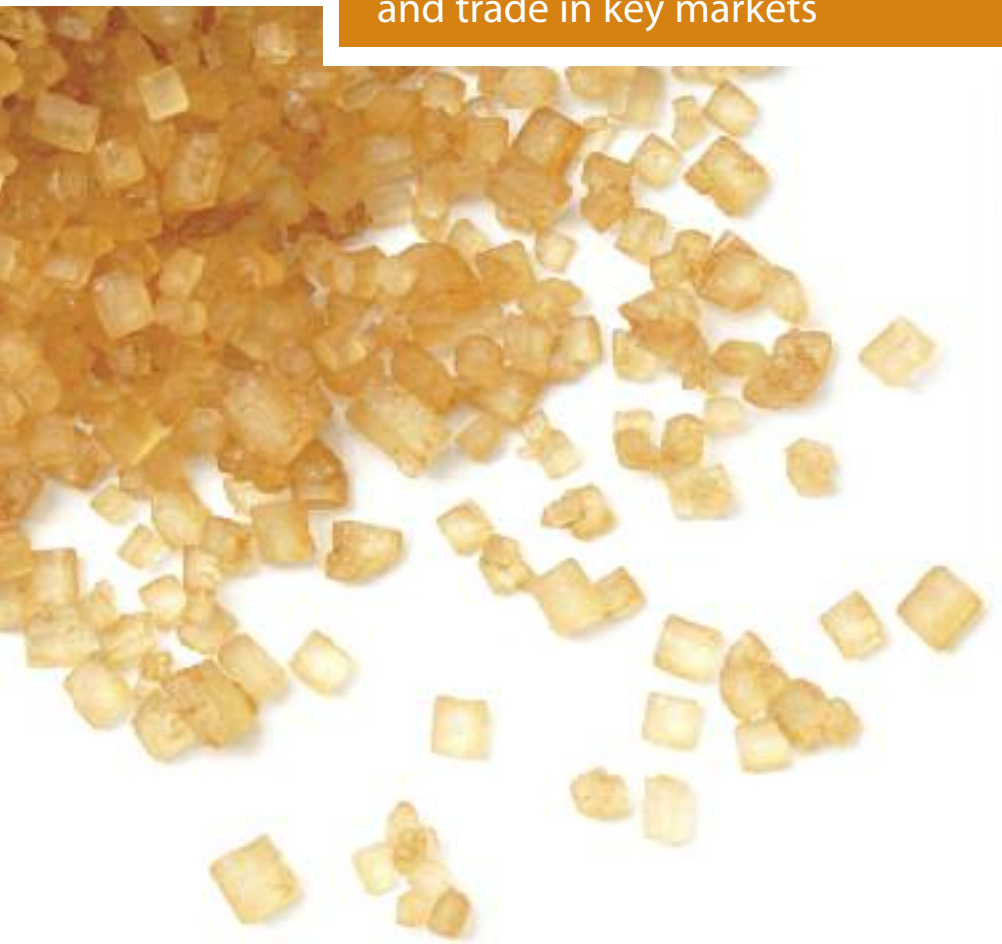


Global Sugar to 2021

Long-term prospects for production, consumption
and trade in key markets



Global Sugar to 2021

Long-term prospects for production, consumption
and trade in key markets

Authors:
Adam Tomlinson
Pablo Sherwell
Rafael Barbosa
Tracey Allen
Asitava Sen
Maya Donceva
Alexandra Bosma
Andy Duff

Rabobank International

**Food & Agribusiness
Research and Advisory**

Contact: Andy Duff
andy.duff@rabobank.com
+55 11 5503 7235

www.rabotransact.com
www.rabobank.com/f&a

Disclaimer: This document is issued by Coöperatieve Centrale Raiffeisen-Boerenleenbank B.A. incorporated in the Netherlands, trading as Rabobank International ("RI"). The information and opinions contained in this document have been compiled or arrived at from sources believed to be reliable, but no representation or warranty, express or implied, is made as to their accuracy, completeness or correctness. This document is for information purposes only and is not, and should not be construed as, an offer or a commitment by RI or any of its affiliates to enter into a transaction, nor is it professional advice. This information is general in nature only and does not take into account an individual's personal circumstances. All opinions expressed in this document are subject to change without notice. Neither RI, nor other legal entities in the group to which it belongs, accept any liability whatsoever for any loss howsoever arising from any use of this document or its contents or otherwise arising in connection therewith. This document may not be reproduced, distributed or published, in whole or in part, for any purpose, except with the prior written consent of RI. All copyrights, including those within the meaning of the Dutch Copyright Act, are reserved. Dutch law shall apply. By accepting this document you agree to be bound by the foregoing restrictions.

© Rabobank International Utrecht Branch, Croeselaan 18, 3521 CB, Utrecht, the Netherlands +31 30 216 0000



Rabobank

Contents

	Page
Introduction	1
Section 1	
China	3
Recent trends and current situation	3
Outlook for sugar production	3
Beet and cane area	3
Beet and cane yields	4
Beet and cane quality and factory efficiency	5
Sugar production	5
Outlook for sugar consumption	5
Outlook for sugar trade	6
Section 2	
India	7
Recent trends and current situation	7
Outlook for sugar production	8
Cane area	8
Cane yields	8
Cane quality and factory efficiency	9
Sugar production	9
Outlook for sugar consumption	10
Outlook for sugar trade	10
Section 3	
Indonesia	13
Recent trends and current situation	13
Outlook for sugar production	14
Cane area	14
Cane yields	15
Cane quality and factory efficiency	15
Sugar production	15
Outlook for sugar consumption	15
Outlook for sugar trade	16
Section 4	
Thailand	17
Recent trends and current situation	17
Outlook for sugar production	18
Cane area	18
Cane yields	18
Cane quality and factory efficiency	19
Sugar production	19
Outlook for sugar consumption	19
Outlook for sugar trade	20
Section 5	
Australia	21
Recent trends and current situation	21
Outlook for sugar production	21
Cane area	21
Cane yields	22
Cane quality and factory efficiency	23
Sugar production	23
Outlook for sugar consumption	23
Outlook for sugar trade	24

Section 6	
Africa	25
Recent trends and current situation	25
Outlook for sugar production	26
Outlook for sugar consumption	27
Outlook for sugar trade	28
Section 7	
The EU	29
Recent trends and current situation	29
Outlook for sugar production	30
Outlook for sugar consumption	31
Outlook for sugar trade	31
Annex: Abolition of quotas	31
Abolition of quotas—outlook for sugar production	32
Abolition of quotas—outlook for HFS	33
Abolition of quotas—outlook for refining and for imports of raw sugar	33
Section 8	
Russia	35
Recent trends and current situation	35
Outlook for sugar production	36
Beet area	36
Beet yields	36
Beet quality and factory efficiency	37
Sugar production	37
Outlook for sugar consumption	38
Outlook for sugar trade	38
Section 9	
NAFTA region—Mexico	39
Recent trends and current situation	39
Outlook for sugar production	40
Cane area	40
Cane yields	40
Cane quality and factory efficiency	41
Sugar production	41
Outlook for sugar consumption	41
Outlook for sugar trade	42
Section 10	
NAFTA region—US	43
Recent trends and current situation	43
Outlook for production	44
Beet and cane area	44
Beet and cane yields	44
Beet and cane quality and factory efficiency	44
Sugar production	44
Outlook for sugar consumption	45
Outlook for sugar trade	45
Section 11	
Brazil	47
Recent trends and current situation	47
Outlook for sugar production	48
Cane area	48
Cane yields	49
Cane quality and factory efficiency	49
Sugar production	50
Outlook for sugar consumption	51
Outlook for sugar trade	51
Section 12	
Conclusions	53



Introduction

Seeking to identify trends that will shape the development of key players in the global sugar industry over the coming ten years, this report considers the long-term outlook for sugar production, consumption and trade at a global level. The aim is to draw strategic conclusions regarding the potential of future growth in various markets.

There are ten countries or regions that we consider major players in the world of sugar: China, India, Indonesia, Thailand, Australia, Africa, the European Union (EU), Russia, NAFTA (i.e. the United States (US) and Mexico) and Brazil. Considering the outlook for each of these markets and pooling the analyses together with projections for the rest of the world leads us to generate a view of global trends.

The study reflects the current and expected future significance of these markets in the global context.

- **Brazil, Thailand and Australia** are ranked as the world's first, second and third largest sugar exporters, respectively. The development of all three industries is likely to have a material impact on the evolution of global sugar export availability. Of particular concern is whether Brazil will continue to exhibit vigorous growth in global sugar exports over the next ten years or grow at a pace that is more in line with the overall growth in international trade.
- **The EU, the NAFTA region, Indonesia and Russia** are protected markets that

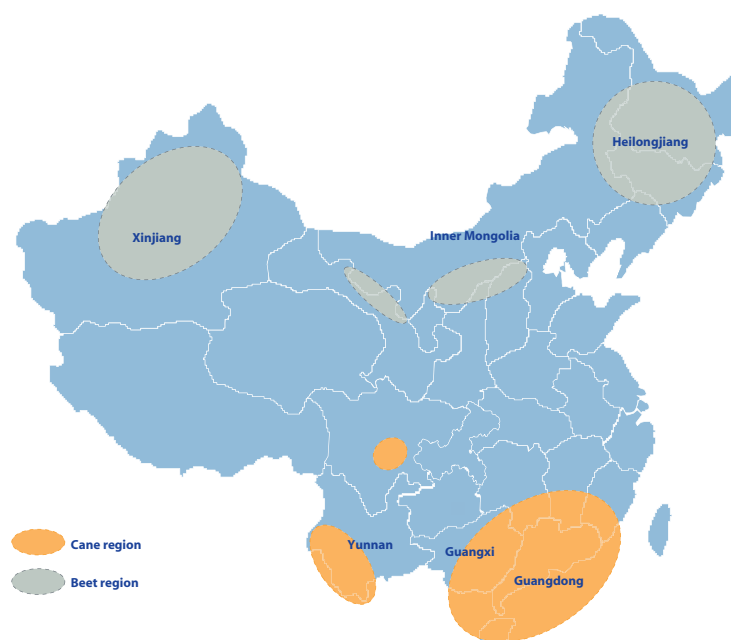
are net sugar importers and significant contributors to global import demand. However, all four have large domestic sugar industries capable of expansion under certain combinations of market and policy circumstances. The question is how the import demand of these players will evolve in the next ten years.

- **China and India** are Asia's giants of the sugar industry—both have enormous sugar markets with considerable potential for further growth. Both countries also boast large domestic sugar industries. However, it is far from clear whether Indian and Chinese production will be able to keep pace with domestic consumption in the future, or whether gains in productivity can to some extent offset the limited availability of agricultural land in both countries.
- **Africa** is widely recognised as having potential for cane expansion that is second only to Brazil. However, it is probably fair to say that over the past decade, the development of sugar production in Africa has fallen short of initial expectations. Nevertheless, a large number of projects—at various stages of development—across a range of countries still remain active. Meanwhile, sugar consumption in Africa is growing faster than in any other region of the world. Under these circumstances, there is some question as to how the continent's sugar trade status will evolve over the next ten years.

The projections for the development of select global sugar industry players have been broadly based on the following approach:

1. Examine past trends and relationships (e.g. between sugar consumption per capita and per capita gross domestic product (GDP) or annualised gains in cane yields over the last 15 to 20 years).
2. Question whether such trends may continue to be valid for the future (e.g. whether it is possible that alternative sweeteners will impact sugar consumption growth, or whether there is evidence of new investment in industry processing capacity that will significantly raise future sugar output).
3. Consult, to the extent possible, local industry players and scientific researchers in order to align projections with realistic expectations for investment, gains in productivity, etc.

This approach has served to generate long-term trends for the countries and regions in this study. We have not made specific assumptions regarding the movement of world prices beyond the assumption that world raw sugar prices will reflect a trend level of USc 18/lb to USc 22/lb pound during the forecast period. We also make a parallel assumption that there are no substantial exchange rate changes over the forecast period. If the future is anything like the past, then over the next ten years there will be a pronounced cycle around this long-term trend. However, we have not attempted to forecast these cyclical movements on a year-to-year basis. Indeed, given that our projections of future sugar production and consumption are essentially trend-based, we are aiming to look 'through the cycle'.



1 China

Recent trends and current situation

China's sugar requirements are met by a combination of three distinct supply sources: cane sugar production, beet sugar production and sugar imports, including the refining of imported raw sugar. China's cane industry is the dominant supplier of sugar to the domestic market and is located in the south of the country. The beet industry is situated in the north of the country and has also expanded into the far west province of Xinjiang. The distances between domestic centres of sugar production and centres of consumption are considerable—the cane industry and the western portion of the beet industry are located over 2,000 kilometres from the densely populated zones of the northeast, such as Beijing. The country's refineries are mainly located in the northeast of the country on the coastline, where the supply of locally produced sugar relative to regional demand is lowest.

In recent years, China has become one of the world's largest importers of sugar. A combination of a period of lower sugar prices following a record crop in 2007/08 plus a series of adverse weather developments in the following years impacted China's domestic sugar production. Since 2008/09, China's domestic sugar output has persistently fallen short of domestic sugar requirements, and as a result, the country's annual imports reached a 16-year high of over 3 million tonnes in 2011/12 (see Figure CH.1).

To combat the declining domestic sugar supply, the People's Republic of China's 12th

Five-Year Plan (2011 to 2015) is targeting a figure of 85 percent self-sufficiency in sugar production, which compares with an estimate of 79 percent self-sufficiency for 2011/12. The central government is expected to encourage domestic production by supporting new investment and implementing price incentives for both farmers and processors.

Production of both cane and beet is largely carried out by small farmers. The average cane area per household in Guangxi—China's largest cane and sugar producing region—is approximately one-quarter of a hectare. Scarcity of field labour and rising labour costs have had a significant impact on the margins of both beet and cane production, reducing attractiveness for farmers, which has partly driven rising cane and beet prices. Meanwhile, several key technical measures will likely obtain government support in an effort to boost output. These include crop variety research and development (R&D) as well as advances in field practices, such as the use of supplementary irrigation and machinery modernisation. The development of sugar co-products and value-added by-products is also a focus of research.

Outlook for sugar production

Beet and cane area

Guangxi, located in the subtropical to temperate region of southern China, is the leading cane growing province. Sugar production in Guangxi has increased by an average of 5 percent annually since 1998, reaching a record level of 9.4 million tonnes of white sugar production, equivalent to

10.2 million tonnes raw value, in 2007/08. In Guangxi and throughout southern China's cane producing provinces, infrastructure developments, timber plantations and alternative crops such as rice, cassava, banana and mulberry all compete with cane for land.

The total national cane area of 1.68 million hectares makes up around 1.06 percent¹ of area sown to all crops in China and is forecast to expand by 12 percent between 2011/12 and 2020/21, to 1.90 million hectares. The major cane growing provinces of Guangxi (62 percent of China's cane area) and Yunnan (19 percent of China's cane area) are expected to capture land from cassava cropping and timber plantations as a result of relatively lower output prices and lower productivity in these industries. Area sown to cane as a proportion of total agricultural area in Guangxi and Yunnan is expected to increase from 18 percent and 5 percent, respectively, in 2011/12 to 20 percent and 6 percent, respectively, by 2020/21.

The three key beet production provinces are Xinjiang (35 percent of China's beet area), Heilongjiang (35 percent of China's beet area) and Inner Mongolia (17 percent of China's beet area). China's total beet area is expected to increase from 240,000 hectares in 2011/12 to 320,000 hectares in 2020/21, with Heilongjiang driving most of this growth by recapturing land that beet occupied in the 1990s. The beet industry accounted for as much as 600,000 hectares in the late 1990s, but area declined as a result of prolonged years of relatively low sugar prices and the subsequent lack of industry investment.

