicles (FFV) has created a new dynamic in the market. Because FFVs can run on ethanol or gasoline (or any combination of the two), ethanol now has to compete with gasoline on price terms. As ethanol has a lower energy value, it has to trade at 70 percent or less of the gasoline price to be competitive. Now that the FFV market has grown to become the main market for ethanol, gasoline is the peg on which ethanol prices are now hung. Moreover, co-production of sugar and ethanol means that sugar prices are now linked to gasoline prices via ethanol and cannot fall out of line in the long run.

This means that, in addition to Brazil's production costs, sugar prices are now influenced by energy prices. This is because, if the sugar price falls below its ethanol equivalent level, Brazilian millers are able to divert cane away from sugar, creating a support price for sugar over the long run. The interaction between Brazil's ethanol market, the Government's gasoline pricing policy and world oil prices has now become the key driver of global ethanol and sugar prices. This relationship is summarized in Figure 95.

**Figure 95: The relationship between oil, gasoline, ethanol and sugar**



Source: LMC International.

In 2011–2012, the retail price of gasoline in Brazil was around RUR 2.4–2.5 (USD 1.5–1.6) per litre and had remained at this level since 2006. After adjusting for taxes and blenders’ and distributors’ margins, this equates to a world oil price of around USD 90 per barrel (about 10 percent below the prevailing oil price).

Based on this gasoline price, and the fact that ethanol now trades at around 65–70 percent of this price, Brazilian millers anticipated a market for ethanol at an equivalent world raw sugar price of USD 0.20–22/lb. In other words, Brazil’s ethanol market provides a floor for world sugar prices over the long run, because of millers’ ability to alter their product mix, thereby arbitraging price differentials between sugar and ethanol prices.

### The slowdown in Brazil’s expansion

Brazil’s cane sector grew hugely over the last decade at an average annual rate of 9 percent. However, most of this growth took place prior to 2008. While the market for ethanol has increased at an extremely fast rate, the cane sector has witnessed a dramatic slowdown in the rate of expansion. There are two underlying reasons:

**The government’s gasoline policy.** As ethanol now has to be priced competitively with gasoline, the government’s policy of controlling gasoline prices has had a major impact on the industry. This issue was of particular importance in 2008, when rising oil prices pushed up the cost of producing ethanol to the point where millers were unable to make a profit. Moreover, large-scale exports from India kept sugar prices depressed, creating a challenging environment for Brazilian millers.

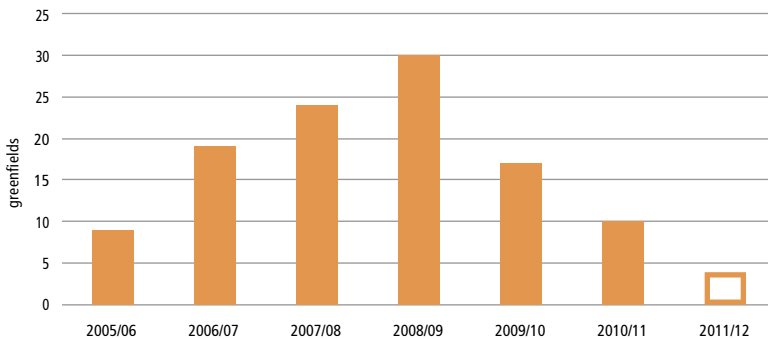
**The financial crisis.** These problems were then compounded by the global financial crisis, which severely limited the industry’s

access to credit. This has resulted in low replanting rates, which have significantly increased the average age of cane, and sub-optimal levels of crop care, which are depressing cane yields.

The combination of these two factors has resulted in the shelving of expansion plans, particularly among smaller milling companies. Meanwhile, millers looking to expand have chosen to focus on brownfield acquisitions rather than building new mills.

The impact of this is shown clearly in Figure 96. The number of greenfield projects expected to come on stream over the next few years has slowed to a trickle. As there are very few new projects in the pipeline, there will be a significant time lag before this number can pick up, as it takes at least three years to move from the design stage to the first year of production.

**Figure 96: Number of greenfield projects in Brazil, 2005/06-2011/12**



Source: LMC International.