¹ China Statistical Yearbook 2011

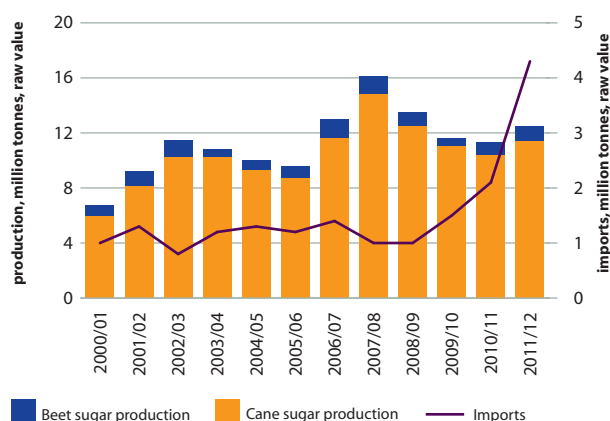
In the short to medium term, increased industry investment in processing infrastructure (both upgrading of existing facilities and the addition of new capacity) is expected to support the gradual expansion in crop area for both cane and beet.

Beet and cane yields

A key focus area in the drive to develop China's sugar industry is improving field productivity of both cane and beet (see Figure CH.2). Cane yields, which rose at an average annual rate of 1.1 percent over the last decade, are expected to grow around 0.9 percent per year as a result of the increasing adoption of advanced irrigation practices along with cane variety improvements. Both cane milling companies and national research bodies are also offering extension services to farmers and incentives for replanting higher yielding cane varieties. A large portion of cane currently grown in Guangxi is from cane varieties introduced to the region more than ten years ago.

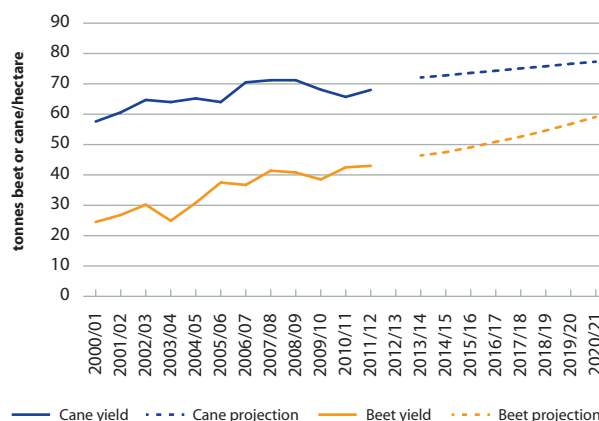
Beet yields are expected to increase at more than double the rate of cane yields. Yields in Xinjiang have historically grown at around 2 percent per year and are already high, regularly exceeding 60 tonnes/hectare. The renewed interest in the beet sugar industry and the government's push to increase productivity through modernisation are expected to drive further yield increases. Because the Heilongjiang beet industry has suffered the most from underinvestment in recent years, this area could see the greatest gains in yields in the coming ten years. Multinational seed and agrochemical companies are likely to play a leading role in helping to lift beet productivity and output at the farm level by collaborating with China's major beet processors and industry research bodies.

Figure CH.1: China—Sugar production and imports, 2000/01–2011/12



Source: BSNABC, F.O. Licht, Rabobank, 2012

Figure CH.2: China—Cane and beet yields, 2000/01–2020/21



Source: BSNABC, China Statistical Yearbook 2012, Rabobank, 2012

Beet and cane quality and factory efficiency

Developing a more efficient sugar processing infrastructure in China is likely to be one of the industry's priorities for improving technical performance. The key areas for improvement will be transporting raw material to the mill and processing this material into sugar in a timelier manner with minimal losses.

Renovating existing processing facilities will be another key investment point for sugar crop processing. It is estimated that China's processing capacity for cane and beet collectively amounts to over 17 million tonnes of sugar. However, much of this capacity has not been used in recent years and is in need of revitalisation to address deterioration.

Arriving at estimates for the tonnes of cane per tonne of sugar (TCTS) and tonnes of beet per tonne of sugar (TBTS) ratios has been complicated by differences in data sets with respect to cane and beet milled by the respective sectors (see Figure CH.3). Projections for future TBTS and TCTS ratios used in this study are conservative, starting from estimated average levels achieved by the respective sectors in recent years, with the projection of modest improvements over the coming ten years as a result of the combined initiatives in improved varieties, agricultural and transport operations, and factory upgrading.

With new, government sponsored co-product market developments, the enhanced use of bagasse and molasses in China should increasingly contribute to millers' revenues and profits, thus boosting margins while diversifying the revenue base. A pilot project is currently underway involving the export of electrical power to the grid

network by bagasse-powered cogeneration facilities, which is a positive development for the cane industry.

Sugar production

The combined projections for cane and beet area, cane and beet yields, and the conversion of these crops to sugar point to a projection of Chinese sugar production of some 18.4 million tonnes raw value by 2020/21, comprising 16.3 million tonnes of cane sugar and 2.1 million tonnes of beet sugar (see Figure CH.4). These projections appear ambitious as they imply an increase in cane and beet sugar production of 44 percent and 95 percent, respectively, compared to 2011/12. However, even at this level of output, China's self-sufficiency ratio is expected to reach no more than 80 percent.

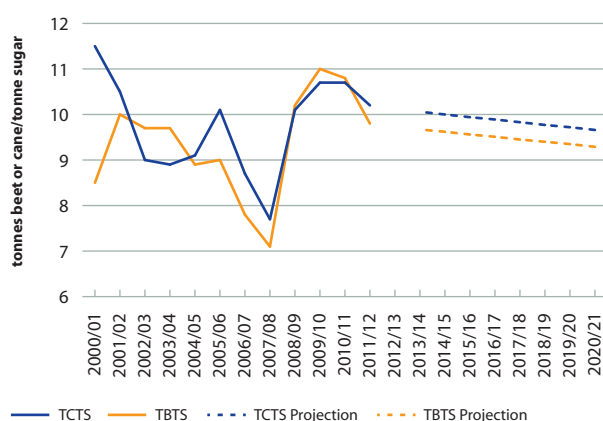
Outlook for sugar consumption

A key driver for increases in sugar consumption in China will be the expanding scale of the industrialised food and beverage industry. The annual growth rate for the consumption of industrialised food and beverage products during the last five years has ranged from 4 percent to 14 percent² for the main categories of these products. Increasing urbanisation and rising incomes are the principal drivers underpinning demand for products containing sugar.

Sugar from cane and beet processing competes with other sweeteners, such as high fructose syrup (HFS), derived from starch extracted mainly from corn, but also from wheat, cassava or potatoes; as well as intense sweeteners, such as saccharin, for use in industrialised food and beverage products. HFS is expected to increase market share from 6 percent in 2011/12 to 10 percent in 2020/21. A favourable price ratio

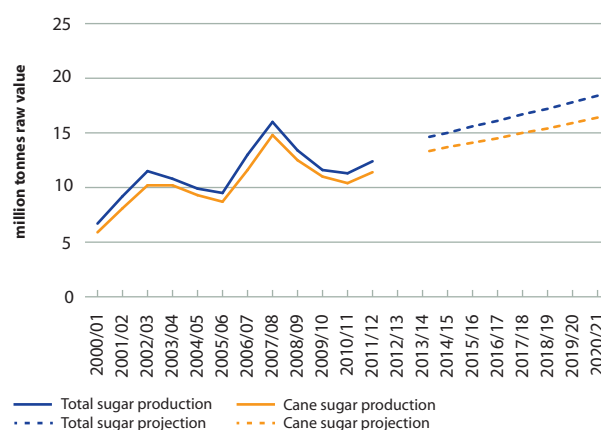
² Euromonitor, 2012.

Figure CH.3: China—TCTS and TBTS ratios, 2000/01–2020/21



Source: Rabobank, USDA, 2012

Figure CH.4: China—Sugar production, 2000/01–2020/21



Source: BSNABC, F.O. Licht, Rabobank, 2012

(i.e. HFS priced at a substantial discount to sugar), as has been the case in China recently, is expected to be a significant force behind the further growth of HFS use by food and beverage players. However, the use of HFS will eventually be limited by raw material supply and by stronger demand for other starch related products.

In view of the limitations for HFS, Rabobank expects Chinese sugar consumption to increase at an average annual rate of 4.15 percent between 2011/12 and 2020/21, while HFS consumption is projected to grow at an annual rate of 7.4 percent over the same period. The key driver for both sweeteners will be growth in industrialised food and beverage sugar demand, projected at 6.8 percent per year. These growth forecasts mean that by 2020/21, Chinese sugar consumption is projected to be some 22.6 million tonnes raw value (see Figure CH.5).

Over the coming ten years, the deficit between local sugar production and domestic sugar demand in China is expected to gradually widen to some 4 million tonnes of raw sugar (see Figure CH.6). The local sugar refining industry is positioning for the anticipated growth in import demand, with new refinery developments underway along the Chinese coast.

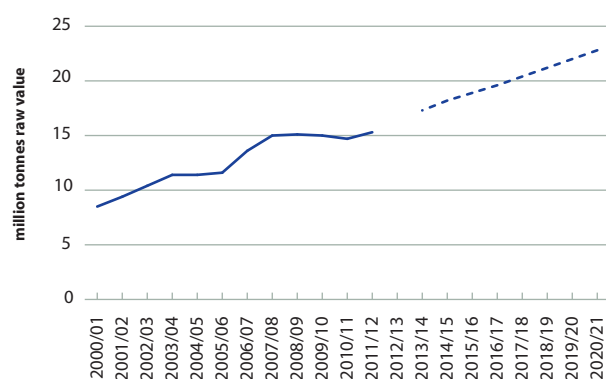
The conditions surrounding China's import policy are expected to change in the short to medium term. With the prospect of a widening sugar deficit, it is likely that the import quota for sugar could be increased in the coming years.

Outlook for sugar trade

China has maintained a tariff rate quota (TRQ) for sugar of 1.95 million tonnes since 2005.³ The conditions for the TRQ include an in-quota tariff of 15 percent and an over-quota rate of 50 percent. According to the United States Department of Agriculture (USDA) and other industry sources, China's National Development and Reform Commission issued a special permit to import an extra 1 million tonnes of sugar in 2011 to replenish national sugar reserves. Including imports from Cuba under the bilateral agreement signed in the 1950s, China's sugar imports exceeded 3 million tonnes in 2011/12.

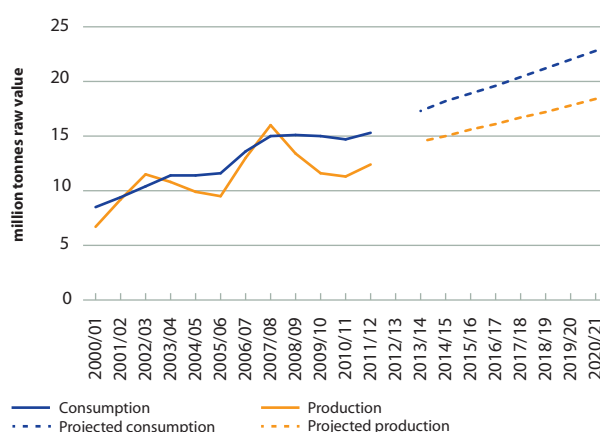
³ WTO and USDA, 2012

Figure CH.5: China—Sugar consumption, 2000/01–2020/21

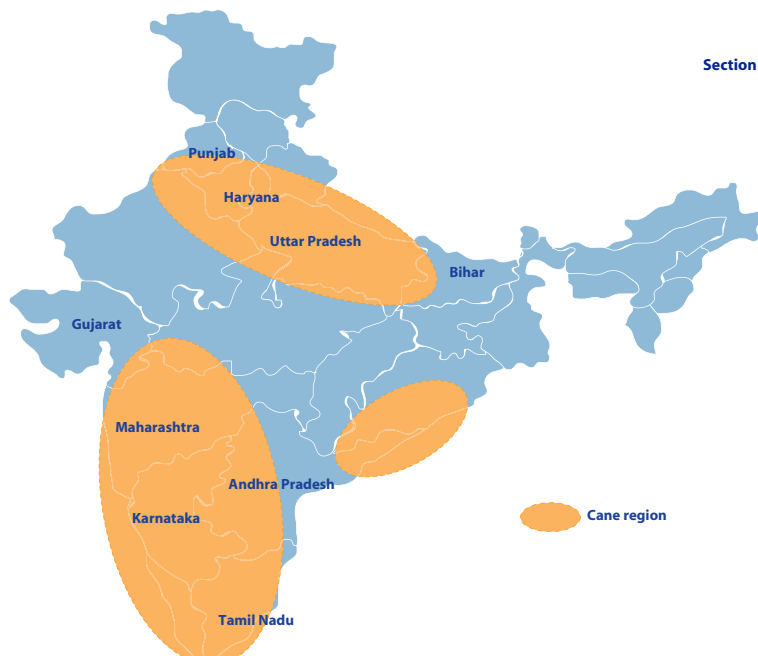


Source: F.O. Licht, Rabobank, 2012

Figure CH.6: China—Sugar production vs. consumption, 2000/01–2020/21



Source: F.O. Licht, Rabobank, 2012



2 India

Recent trends and current situation

India is the second largest producer and the largest consumer of sugar in the world. There are 482 cane mills operating in India, 246 of which are privately owned and 218 of which are cooperatively owned, with the remaining 18 mills owned by the state. Cane is produced by small independent growers, with the average area per farmer around 1 hectare.

A history of large seasonal swings in sugar production has caused India to shift from being a net exporter to a net importer and back again, making India a pivotal participant in the global sugar market. Although weather is a key driver behind these seasonal production swings, government policy measures at both the federal and state levels (e.g. cane price setting and supply chain restrictions) also have a major impact on the Indian sugar industry. In various ways, approximately 50 million people are dependent on the Indian sugar industry as their primary source of income, which gives the industry a political significance in addition to its contribution to the economy at both the regional and national level.

This political significance means that the possibility of shifts in government policy is one of the key uncertainties when forecasting India's sugar production. Policy intervention is extensive in India—the list of issues affected by policy includes the designation of mill command zones, land ownership, minimum cane prices, the timing and volume of mill sales, sugar inventory purchases for local traders and end users, and the export and

import of sugar. The Indian government has repeatedly studied the liberalisation of the sugar sector (most recently via the Rangarajan Committee, which submitted its recommendations in late 2012), but the political sensitivity of the issue is a major impediment to change.

Under the current policy regime, millers are often caught between rising official cane prices and rigid sales regulations for the products they sell on the domestic market or for export. Especially when cane deliveries to mills are abundant, many millers are often forced to delay payments to farmers owing to the squeeze on their working capital. This creates a build-up of obligations to growers (i.e. cane payment arrears), which has historically been one of the drivers of the production cycle in India.

In recent years, India has been an exporter of sugar, following a period of favourable farm economics and monsoonal weather conditions. India's sugar exports for 2011/12 were over 3 million tonnes, accounting for over 5 percent of international sugar trade. Conversely, in 2008/09 and 2009/10, a combination of low sugar prices and poor monsoons saw sugar production fall short of domestic consumption by 8.4 million tonnes and 2.4 million tonnes, respectively (see Figure INDI. 1).

Unless major new policy initiatives are introduced, India's sugar industry will very likely continue to swing between exporting and importing over the medium term. The

assumption of no major policy change underlies the projections made in this chapter.

Outlook for sugar production

Cane area

India produces sugar from cane grown in both the southern tropical region and the northern subtropical region.⁴ In 2011/12, approximately two-thirds of India's sugar production was derived from the southern region. The southern region has experienced a 30 percent increase in average sugar production since 2005/06. During the same period, sugar production remained relatively stable in the northern region. Rising cane area has been the key driver for the production increase in the southern region, particularly in the states of Maharashtra and Karnataka.

Cane area in the northern production region is expected to rise over the medium term, particularly in states such as Bihar. The key driver of this development is the projected long-term competitiveness of cane versus alternative crops, such as coarse grains and rapeseed. Overall, cane area in India is expected to reach 5.5 million hectares by 2020, an 8 percent increase from 2011.

Cane yields

Cane yields that are 50 percent higher than those in the northern subtropical region are an advantage for growing sugar in the southern region (see Figure INDI.2). The shorter farming history in the southern region is a key supporting factor for the higher yields. Before the 1950s, over 90 percent of India's cane was planted in the northern zone. Intensive agriculture has only been developed in the southern region more recently. The soil health in this area has not declined to the same extent as some

northern areas. There are two key drivers of the shift towards cane production in the southern areas. First, the seasonal attributes, such as a lower frost risk and longer periods of warm weather, present superior agronomic conditions for higher yielding cane. Second, mill profitability and the relative profitability of cane in comparison with alternative crops are less favourable in the north. The higher state-administered prices for cane in some of the northern states, notably Uttar Pradesh, lead to low or often negative profitability from sugar production. The lower profitability ultimately restricts the mills' ability to pay farmers in a timely manner and therefore reduces the farmers' ability to optimise farm input use and to adopt advanced farming practices.

India's cane yields are not expected to increase dramatically by 2020/21. Irrigation by either supplementary or full season methods already plays a key role in supporting India's cane production. However, sourcing irrigation water is becoming more challenging. Farmers are increasingly relying on deeper wells and inconsistent supply from catchment reservoirs due to competition for limited water resources, particularly in states such as Maharashtra and Tamil Nadu.

Despite these resource challenges, cane yields are attracting more attention from large plant breeding companies and government research bodies. There is also an increasing focus on raising the sugar content in local cane. Yields of cane produced in India have been relatively stable over the last ten years, but the renewed focus on R&D investment is expected to bring modest improvements through to 2020/21.

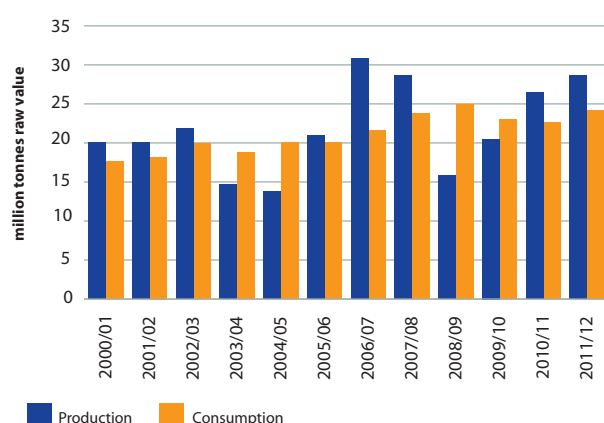
⁴ Northern subtropical region:

Uttar Pradesh, Bihar, Uttarakhand, Haryana and Punjab.

Southern tropical region:

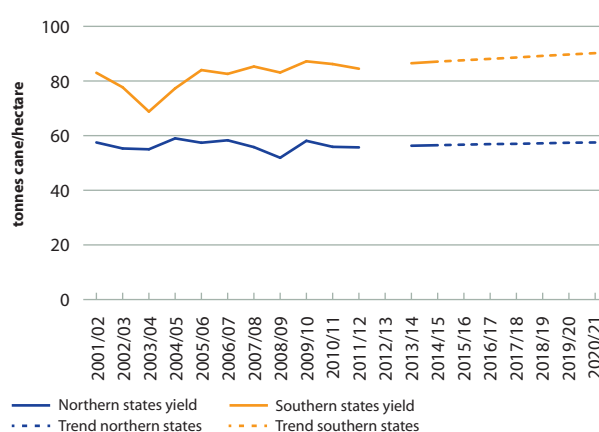
Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh and Gujarat.

Figure INDI.1: India—Sugar production and consumption, 2000/01–2011/12



Source: F.O. Licht, Ministry of Agriculture, 2012

Figure INDI.2: India—Cane yields, 2001/02–2020/21



Source: Ministry of Agriculture, Rabobank, 2012

Cane quality and factory efficiency

There has been a modest downward trend in India's average tonnes of cane per tonne of sugar (TCTS) ratio over the last ten years, which has been used as the basis for the projection to 2020/21 (see Figure INDI.3). Continuing improvements are the result of efforts to raise cane sucrose content as well as efforts to raise the efficiency of sucrose extraction and recovery in the country's factories.

Many cane mills are now capitalising on co-product industries, such as cogeneration power sales and molasses processing for ethanol, which reduces the reliance on sugar sales to reach annual revenue targets. In 2010/11, some of the leading private cane millers in India received over 12 percent of their revenue from cane products other than sugar, up from the 4 percent received from co-products in the 2005/06 season. The increasing diversification of revenue between cane products is a positive step for India's cane industry as it should underpin more favourable mill returns. This in turn will encourage further cane production as mills become more comfortable with the implementation of a long-term strategy and incentivise the farmer accordingly.

Government support has been a key driver for the development of the co-product industries—a significant strategy for progressive cane mills—with higher returns for power and ethanol sales welcomed by cane millers. The surplus power generated by the cane industry is crucial for local industry development, so the government provides soft loans from the Sugar Development Fund to encourage cogeneration power production. The cogeneration power scheme profits are tax free and although prices

vary between states, the prices set by governments have generally been rising, which is favourable for the cane industry.

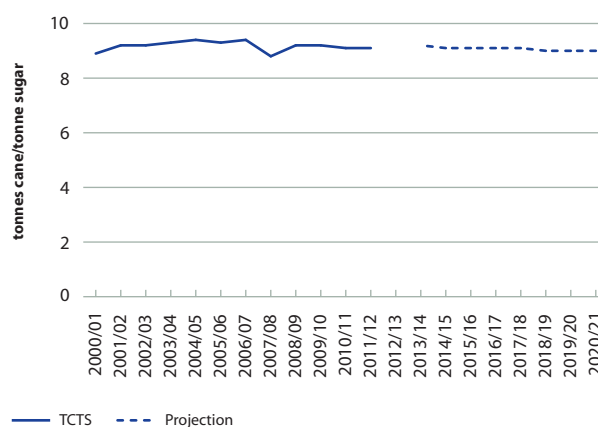
Molasses is the primary feedstock for the ethanol industry. Although the government requires 22 percent of molasses to be set aside for liquor production, the mandate for E-5 blending—a mixture of 5 percent biofuel in transport fuel (i.e. 5 percent ethanol and 95 percent gasoline)—is underpinning the development of an additional revenue stream for cane millers. E-5 blending is compulsory in nine cane producing states, and it is estimated that demand from oil marketing companies (OMC) for ethanol reached 400 million litres in 2012, up from 365 million litres in 2011.

Sugar production

Currently, 66 percent of India's cane is sold to millers for sugar processing, with the balance sold to other processors to make traditional non-centrifugal sugars such as gur (also known as jaggery) and khandasari. Rabobank projects that by 2020/21, India's cane millers will process over 70 percent of cane into sugar and co-products. The northern region is expected to demonstrate the most significant shift, going from a three-year end-point average of 53 percent of cane processed into sugar in 2011/12 to over 58 percent in 2020/21.

Urbanisation and increasing incomes are primary drivers for the shift away from gur consumption in India. In the 1960s, India's average annual per capita consumption of gur was around 15 kilogrammes but has fallen to around 5 kilogrammes in recent years. Over the same period, sugar has become the primary sweetener, with consumption growing from 5 kilogrammes per capita to over 20 kilogrammes per capita.

Figure INDI.3: India—TCTS ratio, 2000/01–2020/21



Source: Ministry of Agriculture, Rabobank, 2012

The primary driver of this shift is growth in the industrialised food and beverage sector, which caters to a more urbanised demographic with higher incomes. The northern state of Uttar Pradesh produces over 50 percent of India's total gur production. Ultimately, as the domestic demand for gur diminishes, the marginal gur production—particularly in the northern states—will be forced out of India's sweetener market and more cane will be directed to sugar production.

On the basis of the projections made for cane production and the use of cane by the sugar industry, plus the projections of the average TCTS ratio, it is estimated that sugar production in India should trend gradually higher over the coming ten years, reaching 30 million tonnes raw value by 2020/21 (see Figure INDI.4). The seasonal cane milling capacity already installed in India is estimated above 31 million tonnes of sugar equivalent. The maximum production capacity was almost utilised in the record crop year of 2006/07, when sugar production (in raw value terms) went above 30 million tonnes. Given the cyclical nature of sugar production in India, it is fully expected that the actual evolution of production will fluctuate around the trend projection. Given that the key drivers of the production cycle are weather and policy factors, attempting to make projections of the cycle itself is very unlikely to be successful.

Outlook for sugar consumption

India's annual sugar consumption per capita was estimated at 21 kilogrammes raw value in 2010/11, which was lower than the world average of 24 kilogrammes raw value for that year. However, India's sugar consumption is

growing more than the world average, at a ten-year growth rate of 2.6 percent per annum, compared to the world average of 2 percent.

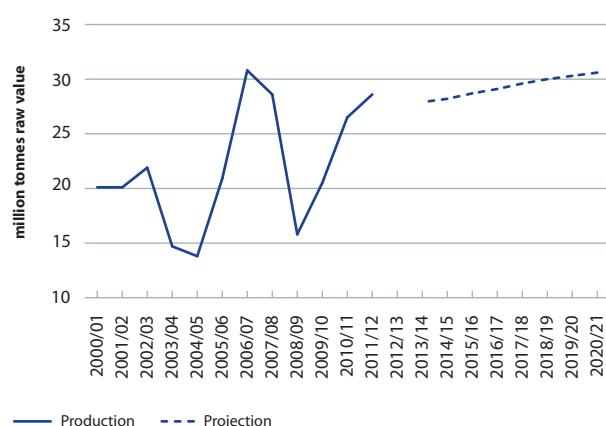
Rabobank projects that sugar consumption in India will grow at an average annual rate of 3 percent through to 2020, rising to 30 million tonnes raw value by 2020/21 (see Figure INDI.5). Although this projection is higher than the previous ten-year average, Rabobank's projection scenario is considered conservative. Presently, many industry players, including government bodies, forecast sugar consumption growth of around 4 percent per annum. The sales of products containing sugar, such as soft drinks, bakery goods, confectionery, and sweet and savoury items have grown by over 6 percent annually since 2000. Increasingly, sugar will be directed to the larger food and beverage processors who will aim to capitalise on India's rising incomes. Over the last ten years, disposable incomes for all classes in India have risen by over 7 percent annually.⁵

Outlook for sugar trade

Fluctuating sugar production dynamics will continue to present challenges for India's sugar industry. In the long term, it is projected that the growth in India's sugar demand will outstrip the moderate increases in production that will be made possible by growth in the cane area planted and R&D developments. India's sugar industry is heading towards a balanced sugar outlook by 2020, with a structural domestic sugar deficit looming beyond this point (see Figure INDI.6).

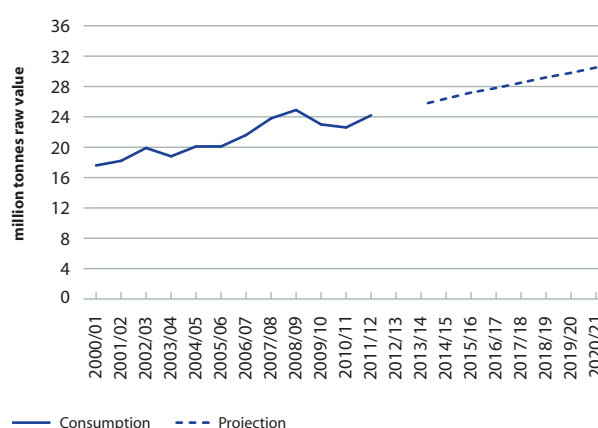
⁵ Euromonitor, 2012.

Figure INDI.4: India—Sugar production, 2000/01–2020/21



Source: F.O. Licht, Ministry of Agriculture, Rabobank, 2012

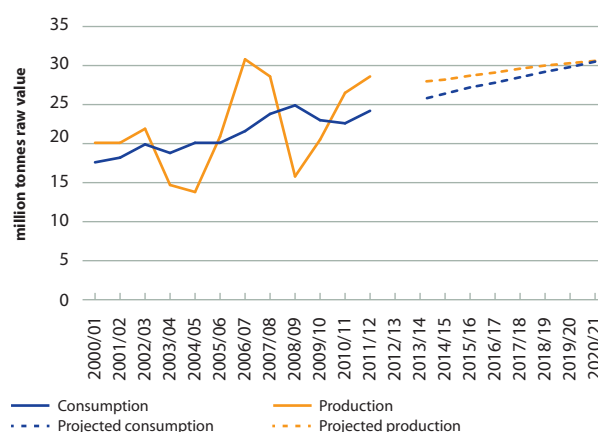
Figure INDI.5: India—Sugar consumption, 2000/01–2020/21



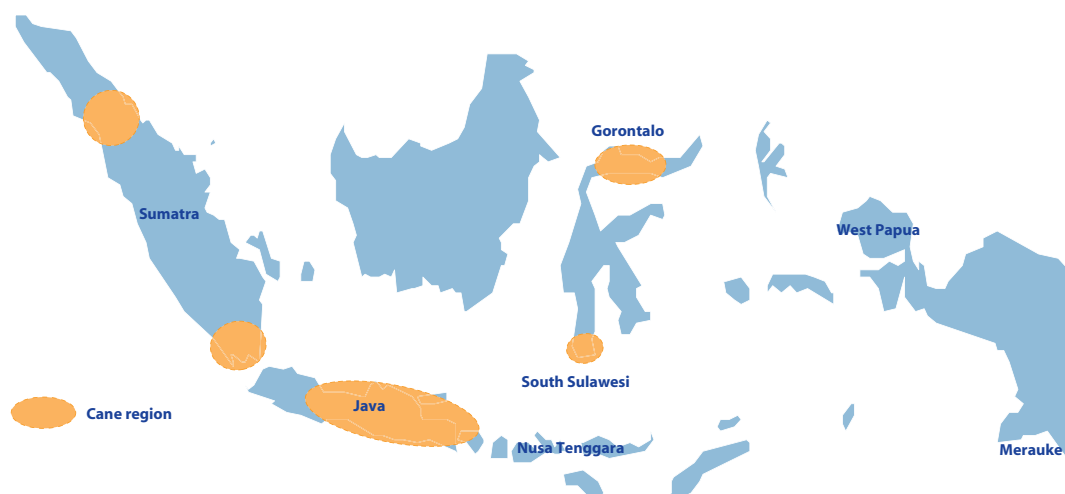
Source: F.O. Licht, Rabobank, 2012

A development related to this long-term perspective is the construction of port-based refineries for the purpose of processing raw sugar imports. Although the port-based refineries are strategically positioned to process raw sugar and sell refined sugar to nearby offshore markets such as the Middle East, the primary long-term objective for these refineries is to supply the growing Indian market. It is estimated that the port-based sugar refining sector will reach a capacity of 2.4 million tonnes by 2013. Over the last ten years, India's sugar imports have reached as much as 5 million tonnes in some years due to local sugar production setbacks. With a structural sugar deficit looming in India, a number of long-sighted players are positioning themselves to process large volumes of imported raw sugar in the future.