### The challenge over the next decade

These developments have dramatically altered the outlook for the global sugar market. The question now is: will Brazil continue to meet all the growth in global sugar import demand, or will other producers now expand faster? The challenge ahead is to meet the growth in global sugar consumption, which is expected to increase by around 3.5 million tonnes, raw value, per annum, requiring the production of 35 million tonnes more sugar over the next decade.

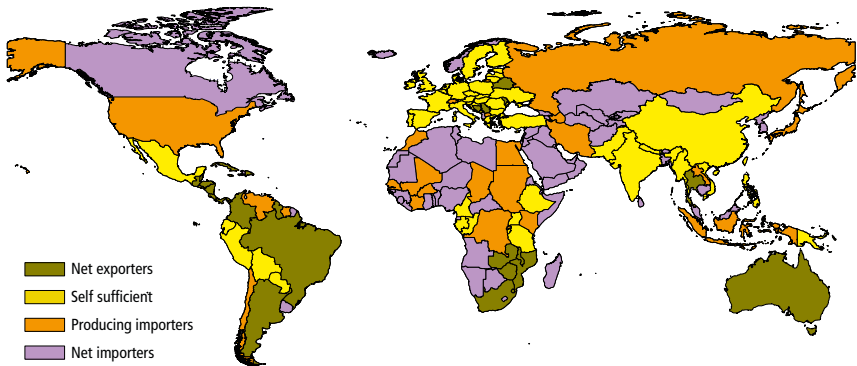
The slowdown in cane production in Brazil over the next three to five years, owing to the decline in new investments in the sector, will be supportive of global sugar prices.

## Opportunities for the rest of the world

According to the recent OECD-FAO Agricultural Outlook,<sup>21</sup> despite anticipated production growth in Brazil, other leading exporters also enjoy growth opportunities. A number of countries could increase sugar production; however, the vast majority are net importers that rely heavily on a small group of net exporters to meet their needs. To illustrate this point, Figure 97 categorizes the world into four main groups:

- structural exporters;
- self-sufficient countries, producing between 75 percent and 125 percent of their consumption;
- producing importers, producing between 25 percent and 75 percent of their domestic consumption; and
- structural importers that produce less than a quarter of their domestic requirements.

**Figure 97: Location of the world's sugar exporters and importers**



Source: LMC International.

From this analysis, a number of conclusions can be drawn:

- While the structural exporters generate a large surplus, the vast majority of this is produced by Brazil.
- This surplus has to meet all the import demand of the other categories. This includes countries that produce little or no

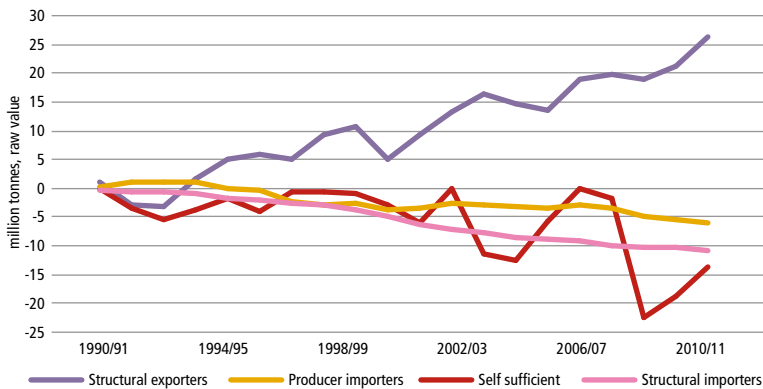
<sup>21</sup> The *OECD-FAO Agricultural Outlook 2013–2022*, available at: [www.oecd.org/site/oecd-faoagriculturaloutlook/](http://www.oecd.org/site/oecd-faoagriculturaloutlook/)

sugar, as well as a portion of demand in countries that fall into the “producing importers” category. Moreover, exporters also have to adapt to swings in imports/exports from those in the “self-sufficient” category.

These points are shown in Figure 98, which shows the cumulative surplus/deficit by group over time.

- The deficit has grown for structural importers as well as for “producing” importers and “self-sufficient” countries. In other words, these countries have been relying more and more heavily on imports, putting increasing pressure on exporters, notably Brazil, to meet their needs.
- Going forward, it is these countries, in particular, along with several structural exporters, who will have a greater opportunity to expand.

**Figure 98: Cumulative changes in supply/demand balances by group, 1990/91-2010/11**



Source: LMC International.