Figure INDI.6: India—Sugar production vs. sugar consumption, 2000/01–2020/21



Source: F.O. Licht, Rabobank, 2012



3 Indonesia

Recent trends and current situation

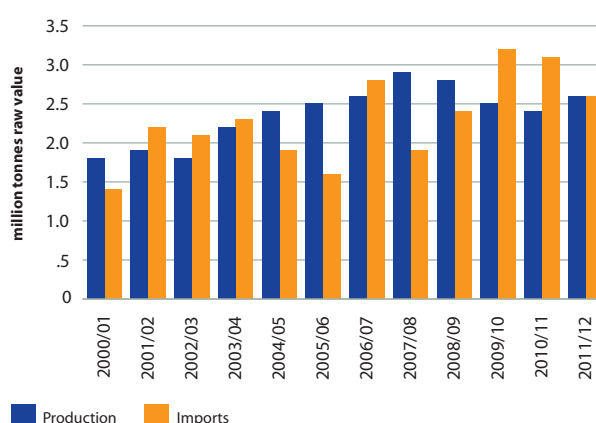
Indonesia's sugar market is one of the fastest growing in the world. Local sugar consumption has grown at an average annual rate of close to 5 percent over the last ten years, and while the country's sugar production has also risen over this period, it has struggled to match the blistering pace of consumption growth. Consequently, in recent years, imports have risen sharply and Indonesia has emerged as one of the world's top three importers of sugar (*see Figure INDO.1*).

With this growing sugar deficit in mind, the Indonesian government has a long-standing goal of achieving self-sufficiency in sugar production. To encourage higher local sugar output, the government has implemented support measures, such as the provision of

funding to revitalise old cane mills and land entitlements for pioneering greenfield projects.

Over 55 percent of cane area in Indonesia is managed by smallholder farmers. The smallholder farming base is predominantly located on the island of Java, where over 60 percent of Indonesia's sugar is produced. The cane produced by smallholder farmers is predominantly milled by state-owned enterprises (SOE). In 2011, there were 61 mills operating in Indonesia, with 52 being managed by SOEs, of which, 44 were located on Java. The rest of the country's mills are managed by private companies, which dominate production on the island of Sumatra. The private companies have been leading productivity gains in cane production. In recent years, these companies have accounted for over 25 percent of

Figure INDO.1: Indonesia—Sugar production and imports, 2000/01–2011/12



Source: F.O. Licht, 2012

Indonesia's total cane area while achieving over 35 percent of total sugar production. The private companies' average sugar yields per hectare are 40 percent higher than the average yields of smallholder farmers and 60 percent higher than the average yields of SOEs that manage their own cane plantations.

The sugar industry in Indonesia is subject to various government intervention measures impacting prices and trade. A minimum reference price (MRP) for white sugar is negotiated each season by the Indonesia Sugar Council (on behalf of the farmers) and the government.

The key objective for the government in setting the MRP is to support local sugar production in an endeavour to reach sugar self-sufficiency and thereby reduce dependence on imports.

The MRP effectively represents a sugar price that millers must use as a reference when determining the price paid to farmers for cane delivered to the mill. The MRP reflects the cost of producing cane for processing into sugar on the island of Java and is set at a level to incentivise higher local production. The MRP has been increasing in line with Indonesia's economy in recent years. In 2012, the MRP was set at IDR 8,750/kilogramme (USD 0.92/kilogramme), 21 percent higher than the 2011 season and 34 percent higher than the 2010 season.

The government sets import quotas for sugar and also grants licences for processors and traders to participate in sugar trading. Although government intervention is considered to be in the best interest of sugar producers, three key industry implications exist. First, high sugar prices relative to other countries in the region have meant that smuggling of sugar into the country has increased. Second, the increasing MRP at the national level has created very lucrative margins for efficient producers in low cost regions such as south Sumatra. Finally, the fact that self-sufficiency is far from being achieved despite the high MRP reflects the difficulty of incentivising sugar production growth in Indonesia.

Under these circumstances, the local refining industry that relies on imported raw sugar can probably count on a continuing high volume of throughput over the medium term.

The Indonesian government controls sugar inflows by licensing raw sugar refiners and enforcing raw sugar quotas on a seasonal basis. Currently, there is also a clear separation

between the sale of locally produced sugar and imported refined sugar, with the sale of imported refined sugar limited to a select number of registered buyers. Although the government is able to manage this separation by regulating sugar imports and controlling sales channels, it is expected that over time the liberalisation of trade among Association of Southeast Asian Nations (ASEAN) members could impact the sugar supply chain. In the event that Indonesia's sugar market is opened to lower priced sugar imports of all categories, the local sugar producers and refiners will need to focus on sugar production efficiency and marketing strategies to maintain their market share. Retail sugar prices in Indonesia are currently more than 40 percent higher than in Thailand, which is indicative of the pressure that industry players in Indonesia could face in the event of regional trade liberalisation over the medium term.

Outlook for sugar production

Cane area

The Indonesian sugar industry is positioning itself for a period of production growth. High prices for local sugar, supported by government-enforced minimum prices, have instilled confidence in milling companies to expand raw material processing by revamping existing cane mills and developing greenfield operations. It is also likely that new sugar production capacity being commissioned in remote regions of the country will obtain special economic assistance due to the significant cost of building infrastructure in these areas.

Indonesia's cane area increased by 14 percent from 2006 to 2011, and projections suggest it will increase another 31 percent by 2020. Currently, Java holds the major share of cane area, at 60 percent of the national total. However, with developments outside of Java expected to expand over the medium term, Java's share is projected to drop to 54 percent by 2020. The cane production development zone will mainly be in eastern Indonesia, between the islands of Nusa Tenggara and Merauke in the southern part of West Papua. However, these large scale projects will take time to develop and will likely require further government support as land ownership and infrastructure challenges continue to impact development in these areas.

Cane yields

Cane yields across Indonesia have remained relatively flat over the last five years and are not expected to increase dramatically in the short to medium term (see Figure INDO.2).

Although the government and private industry are attempting to increase productivity by investigating measures such as the use of genetically modified cane, the primary use of traditional farming practices and the expansion of cane into new areas will limit the effectiveness of new cane varieties in boosting average yields at the national level.

Cane quality and factory efficiency

The key area for expected improvements in cane quality is sucrose content. Much of the cane grown in Java is manually harvested as green cane, which generally results in lower sucrose content compared to the historic practice of pre-harvest burning. A large percentage of new development in the cane industry will occur within the private sector, which will be aiming for increased harvest mechanisation and efficiency in transporting harvested cane to the mill. Although gains in sucrose content will be subject to the impact of varying weather conditions, the improvements in field to mill efficiency along with mill upgrades are projected to shift the average tonnes of cane per tonne of sugar (TCTS) ratio from 13.6 in 2011/12 to 12.2 in 2020/21 (see Figure INDO.3).

Sugar production

Combining the outlook for cane area, cane yields and TCTS ratio leads us to project Indonesia's sugar production at some 4 million tonnes raw value by 2020/21 (see Figure INDO.4). This represents a substantial (>60 percent) increase in output versus production in 2011/12 and is clearly very dependent on the successful development of projects currently planned for eastern Indonesia and Sumatra plus significant expansion and upgrading in Java.

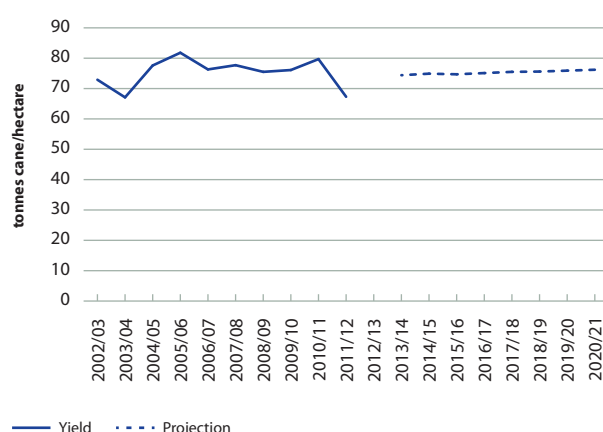
⁶ Euromonitor, 2012.

Outlook for sugar consumption

Indonesia's sugar needs are met from a combination of two sources: sugar locally grown and processed for the quality specifications of the household market, and raw sugar that is imported and refined for the quality specifications of the industrialised food and beverage industry. Total sugar consumption in Indonesia has been growing by over 4 percent per year in recent years, with much of the growth coming from the processed food and beverage industry. Currently, these users represent 44 percent of Indonesia's total sugar demand but will likely rise above 50 percent by 2020/21.

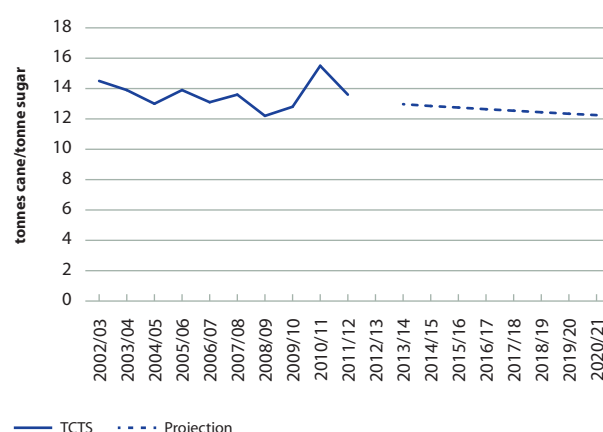
Indonesia's population growth and rising disposable incomes underpin the outlook for sugar demand. Indonesia's population is expected to reach 264 million by 2020, up from 238 million in 2010. Rising disposable incomes will also be a key demand driver, particularly for industrialised food and beverage products, with projections showing disposable incomes increasing by around 40 percent from 2012 to 2020.⁶ As a result of the development of these drivers, sugar consumption in Indonesia is projected to grow from an estimated 5.6 million tonnes in 2011/12 to 7 million tonnes by 2020/21 (see Figure INDO.5).

Figure INDO.2: Indonesia—Cane yields, 2002/03–2020/21



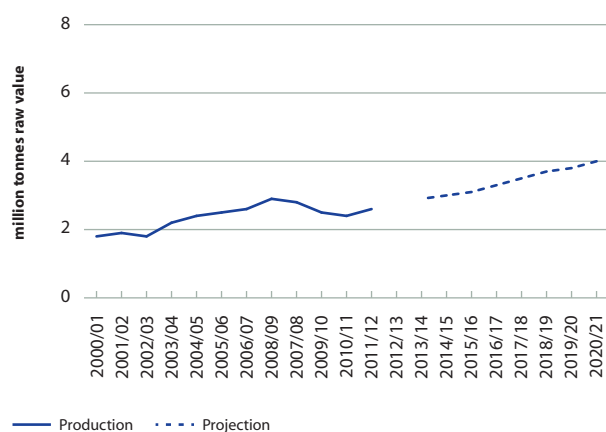
Source: Directorate of Plantations, Rabobank, Statistics Indonesia, 2012

Figure INDO.3: Indonesia—TCTS ratio, 2002/03–2020/21



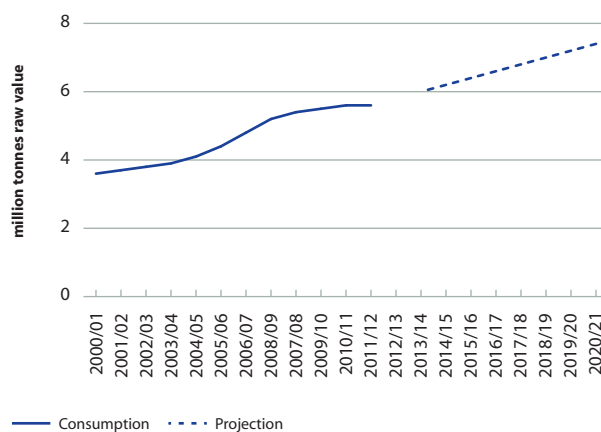
Source: Directorate of Plantations, Rabobank, Statistics Indonesia, 2012

Figure INDO.4: Indonesia—Sugar production, 2000/01–2020/21



Source: Directorate of Plantations, Rabobank, Statistics Indonesia, 2012

Figure INDO.5: Indonesia—Sugar consumption, 2000/01–2020/21



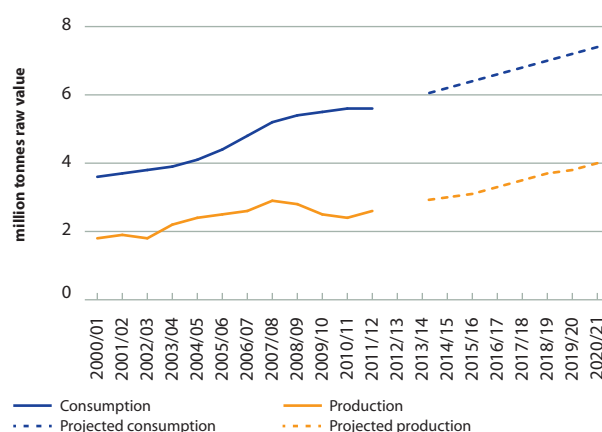
Source: Directorate of Plantations, Rabobank, Statistics Indonesia, 2012

Outlook for sugar trade

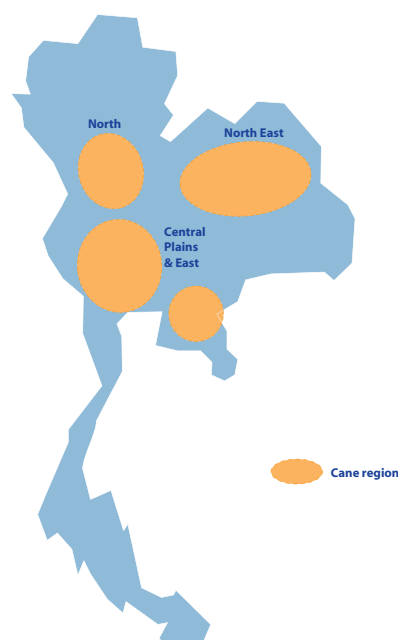
To meet the needs of the growing food and beverage industry, Indonesia's sugar refining capacity has increased substantially in recent years, from only 0.3 million tonnes in 2003 to over 2 million tonnes in 2011. Indonesia has switched from being a large, white sugar importer to being a large, raw sugar importer, allowing value-added food and beverage players to work more closely with sugar refiners and suppliers based in Indonesia. With the sugar production outlook for 2020/21 at 4 million tonnes raw value, around 3 million tonnes of sugar will need to be imported annually to meet the forecast demand for sugar of some 7 million tonnes raw value (see Figure INDO.6). It is expected that much of the imported sugar will be directed to the raw sugar refiners who will ultimately be supplying the needs of the industrialised food and beverage industry.

With the total capacity of the Indonesian sugar refining industry already over 3.5 million tonnes per year, the competition between the sugar refiners for market share is expected to intensify.

Figure INDO.6: Indonesia—Sugar production vs. sugar consumption, 2000/01–2020/21



Source: Directorate of Plantations, Rabobank, Statistics Indonesia, 2012



4 Thailand

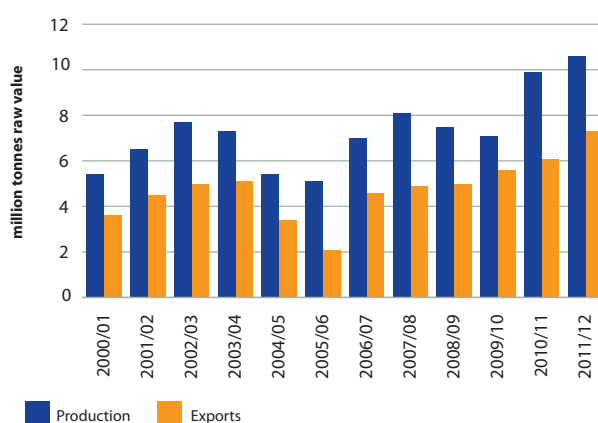
Recent trends and current situation

Thailand is the second largest sugar exporter in the world and is the leading supplier of sugar to Asian importers. The Thai sugar industry has achieved a dramatic (30 percent) increase in both cane and sugar output over the last three seasons, driven largely by gains in cane area and in cane yields (see Figure TH.1). However, in order to capitalise on future growth in Asian sugar demand, Thailand's cane industry is set to enter a new growth phase via a significant increase in national cane crushing capacity. The Thai government is backing this growth by issuing new licences that should permit mill numbers to rise from 46 to 61 by 2016. If the expansion plans are fully implemented, it is estimated that Thailand's cane crushing

capacity will increase by some 30 percent between 2012 and 2017.

Cane production in Thailand is dominated by smallholder farmers with an average land holding of 5 hectares. These farmers generally have a number of alternative crops that they could produce instead of cane, making the competitiveness of cane versus alternative crops a key determinant of the development of cane and sugar production. The competitiveness of cane is supported by Thailand's Cane and Sugar Fund, a state run programme that receives the value-added tax collected on sugar sales. To buffer fluctuations in world sugar prices, the Cane and Sugar Fund can act as a support mechanism for cane prices paid to farmers.

Figure TH.1: Thailand—Sugar production and exports, 2000/01–2011/12



Source: F.O. Licht, 2013

Thailand's cane production will have to expand significantly in the medium term in order to meet the increased requirement for cane arising from the projected expansion of milling capacity. While there is some scope for cane area to increase, the key drivers of this expansion are expected to be the development of new varieties and on-farm investment in technology. At present, only around 13 percent of cane area is irrigated.

Outlook for sugar production

Cane area

Thailand's cane area has grown in recent years, reaching 1.3 million hectares in 2010/11. Planted area is distributed between three main regions, the Central Plains and eastern region (35 percent), the northern region (22 percent) and the northeastern region (43 percent). For much of the decade leading up to 2009/10, Thailand's cane area was around 1 million hectares. During the 2010/11 season, the competing crop—cassava—encountered a problem with mealy bugs, which saw many farmers switch from producing cassava to producing cane. This outcome has been a key turning point for the Thai cane industry. Although projected farm margins for smallholders continue to favour cane over cassava at a two-to-one ratio,⁷ millers in Thailand are focusing their efforts towards maintaining cane's competitive edge in order to encourage further cane plantings. These efforts in expanding milling capacity are expected to bring Thailand's area devoted to cane to some 1.45 million hectares by 2020/21.

Cane yields

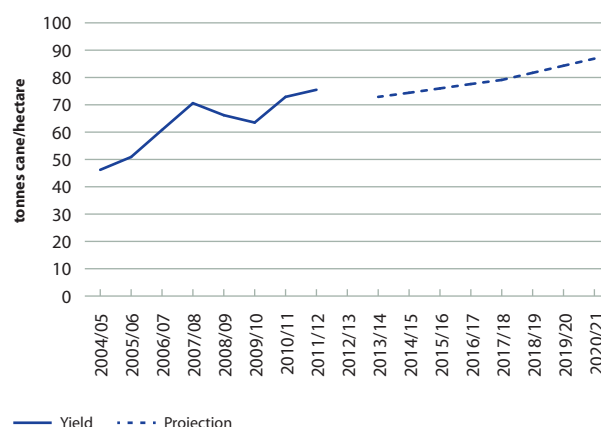
Thailand has seen a significant gain in average cane yields over the past ten years. Over the 2000/01 to 2004/05 period, average

yield was 58 tonnes/hectare, while the average yield over the five-year period of 2007/08 to 2011/12 increased to 70 tonnes/hectare. Field mechanisation developments across the farming sector and increased supplementary irrigation in the central and northern regions have been key strategies for increasing yields. R&D has also played a role, particularly from cane millers, such as Mitr Phol, who have invested in their own R&D resources to support their farming base. However, the level of government investment in R&D for the cane sector is considered low at less than 1 percent of sugar export earnings on an annual basis.⁸

Dry weather episodes during the critical growing months of July to September have historically led to relatively large swings in national sugar production. To mitigate the impact of dry weather on cane yields, farmers in the central and northern zones of Thailand are steadily adopting supplementary irrigation practices. Although this strategy has been a drawn-out process, with estimates suggesting that less than 10 percent of Thailand's cane is currently irrigated, mills located in irrigation zones are promoting further adoption by providing funding options and extension services to farmers. However, in offering support for irrigation, mills will proceed cautiously as farmers who adopt irrigation could switch to rice more easily. Irrigated rice is favourable to farmers as it can generally grow on the same field with two rotations per year. It is estimated that farmers growing two crops of rice per year currently earn similar margins to cane farmers.

As a result of the gradual spread of irrigation where it is feasible, plus the continuing investment in the development of new

Figure TH.2: Thailand—Cane yields, 2004/05–2020/21



⁷ Office of Agricultural Economics, Rabobank analysis, 2012

⁸ National Research Council of Thailand, 2012

varieties and better agricultural technology, it is expected that cane yields in Thailand will continue to exhibit an upward trend, rising by a projected 1.8 percent per year on average, reaching 86 tonnes/hectare by 2020/21 (see Figure TH.2).

Cane quality and factory efficiency

The gradual increase in mechanisation of harvesting may have an impact on cane quality by lessening the time it takes to get cane from field to mill from a historical average of 48 hours to as little as 36 hours or less. Reducing the time between harvest and milling is associated with increased extraction of sucrose from the cane. However, mechanisation can also be associated with negative impacts on cane quality, owing to the increase in fibrous material entering the milling process along with the cane. Most mills are supportive of mechanisation and play a role in structuring finance for the farmers' machinery, backed by a commitment from the farmer to continue producing and delivering cane to their mills.

Regarding cane quality and extraction of sucrose in the mill, the Thai cane industry's recent performance can be summarised by the tonnes of cane per tonne of sugar (TCTS) ratio, which captures the impact of both factors by measuring the number of tonnes of cane milled per tonne of sugar produced by the industry. There appears to have been little discernible trend in the TCTS in recent years, and for the purposes of projections, it has been conservatively assumed (i.e. weighing the possible benefits and challenges of increasing mechanisation of harvesting) that the average TCTS ratio to 2020/21 will remain similar to levels achieved in recent years (see Figure TH.3).

⁹ World Bank

Sugar production

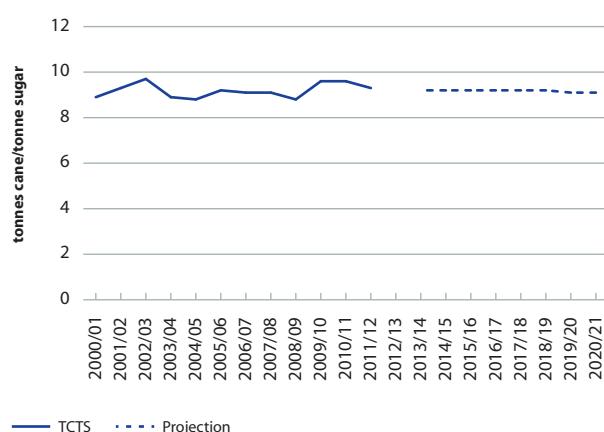
The combination of the preceding projections for capacity expansion, cane area, cane yields and TCTS ratios points to an output of 13.6 million tonnes raw value by 2020/21, representing an increase of close to 30 percent compared with output in 2011/12 (see Figure TH.4).

Outlook for sugar consumption

Thailand's current annual sugar consumption per capita is around 42 kilogrammes raw value, which is similar to the levels in mature markets, such as western Europe. The government quota system (which establishes a specific volume of sugar that can be sold on the domestic market, at a regulated price) has provided a foundation for affordable sugar to consistently flow into the domestic market. Domestic sugar consumption has been growing at around 3 percent annually over the last ten years. Looking towards 2021, the key drivers for increasing sugar consumption will be rising incomes and increasing urbanisation. Thailand has one of the lowest urbanised populations in Asia at around 34 percent, having increased from 29 percent in 1990.⁹ Rabobank projects that Thailand's sugar consumption will grow at 2.75 percent per year over the medium term (see Figure TH.5).

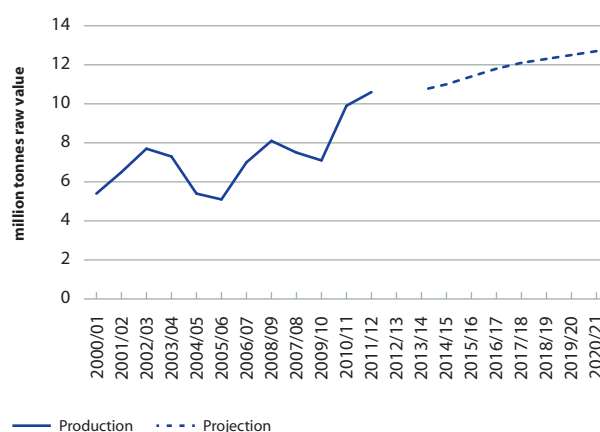
The key downside risks to sugar consumption growth in Thailand will be policy changes surrounding regional market conditions. The Association of South East Asian Nations (ASEAN) Economic Community Blueprint aims to see freer market conditions by 2015. The ASEAN plan, referred to as AEC 2015, will encourage the reduction of non-trade barriers, such as tariffs, and will open domestic

Figure TH.3: Thailand—TCTS ratio, 2000/01–2020/21



Source: F.O. Licht, OCSB, Rabobank, 2012

Figure TH.4: Thailand—Sugar production, 2000/01–2020/21



Source: F.O. Licht, OCSB, Rabobank, 2012

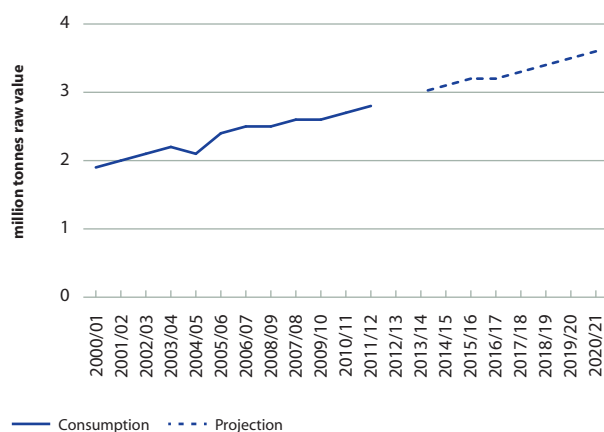
trading conditions to be more market driven. For Thailand, this could lead to an increase in domestic sugar prices as the government loosens its hold on regulatory price measures. Currently, Thailand's retail sugar prices are more than 40 percent lower than retail sugar prices in some other South East Asian countries, such as Indonesia.

Outlook for sugar trade

Thailand ships around 90 percent of its sugar exports to destinations within Asia. The key export markets for Thai sugar are Indonesia, Japan, Cambodia, the Republic of Korea and Malaysia. By 2021, Thailand's average exportable surplus is expected to reach 10 million tonnes, more than twice the amount exported in 2006/07 (see Figure TH.6). In the past, Thailand was the key sugar source for China. In the mid-1990s, China's annual imports were around 3 million tonnes, with Thailand the leading supply source at around 40 percent of total imports.¹⁰ In the coming years, it is expected that an increasing proportion of Thailand's sugar exports will be destined for China, given the expected growth of Chinese consumption and import demand.

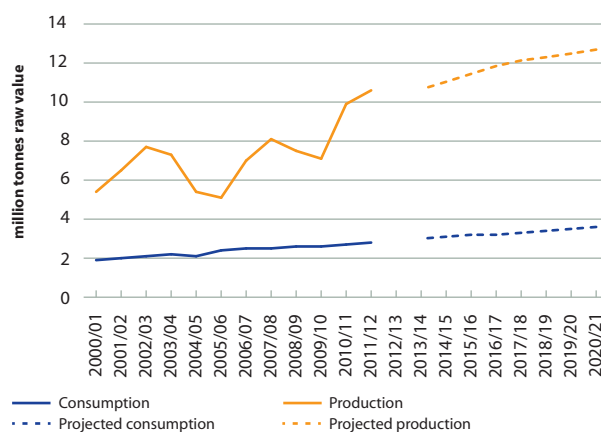
¹⁰ UN Comtrade, 2012

Figure TH.5: Thailand—Sugar consumption, 2000/01–2020/21



Source: F.O. Licht, OCSB, Rabobank, 2012

Figure TH.6: Thailand—Sugar production vs. sugar consumption, 2000/01–2020/21



Source: F.O. Licht, OCSB, Rabobank, 2012



5 Australia

Recent trends and current situation

The Australian cane industry is currently experiencing a period of rejuvenation. A number of leading East Asian agribusiness players have recently invested in the industry, consolidating milling assets and securing cane supply. Around three-quarters of Australian cane crushing capacity is now owned by offshore investors. This industry consolidation and capital injection has come at a pivotal time for the world's third largest raw sugar exporter, which has experienced a downturn in production over the last ten years.

The industry comprises some 4,000 cane growing businesses, 23 mills and 4 refineries, primarily located along the coastline of Queensland and northern New South Wales. Around 4.5 million to 5 million tonnes of raw sugar is produced on average each year, of which, around 1.4 million tonnes raw value is accounted for by domestic consumption. Of the remainder, nearly 90 percent is exported into East Asian markets.

Like all Australian agricultural industries, cane growing is subject to a naturally variable and sometimes extreme climate—a risk which is heightened by the industry's exposure to tropical cyclones. In recent years, extreme weather events, including droughts, floods and cyclones, have constrained Australian cane production and limited the profitability of the industry. Alternate land use pressures present constant competition and growth constraints for the Australian cane industry, with urban encroachment and alternate crops limiting the area of land that is economically

viable to grow cane. However, following the influx of international investment into the milling sector, the Australian cane industry is at a turning point as cane area and production are growing once again (see Figure AUS.1).

National milling capacity is currently around 38 million tonnes of cane. While the ownership of many of the country's mills has changed hands recently, a new mill has not been commissioned in over 40 years and the oldest mills are over 100 years old. Developing greenfield milling sites does not seem to be on the near-term agenda of existing milling conglomerates. However, expansion projects for existing facilities are occurring.

Outlook for sugar production

Cane area

Australian cane area is in the midst of a rebound, reversing the downward trend set over the last ten years and returning to normal levels. The area of cane harvested in Australia peaked in the 2002/03 season at 0.45 million hectares and declined for the remainder of the decade, falling 17 percent from 2000/01 to 2010/11.¹¹ However, elevated sugar prices and a wave of foreign investment have provided incentives to lift and maintain Australian cane area at 'normal' levels of above 0.40 million hectares.

Milling capacity has been underutilised over the last ten years. In an effort to maximise cane throughput and reduce idle capacity, millers have provided growers with a range of incentives to replant cane and to bring 'new'

¹¹ Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), 2011.

area into cane. Millers have also directly purchased land, including existing cane fields as well as former managed investment scheme (MIS) forestry land—which in many cases was taken out of cane—to maximise throughput and secure cane supply in regions where there is potential for competition for cane between mills. Cane produced on miller-owned land currently constitutes only a small proportion of overall cane supply. However, we expect miller-owned and leased farms to be a more prominent feature in the future.