Table 21 highlights some of the major countries that fall into this category. Countries are grouped according to their status over the last few years. However, the situation is changing. For example, China is struggling to keep up with growth in domestic consumption and is likely to increase its import demand in the future.

**Table 21: Major self-sufficient/producing importing countries/regions**

Self sufficient	Producing importers
China	European Union
India	Indonesia
Pakistan	COMESA
Philippines	Russia
Viet Nam	Ukraine
	NAFTA

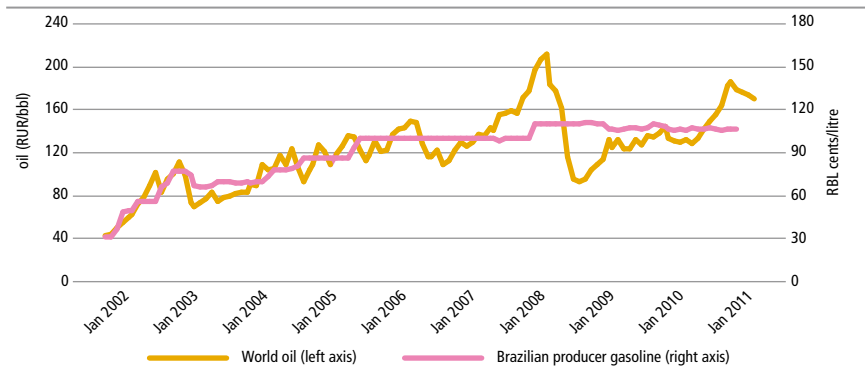
**Price risk**

While the above developments in Brazil are likely to support world sugar prices above USD 0.20 /lb, this level of price support hinges critically on two factors:

**The BRL/USD exchange rate.** If the *real* was to depreciate significantly, this would lower Brazil’s costs denominated in dollar terms and reduce the dollar price at which sugar is competitive with domestic ethanol. Both these factors would push the long-term prospects for sugar prices downwards.

**The Brazilian gasoline price.** While the Brazilian gasoline price broadly follows the world oil price over time, it is managed by the government to control domestic inflation (Figure 99). The gasoline price is currently set at an oil equivalent price of around USD 90/bbl. If world oil prices were to fall below this level for a sustained period of time, this would be bearish for sugar prices.

**Figure 99: World oil and Brazilian producer gasoline prices, 2002-2011**



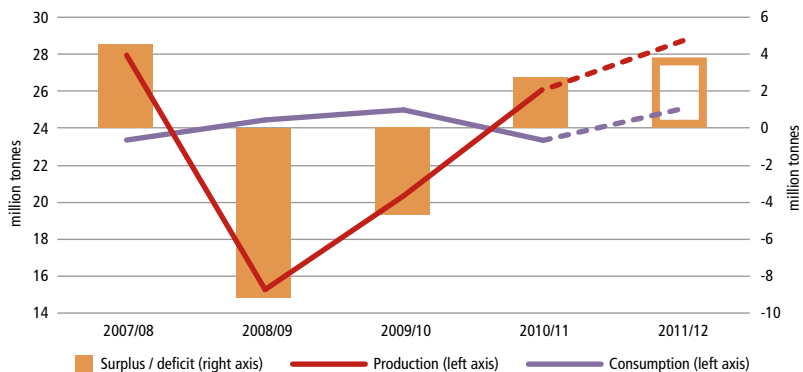
Source: LMC International.

It should also be borne in mind that, although in the long run prices will reflect the above developments in Brazil, in the short run world sugar prices are susceptible to fluctuations caused by the cyclical nature of production in India and other Asian countries.

In India, sugar cane is produced by a very large number of small-scale farmers. The collective decisions of these farmers as to whether or not to plant cane has a significant effect on India's production. During times of high sugar prices, Indian farmers dramatically increase the area planted to cane, which exerts downward pressure on sugar prices. As a result, margins at mills become squeezed and they delay payment to farmers. In response, farmers return to alternative crops, and cane production falls, which leads once more to high sugar prices.

Figure 100 shows the resulting wild swings in India's level of production. As India is the largest consumer of sugar in the world, its surplus/deficit situation often determines whether sugar trades at a premium or discount to ethanol in the short term.

**Figure 100: India's supply/demand balance, 2007/08-2011/12**



Source: LMC International.

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Russian Federation – Sugar sector review  
Report No. 12 - December 2013