Looking to 2020/21, Rabobank expects Australian cane area to grow by around 25 percent from current levels of 0.4 million hectares. Cane area is expected to be reclaimed in all growing regions, but particularly in the Burdekin, one of the most productive growing regions in the country. Expansion in the central and northern growing areas is also imminent, following a change in local mill ownership. Elsewhere, political decisions around infrastructure development—including water—will determine the industry's expansion potential. Outside the traditional cane areas of the country, a number of cane projects near the Ord River of Western Australia are currently under discussion. Despite the water and land availability along the Ord, previous projects have failed due to a lack of economies of scale. Without substantial public and private sector investment in sugar infrastructure throughout the Ord River region, it is likely that the projects currently under discussion will experience the same challenges.

In our view, any additional growth beyond 0.46 million hectares would require substantial public and private sector investment to develop new growing areas,

extend existing water infrastructure and bring additional crushing capacity online. This possibility should not be ruled out but would require a robust price outlook and is in any case a longer term play. At the right price, land is available and could be converted to cane area in existing growing regions, particularly the central region around Proserpine and to the north of the Burdekin.

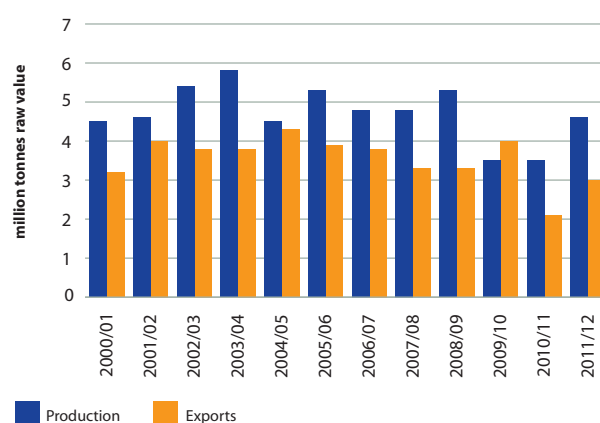
Various plans to develop new mills and ethanol distilleries are currently in the pipeline, to varying degrees of fruition. If these or other projects are commissioned, increased cane supply will be required to sustain the associated cane throughput demand. However, in the absence of a national ethanol mandate it is unlikely that additional ethanol capacity will be developed.

Cane yields

Historically, Australian cane yields have been highly variable but have trended upwards over the long term (*see Figure AUS.2*). A range of factors, including extreme weather events and rust outbreaks, have hampered Australian cane yields, which have nevertheless averaged around 83 tonnes/hectare over the last 20 years.

The Australian cane industry experienced one of the wettest crushes on record in 2010/11 and around 20 percent of the crop was left in the ground for the following season, which was then battered by cyclones and flooding. Subsequent cane yields have been constrained as a result, but following a substantial replanting effort, cane yields are expected to reach average productivity levels of 86 tonnes/hectare in the 2012/13 season. With a large area of planted cane to be cut in the 2013/14 season and new area also likely to be developed in the coming seasons, the

Figure AUS.1: Australia—Sugar production and exports, 2000/01-2011/12



Source: ABARES, Rabobank, 2012

mid-term outlook for cane productivity is expected to be in line with, or in excess of, current average levels.

Cane quality and factory efficiency

Australian cane produces a high proportion of sucrose, and over the last ten years, has yielded an average commercial cane sugar (CCS) output—the amount of recoverable sugar in cane, typically used as the indicator of cane quality in Australia—of around 14 percent. CCS is driven by a combination of factors including the cane variety, growing practices and milling extraction rates.¹² CCS varies seasonally and between growing regions, and has been slowly trending upwards on a national basis over the last four decades. The slow upward trend in cane quality has contributed to a downward trend in the industry average of the tonnes of cane per tonne of sugar (TCTS) ratio, a trend which is expected to continue in the coming ten years (see Figure AUS.3).

The highest yielding cane from both a productivity and industrial yield point of view is grown in the Herbert/Burdekin region, which has a ten-year average CCS of 14.3 percent and has exceeded an annual average CCS of 15.1 percent in the past. This area is an ideal cane growing region as it has both suitable climate and soil types as well as an extensive irrigation system, which provides reliable water at a low cost.

Most Australian mills have cogeneration facilities, which primarily use bagasse to generate power to run the mill, and in some cases, power is also exported to the town's electricity grid. Many mills are constantly expanding cogeneration capacity as a means of adding value and diversifying income streams.

¹² PRS (percentage of recoverable sugar) is also used as a measure of percent recoverable sugar by some Australian mills.

Sugar production

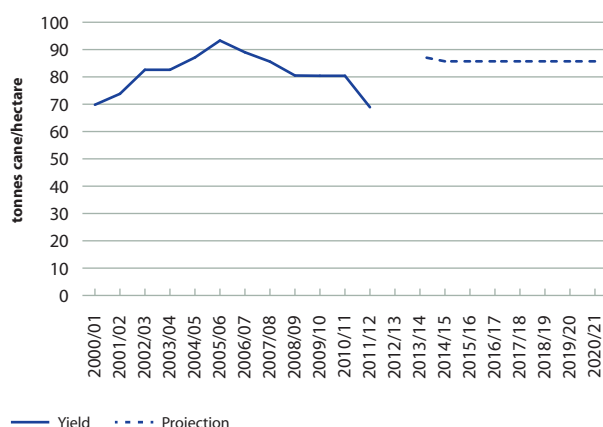
Combining the outlook for cane area, cane yields and cane quality/industrial efficiency leads us to project that by 2020/21, Australian sugar production should increase by around 40 percent from 2011/12 levels to more than 5.7 million tonnes (see Figure AUS.4).

Currently, the Australian sugar industry has the capacity to produce between 4 million to 5 million tonnes of raw sugar equivalent each year. To achieve an increase in production of more than 40 percent on 2011/12 levels over the next ten years, substantial public and private investments would be required to extend existing areas and to develop new cane growing areas with the required infrastructure, including milling capacity and irrigation schemes. Ultimately, it is the prevailing outlook for international sugar prices that will determine the future feasibility of expansion opportunities in the Australian industry.

Outlook for sugar consumption

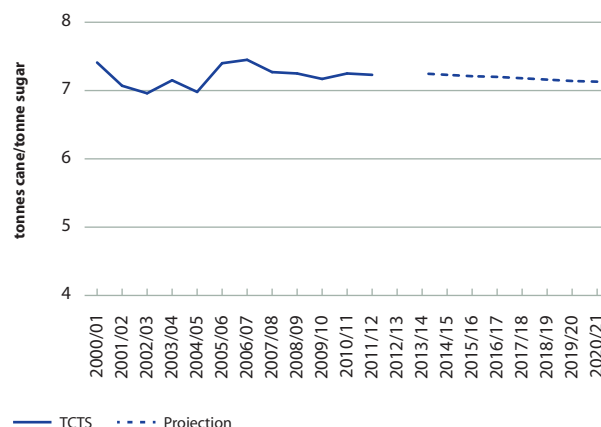
Historically, domestic sugar consumption trends in Australia have been relatively flat, which is mainly due to the stability of both population and income growth. The five-year average of domestic consumption is around 1.3 million tonnes raw value, which represents less than 30 percent of sugar production in a normal year. Over the next ten years, we expect domestic sugar consumption to rise to an estimated 1.7 million tonnes raw value in 2020/21 (see Figure AUS.5). Due to the limited scope for growth in domestic consumption as a result of constrained population growth and health-conscious consumers, it is expected that most of the additional growth in production projected for the

Figure AUS.2: Australia—Cane yield, 2000/01-2020/21



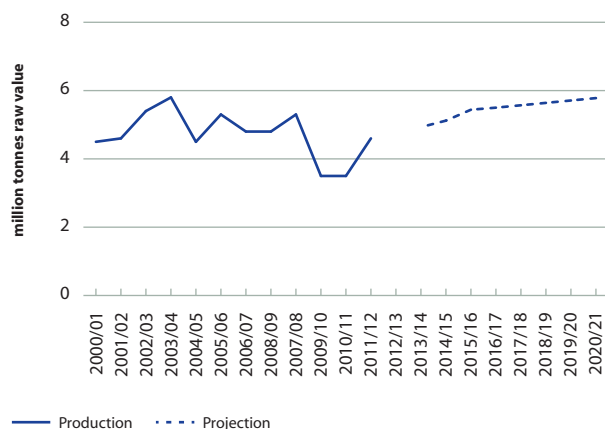
Source: ABARES, Rabobank, 2013

Figure AUS.3: Australia—TCTS ratio, 2000/01-2020/21



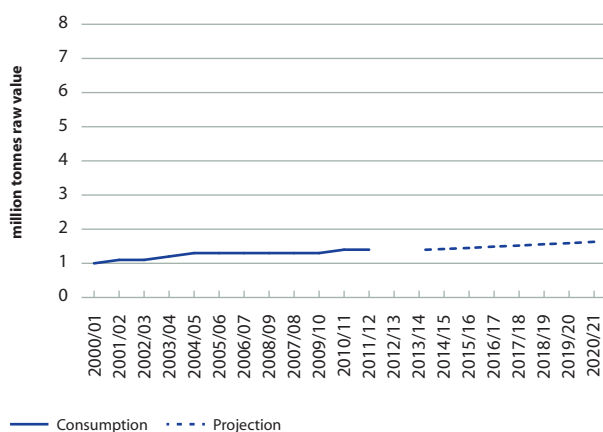
Source: ABARES, Rabobank, 2012

Figure AUS.4: Australia—Sugar production, 2000/01-2020/21



Source: ABARES, Rabobank, 2012

Figure AUS.5: Australia—Sugar consumption, 2000/01-2020/21



Source: ABARES, Rabobank, 2012

coming ten years will contribute to the expansion of Australia's exportable sugar surplus.

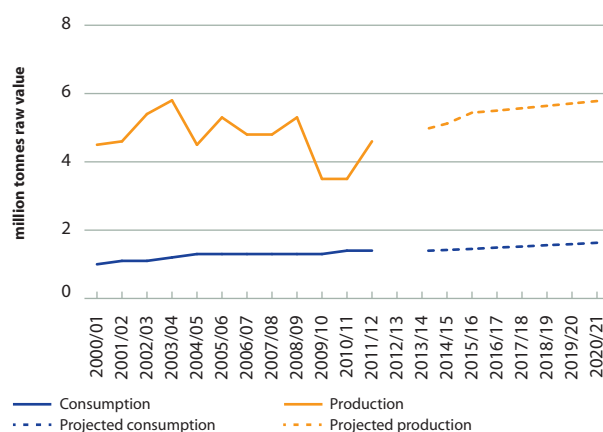
sugar exporter to the East Asian region and to ensure that export volumes grow to match the rising demand.

Outlook for sugar trade

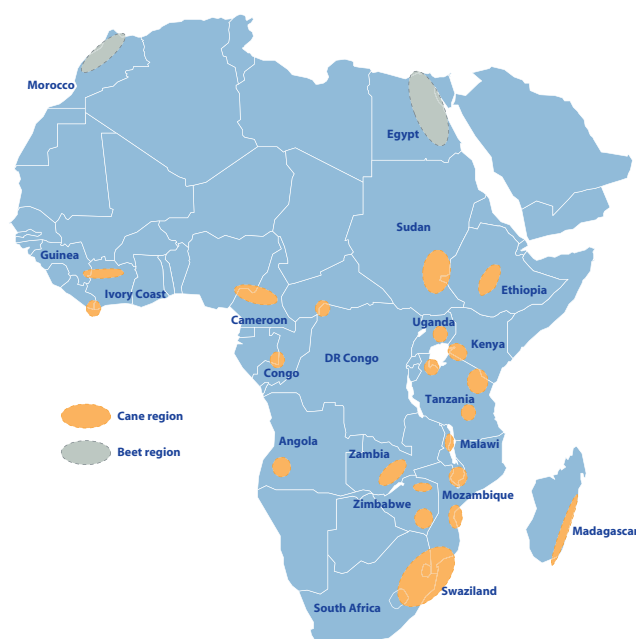
If the Australian industry expansion occurs as projected, Australian sugar exports will grow to over 4 million tonnes raw value by 2020/21 (see Figure AUS.6). We expect that bulk raw sugar will continue to be the dominant export product in the future.

Over the next ten years, the Australian industry is well placed to capitalise on its geographical proximity to the growing consumption markets throughout East Asia. The increasing integration of East Asian sugar companies in the Australian milling industry provides opportunities to build on the current strength of Australia as a supplier to the region. The challenges for the Australian industry will be to maintain the status of being a high quality, reliable

Figure AUS.6: Australia—Sugar production vs. sugar consumption, 2000/01-2020/21



Source: ABARES, Rabobank, 2012



6 Africa

Recent trends and current situation

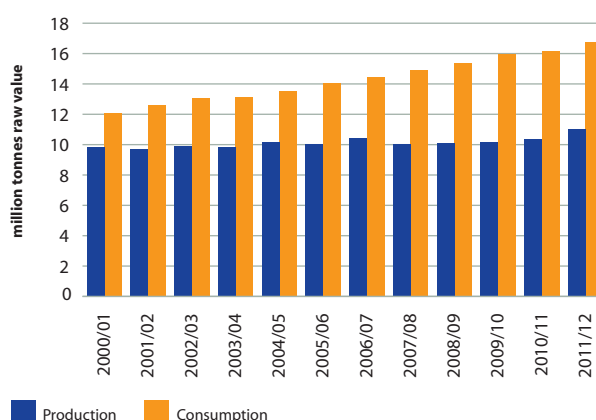
Africa remains one of the few places in the world with untapped land resources for agricultural expansion. Abundant arable land and water resources as well as climatic conditions that are appropriate for most crops can be found in many locations, particularly in the Sub-Saharan region. For this reason, the continent as a whole is regarded as one of the most promising potential sources of growth in global food production in the future.

Africa is also a market where consumption of food commodities, including sugar, is growing faster than in most of the rest of the world, driven by an expanding population, rising real incomes and increasing urbanisation. This growth provides a strong rationale for increasing investment in local

sugar production. Furthermore, many African countries are beneficiaries of preferential trade arrangements with the EU and the US, which create opportunities for African sugar producers to export sugar to these markets at prices that are higher than long-term average world market prices.

Despite this promising backdrop, the actual growth achieved in African sugar production over the past ten years has been unspectacular (see Figure AFR.1). On a trend basis, the average annual growth in African sugar production between 2001/02 and 2011/12 was 0.8 percent, versus a figure of 2 percent for average annual growth in world sugar production. However, this aggregate performance for all of Africa's sugar producers masks some very different trends among individual countries. During this period,

Figure AFR.1: Africa—Sugar production and consumption, 2000/01-2011/12



Source: F.O. Licht, Rabobank, 2012

investment in new projects and in rehabilitation or expansion of existing mills boosted production in countries such as Egypt (+600,000 tonnes raw value), Mozambique (+200,000 tonnes raw value), Zambia (+187,000 tonnes raw value) and Tanzania (+160,000 tonnes raw value), among others. However, much of these gains were offset by declines in trend output in countries such as South Africa, Mauritius, Morocco and Zimbabwe. These declines often have as much to do with politics as with economics.

This serves to highlight that evaluating the outlook for Africa's sugar production is particularly complicated—the continent is home to 53 separate countries spread across a range of agroclimatic zones. Currently, 32 of Africa's countries produce sugar, mostly from cane, but also from beet in the cases of Egypt and Morocco. The degree to which local sugar production is supported—or undermined—by government policy differs greatly from country to country. The same is true of:

- the general level of economic development (which affects the condition of infrastructure, the availability of skilled labour, etc.)
- the local agroclimatic conditions
- the structure of land ownership (which can impact the distribution of agricultural production between smallholders, large commercial farmers and mill estates)
- the degree of natural protection (as a result of freight costs) afforded a local industry

As a result, it is hazardous to generalise. Our approach is thus to try to identify common themes and to highlight the countries likely to have the greatest impact on Africa's development as a sugar producer.

Outlook for sugar production

Africa's rapidly growing sugar consumption, the industry's preferential access to high-priced EU and US markets, as well as considerably higher domestic sugar prices compared to world market prices create a powerful incentive for investment in sugar production and processing.

The available statistics on the number of new sugar projects currently under consideration or under construction in Africa reflect the promise of the continent's sugar market. Rabobank has identified some 60 sugar projects (excluding stand-alone refineries) in Africa, sponsored by private sector parties

or by governments, all scheduled—with varying degrees of certainty—to enter production between 2013 and 2020. If all of these projects were to be fully realised, they would increase sugar production capacity by an estimated 6 million tonnes raw value over this period.

Several countries stand out as substantial contributors to this list of projects, including Ethiopia, Nigeria, Sudan, Angola, Egypt and Mozambique. Ethiopia and Nigeria have very ambitious state-sponsored plans to raise production by millions of tonnes (over 2 million tonnes in the case of Ethiopia, which currently produces some 300,000 tonnes raw value, and 1.8 million tonnes in the case of Nigeria, which currently produces some 60,000 tonnes raw value).

Ethiopia's programme—funded by a combination of state funding and loans from India and China associated with the provision of equipment and infrastructure—is underway, with the expansion of existing mills plus new projects, including six new mills to be constructed in the Omo Kuraz region, jointly requiring the establishment of some 245,000 hectares of irrigated cane. The aim is not only to achieve self-sufficiency in sugar production, but to become one of the world's leading exporters, exploiting Ethiopia's preferential access to the EU market.

Nigeria has recently approved a Sugar Master Plan, requiring some USD 3 billion in investments and aimed at fostering the development of local cane sugar production from today's 60,000 tonnes to 1.8 million tonnes over a ten-year period. The government aims to create an environment conducive to investment in local production by raising import duties and levies and providing tax breaks, among other measures. It also proposes that sugar imports, which currently bridge the gap between local production of 60,000 tonnes and consumption of 1.4 million tonnes, will only be permitted for companies investing in local backward integration (i.e. raw sugar production). This implies a powerful incentive for those companies currently involved in the sugar refining business to invest in local cane sugar production.

Angola's plans are dominated by two large projects, each backed by a powerful private sector sponsor—Brazil's Odebrecht and Marubeni of Japan, respectively. Together, the two projects should bring 0.5 million tonnes of sugar production capacity into operation by 2015.

In Sudan, following the successful though delayed commissioning of the White Nile sugar project in mid-2012, there remains a number of other outstanding projects, including the Kenana-sponsored Rammesh and Redais projects, currently earmarked for commissioning in 2014 and 2015, respectively, and jointly accounting for some 0.6 million tonnes of additional sugar capacity, although it is understood that this is contingent on the participation of other investors in these projects.

In Egypt, the beet sugar sector is the focus of investment interest, with projects comprising some 0.3 million tonnes of additional sugar capacity currently under consideration. Private sector investors, including the Savola Group, are behind the investment plans.

Mozambique continues to be a focus for new investment, with South African investors, including TSB Sugar, recently announcing plans to establish new mills in the country. TSB's project in Massingir (Gaza Province), plus another project announced in Mopeia (Zambézia Province), would add a further 0.2 million tonnes of sugar production capacity to the industry.

Beyond these itemised projects, a number of other projects have been announced in countries such as Kenya, Tanzania and Uganda in recent years. Some of these projects have run into obstacles with respect to access to land or to outgrower cane, which has led to doubts over whether they will be realised within the announced time frame, or even over a longer time horizon. Indeed, risks that can be generally categorised as 'political' remain the largest concern of potential investors in African sugar, exemplified by Illovo Sugar's Markala project in Mali, which the company—an undisputed leader in African sugar production—eventually chose to suspend, citing the government's failure to fulfill key undertakings coupled with a deterioration of the security situation in the country.

It is difficult to evaluate the extent to which these types of challenges will impact the evolution of Africa's sugar production capacity in the coming years. Although general investor perception regarding Africa appears to be steadily improving, UNCTAD statistics for foreign direct investment (FDI) in Africa over the period of 2009 to 2011 show a sharp decline, at least partly explained by the wave of political upheaval across North Africa at the beginning of 2011. With respect to sugar, it is also difficult to evaluate the extent to which the long-term outlook—specifically,

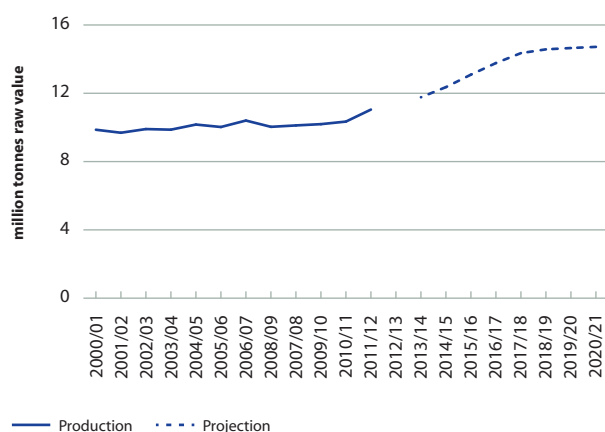
the attractiveness of export markets (including preferential markets such as the EU and the US) or the benefits of import substitution—may temper the ambitions of projects conceived during the recent period of extremely high world market sugar prices. However, it is probably true that the relative attractiveness of Africa as a target for agricultural investment has improved as many competing regions, above all Brazil, have seen costs rise and government intervention increase.

Weighing these factors and individual project details against greenfield projects and expansion projects, we have arrived at an estimate of 'probable' output expansion of 2.6 million tonnes raw value by 2020/21, plus a further 1.6 million tonnes of 'possible' expansion. Probable projects are those with solid plans, sponsors and financing as of the end of 2012, and possible projects are those with reasonable grounds to question the solidity of the plans, sponsors, financing or political environment. Assuming that only a percentage of possible expansion will eventually be realised (with the percentage varying from country to country), we arrive at a total projection for African sugar production of an additional 3.2 million tonnes raw value by 2020/21. Leading contributors to this forecast growth in output are Angola, Ethiopia, Sudan and Mozambique, with smaller but significant contributions from Egypt, Swaziland, Tanzania and Zambia, among others (see *Figure AFR.2*). It is expected that the South African sugar industry will maintain stable output, with the country's producers tending to invest in new projects elsewhere on the continent.

Outlook for sugar consumption

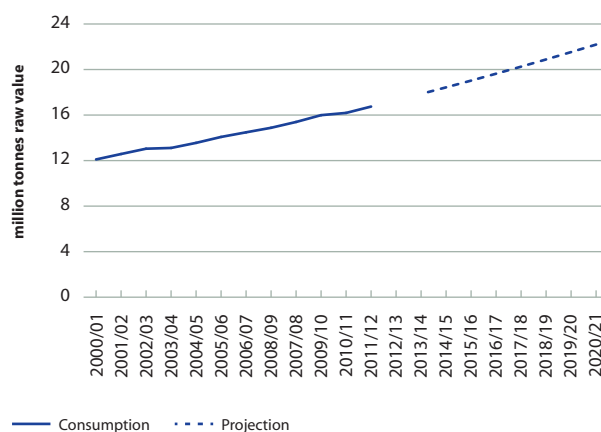
Over the last ten years, sugar consumption in Africa grew at an average annualised rate of 3 percent, well above the world average growth rate of 2 percent during the same period. The key drivers behind this growth—rising population, increasing real incomes and greater urbanisation—are all expected to remain firmly in place across the African continent in the next ten years. Long-term forecasts of real GDP for Africa, prepared by the International Monetary Fund (IMF), suggest that average annual real GDP growth will continue at rates above 5 percent through at least 2017, a rate bettered only by Asia at the regional level. Furthermore, the United Nations (UN) projects that population growth in Africa in the coming ten years will be the highest among the world's regions. Although this means that in terms of real GDP

Figure AFR.2: Africa—Sugar production, 2000/01-2020/21



Source: F.O. Licht, Rabobank, 2012

Figure AFR.3: Africa—Sugar consumption, 2000/01-2020/21



Source: F.O. Licht, Rabobank, 2012

growth per capita, which is regarded as the most relevant statistic linking incomes with sugar consumption, Africa is projected to significantly lag Asia. Africa's growth is from a lower base, with a correspondingly powerful incremental impact on consumption. Thus, the fundamentals behind Africa's sugar consumption growth in the next ten years remain strong.

Outlook for sugar trade

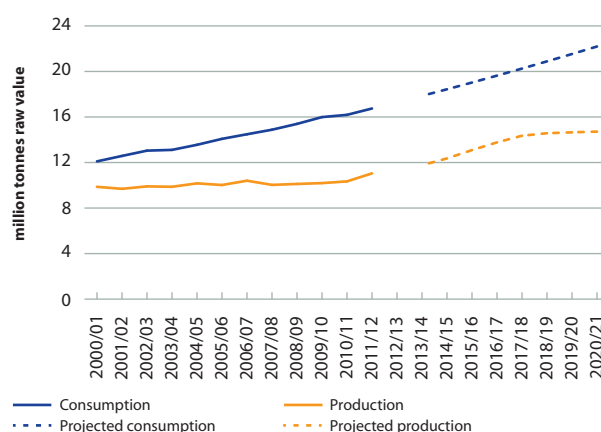
The combined projections of African sugar production and consumption show that while we forecast a significant increase in sugar output, it will not materially reduce Africa's sugar deficit, given the expected robust pace of expansion in domestic sugar consumption (see Figure AFR.4).

The trade status of the continent is the product of the individual trade stances of Africa's 53 countries. Our projections suggest that despite the rate at which Africa's sugar production is expected to grow, only a few

countries will undergo a transformation in trade status from importer to exporter, namely Angola, Ethiopia and Uganda. Naturally, the switch from importer to exporter will be highly dependent on at least the partial success of current expansion plans.

Trade flows could be further impacted if the liberalisation of sugar trade within the Common Market for Eastern and Southern Africa (COMESA) free trade zone (covering a total of 19 countries and stretching from Zimbabwe in the south as far north as Libya) takes place according to schedule in 2014. Given that the introduction of free trade in sugar has already been postponed several times over recent years, there is no guarantee this will change in 2014. However, the liberalisation of trade would encourage flows of sugar from more competitive countries and regions into less competitive regions or countries, which would have knock-on consequences for investment in new capacity in the region.

Figure AFR.4: Africa—Sugar production vs. consumption, 2000/01-2020/21



Source: F.O. Licht, Rabobank, 2012



7 The EU

Recent trends and current situation

The EU's sugar market is highly regulated. The current EU sugar policy was established in 2005 and phased into operation over a four-year period between 2006 and 2010. It represented a substantial reform of the preceding policy regime that had operated more or less unchanged since the 1960s. This reform process was characterised by a reduction of institutional prices and price support (for both farmers and sugar producers), a reduction in production quotas and in sugar exports, plus an incentive scheme for less efficient beet and sugar producers to exit the industry.

Key elements of the EU sugar policy include a system of national production quotas, a minimum price for sugar beet, import tariffs and a preferential access scheme for various groups of countries, including least developed countries, the EU's traditional raw sugar suppliers based in Africa, the Caribbean and the Pacific,¹³ the Balkan countries, and, starting in 2012/13, a group of Central and South American countries.¹⁴ Production quotas also apply to high fructose syrup (HFS)—referred to as isoglucose in the EU—limiting the extent to which HFS can compete with sugar for market share in the EU's processed food and beverage sectors.

As a result of the reforms introduced in 2005, EU beet area, beet production and beet processing capacity declined substantially over the four-year policy transition period. The vast majority of sugar factory closures during this time were in regions that are inherently

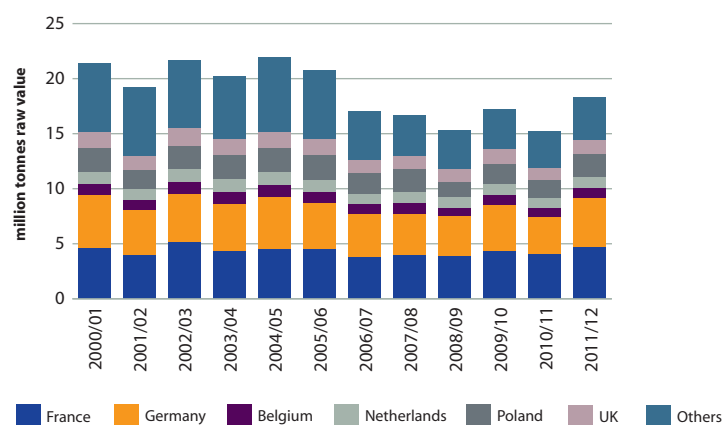
less competitive for beet production, notably southern and central Europe. As a consequence, EU beet and sugar production became increasingly concentrated in the 'beet belt' of north/northwestern Europe, namely the eastern UK, the Netherlands, northern France, Germany and Poland (see Figure EU.1).

Looking ahead, the biggest single issue that will shape the development of the sector in the coming ten years is the expiry of the current policy framework and the possible introduction of another wave of policy reform, scheduled for 2015. The abolition of production quotas is perhaps the most significant post-2015 policy option that has been submitted (by the European Commission) to date. This would certainly be a radical reform and would have profound consequences for EU sugar players. It would increase the degree of competition in the market, not just because there would be no constraint on the expansion of sugar sales by individual companies on the domestic market, but also because the current constraint on HFS production and use would be lifted, raising the possibility of increased substitution of sugar use by HFS.

Among the various stakeholders in the EU sugar sector, there is considerable resistance to the abolition of quotas in 2015. Representative bodies for EU sugar beet growers and beet sugar producers currently argue that quota abolition should be postponed until 2018 or 2020. Representatives of countries with preferential access to the EU market—the traditional raw

¹³ A group of African, Caribbean and Pacific (ACP) countries have long been traditional suppliers of raw sugar to the EU's refiners under the EU/ACP Sugar Protocol of the Lomé Agreement. Among the most important ACP exporters to the EU are Mauritius, Swaziland, Guyana and Fiji. In October 2009, the Sugar Protocol expired and was replaced by Economic Partnership Agreements (EPAs) between the EU and ACP countries. In addition, under the Everything-But-Arms agreement of 2000, 49 less developed countries, mostly African nations, were added to the list of tariff-free suppliers to the EU.

¹⁴ Under free trade agreements with six Central American countries (Panama, Guatemala, Costa Rica, El Salvador, Honduras and Nicaragua) and two Andean countries (Peru and Colombia), the EU has established a collective duty-free tariff rate quota of 264,000 tonnes of raw sugar from these countries, which will increase by 3 percent per year.

Figure EU.1: EU—Sugar production by major national industry, 2000/01-2011/12

Source: F.O. Licht, 2012

sugar suppliers of the African, Caribbean and Pacific (ACP) countries and the least developed countries in particular—also argue that abolition of quotas would run contrary to their interests, as it could result in expansion of EU domestic output and an associated reduction in import demand.

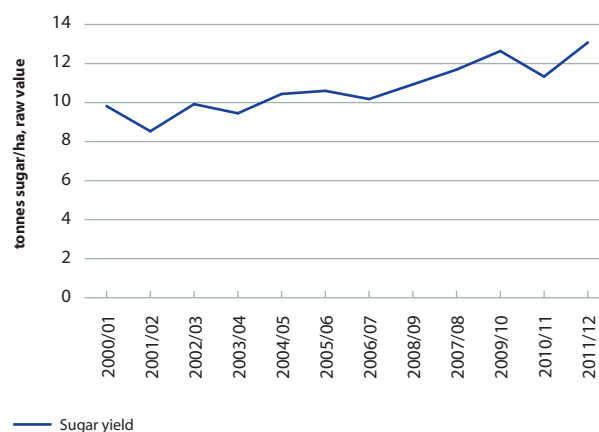
At the time of writing, it appears that the lobby arguing for the extension of the current policy regime beyond 2015 has the upper hand, suggesting that a plausible base case for EU policy to 2020 would be one of little or no change from current circumstances. Indeed, in January 2013, members of the European Parliament's agriculture committee voted to keep sugar quotas and minimum beet prices until 2020, rather than abolishing them as of 2015, as proposed by the EU Commission. However, in recognition that the abolition of quotas post-2015 remains a possibility, a brief analysis of the impact of such a scenario is provided in an annex to this chapter.

Outlook for sugar production

In the EU, policy largely determines sugar production because a large share of total production is quota sugar. Production of non-quota sugar, which is restricted to sales for industrial purposes (i.e. non-food) and is priced differently than quota sugar, is more variable but in recent seasons has accounted for an average of 15 percent of EU sugar output.

With the base case scenario to 2020 reflecting little or no change in EU sugar policy, our base-case sugar production projection is an average of EU output in recent years, totalling 16.8 million tonnes raw value (15.5 million tonnes white value).

The EU has made impressive gains in sugar yields per hectare over time (*see Figure EU.2*). Credit for this success can be attributed to both plant breeders and growers and to their agricultural research services for constantly seeking to improve agricultural techniques and technology. Furthermore, because the

Figure EU.2: EU—Sugar yields, 2000/01-2011/12

Source: F.O. Licht, 2012

reform of EU sugar policy between 2006 and 2010 had the effect of concentrating EU sugar beet production in the most efficient beet producing countries, there has also been a 'statistical' increase in average EU sugar beet yield and quality in recent years.

There is confidence among plant breeders that the gains in beet productivity achieved in the past can be repeated in the coming 10 to 20 years, through a combination of steady, incremental gains and the occasional breakthrough—an example of the latter would be the development of winter-sown sugar beet varieties (sugar beet is traditionally a spring sown crop), which could generate dramatic yield increases owing to the extension of the growing period.

Our base case of static EU sugar production at 16.8 million tonnes raw value combined with a steady increase in sugar yield per hectare points to a conclusion that, under our assumptions, the EU will require a diminishing area of land dedicated to sugar beet production—at least for sugar production (see Figure EU.3). It is possible that EU beet production for ethanol, which is already a significant contributor to ethanol production in France and Germany, could increase over the same period.

Outlook for sugar consumption

The EU is a mature market in which the growth of total caloric sweetener consumption is largely a function of population growth. Given that our base case scenario is that the quota system remains intact during the forecast period, we expect no change in the distribution of caloric sweetener consumption between sugar and HFS. As a result, EU sugar consumption to

2021 is expected to grow at an annual rate of 0.5 percent (see Figure EU.4).

Outlook for sugar trade

Under our base case assumptions, the EU is projected to remain a stable net importer of sugar over the forecast period. It is assumed that the trend in exports will reflect the 1.37 million tonne white value WTO export limit, and imports will essentially account for this, plus the difference between local production and consumption (see Figure EU.5).

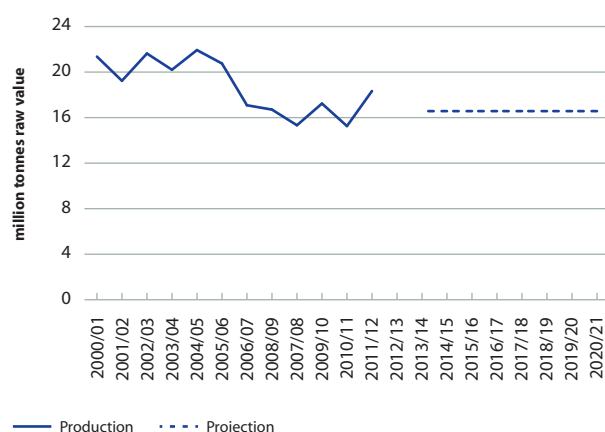
As a result, the EU is expected to be a net importer of around 3.5 million tonnes raw value of sugar by 2020/21, the result of a projected gradual widening of net import demand from recent levels of 1.5 million to 2 million tonnes raw value.

Annex: Abolition of quotas

There are many parties involved in the debate regarding the future of EU sugar policy post-2015. Following the EU Parliament's Agriculture Committee's January 2013 vote to maintain current policy until 2020, it will be the EU Council's turn to consider the issue. Given that any new sugar policy post-2015 needs to be included in the wider reform of the EU's Common Agricultural Policy, which is scheduled to come into force at the beginning of 2014, the outlook for EU sugar policy post-2015 should be determined at some point during 2013.

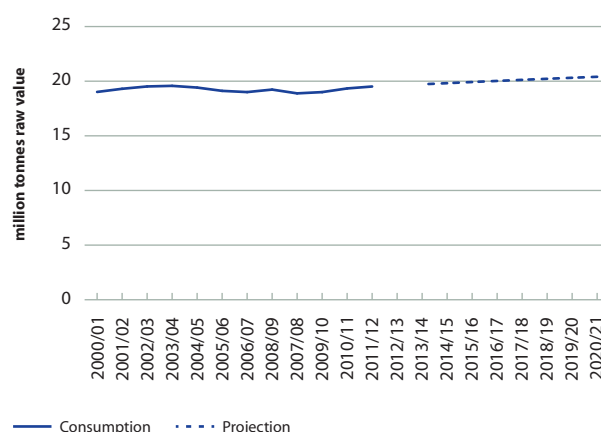
Our base case reflects our view at the time of writing that the lobby arguing for the maintenance of the quota system beyond 2015 appears to have the upper hand in the debate over the future of EU sugar policy. However, recognising that the possibility

Figure EU.3. EU—Sugar production, 2000/01-2020/21



Source: F.O. Licht, Rabobank, 2012

Figure EU.4. EU—Sugar consumption, 2000/01-2020/21



Source: F.O. Licht, Rabobank, 2012

of the abolition of quotas remains, and that this could generate very different circumstances from those projected in the base case, we briefly present a 'no quota' scenario.

Abolition of quotas—outlook for sugar production

To evaluate the general impact of the abolition of quotas on the various groups of industry participants (i.e. beet farmers, beet processors, sugar refineries and starch sweetener producers), it is necessary to consider how this change in the regulatory environment would impact costs, prices and margins for these players.

Our assumption is that the EU will maintain a degree of import protection post-2015, via a tariff on all non-preferential imports. We assume that the EU market price for sugar will therefore reflect the tariff— inclusive of costs of world market sugar (i.e. the import parity price). If the import tariff on raw sugar were to be the equivalent of the current CXL¹⁵ raw sugar import quota (EUR 98/tonne), it would require far from radical assumptions regarding world raw sugar prices and the US dollar/euro exchange rate to arrive at a projected average internal market price of between EUR 450/tonne to EUR 500/tonne of refined sugar. It would be reasonable to expect considerable variation around this average, given the historical volatility of world market prices.

With an average price at these levels, it is likely that the EU's most efficient beet sugar producers would continue to produce sugar at current levels—indeed, in some cases, production might even increase if there is scope to lengthen the processing season. On the other hand, the EU's less efficient players may not be able to sustain production at this

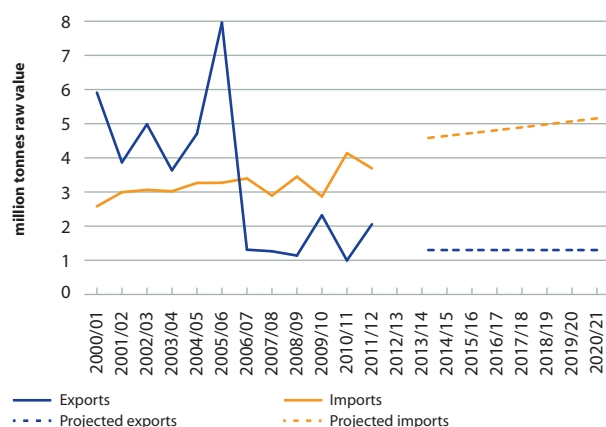
price, for various reasons—competitive pressure from the more efficient players as they attempt to gain market share, for example, or possibly competition from HFS, which we assume would also be free of any restraint on production in this scenario.

Based on an EU Commission analysis of regional break-even sugar prices—adjusted from the original 2005 version to reflect inflation—it is possible to derive an indicative EU beet sugar supply curve (see Figure EU.6). According to this analysis, which we present in index form, we believe that at a market price of EUR 500/tonne the EU's maximum beet sugar output would be around 18.3 million tonnes (see Figure EU.7). The most noteworthy change in projected production as a result of the abolition of quotas is in France, which is estimated to have the potential to increase sugar production by as much as 30 percent. This is because the French beet industry appears to have considerable scope to lengthen its beet processing campaign—historically, the Belgian, Dutch and German beet industries have operated longer processing campaigns than the French industry.

Our analysis suggests that while an average price level of EUR 500/tonne would be sufficient to encourage efficient EU beet sugar producers to fully maximise the use of existing beet processing capacity, it would not be sufficient to encourage the construction of additional processing capacity by these players. The cost of investing in new capacity is high, and our simple analysis of the stream of revenues from such an investment indicates that the projected returns are unlikely to be compelling under these price assumptions, especially given the likely volatility of prices around the projected average of EUR 500/tonne.

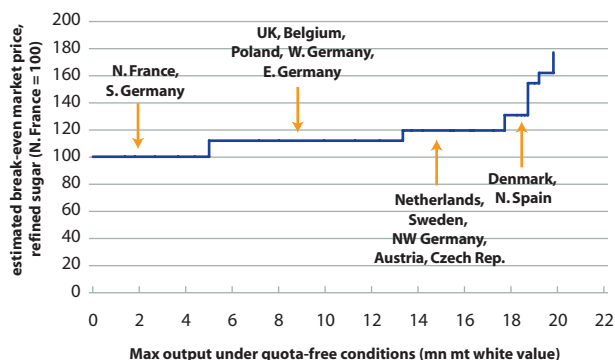
¹⁵ The CXL is an import quota of 677,000 tonnes, almost exclusively of raw sugar, with an import tariff of EUR 98/tonne. It is a legacy of the import agreements made by Finland, Romania and Bulgaria prior to their accession to the EU.

Figure EU.5. EU—Sugar trade, 2000/01-2020/21



Source: F.O. Licht, Rabobank, 2012

Figure EU.6: EU—Sugar supply curve under quota-free conditions



Source: Rabobank projection, 2012 based on EU Commission, 2005

Abolition of quotas—outlook for HFS

HFS production in the EU could also rise in a quota-free environment. In theory, as much as 4 million tonnes to 5 million tonnes of sugar could be potentially displaced by HFS in the market for liquid sweetener applications, if it were to capture a similar share of the EU sweetener market as it holds in the US market. However, the extent to which this potential could ultimately be realised is not easy to evaluate.

HFS in the EU is produced from corn (in southern Europe) and wheat (in northern Europe) by wet milling of these grains. Generally, HFS is one among a range of products that are produced from starch in such wet milling facilities. As a result, there are probably some gains in EU HFS production in a non-quota environment that could be achieved through switching the flow of starch in these plants from alternative products to HFS. Obviously, the margins on HFS would have to be sufficiently attractive to prompt such a switch.

To boost production over and above any gains that can be achieved simply by more intense use of current HFS capacity in the EU, there are two routes: investment in new capacity, or importing fructose in crystalline or syrup form.

Investment in new capacity is expensive, and a preliminary evaluation of the incremental cash flows arising from such an investment may not be sufficient to give a satisfactory return on investment if sugar prices in the EU were to be at the lower end of the EUR 450/tonne to EUR 500/tonne range for any significant length of time. Even in those regions of the EU which are currently deficit regions, or which may be expected to become

deficit regions in a no-quota scenario, we would expect that the riskiness of such investments in the face of volatile sugar prices would prevent the construction of new capacity.

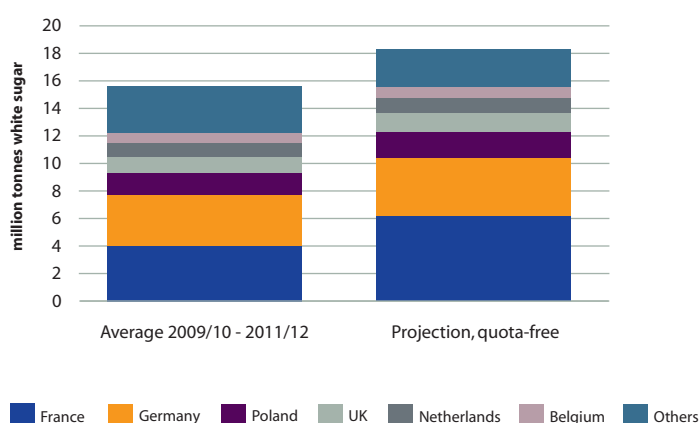
Imports of HFS into the EU could represent an alternative means of boosting the market share of these sweeteners under a no-quota scenario. HFS could either be imported directly, or fructose could be imported in other forms (e.g. crystalline) for blending with lower grade syrups. As the latter process is rather more expensive than the former, it may be that the direct import of HFS may be more likely to result in a change to a no-quota scenario. Again, given the likely volatility of EU sugar prices under such a scenario, the volumes of imported HFS could vary significantly from year to year as end users may well have the opportunity to arbitrage the liquid sugar and HFS markets.

With these considerations in mind, and assuming that the market will be volatile, the actual substitution of sugar by HFS in a quota-free environment in the EU would likely be somewhat below its theoretical potential of 4 million tonnes to 5 million tonnes.

Abolition of quotas—outlook for refining and for imports of raw sugar

With only very modest growth in EU sugar consumption, a possible increase in EU beet sugar production and a possible increase in HFS use, the EU cane sugar refining sector looks vulnerable in a no-quota scenario. The EU's import requirement would be lower than it is currently, creating a substantial mismatch between total EU refining capacity (stand-alone refineries plus refining in beet factories) and refining needs.

Figure EU.7: EU projected sugar production under quota-free conditions, 2009/10-2011/12



Source: Rabobank projection, 2012 based on EU Commission, 2005

This also suggests that the no-quota scenario would impact the raw sugar exporting countries granted preferential access to the EU market, since there would be a greater likelihood that the demand from the EU would be less than the volume they would be willing to supply, at least under the assumption of relatively robust world market prices. These circumstances are exactly the opposite of those generally prevailing in the period of 2008 to 2012, when the availability of raw sugar from preferential suppliers was less than earlier expected.

Furthermore, the price assumptions for the no-quota scenario—that the EU market will essentially become a market that trades at the landed cost of world market sugar plus a modest import tariff—suggest a diminished price differential for exports made to the EU by these countries versus exports made to the world market. This may not matter during times when world prices are high, but it is likely to matter when world prices are low. It suggests that in a quota-free environment, if world prices are assumed to be relatively high, EU prices will be relatively high too, but there may be limited demand for imports from preferential exporters. And if world prices are assumed to be relatively low, EU import demand could be more robust, but the price for preferential exports may also be relatively low.



8 Russia

Recent trends and current situation

Until very recently, Russia was consistently the world's largest importer of sugar. From the 1990s until 2003/04, domestic sugar production varied between 1.5 million tonnes and 2 million tonnes raw value annually. During that time, the country regularly imported an additional 4 million tonnes to 5 million tonnes of raw sugar each year, equivalent to some 15 percent of total world trade in sugar. This made Russia a powerful influence on the international sugar market.

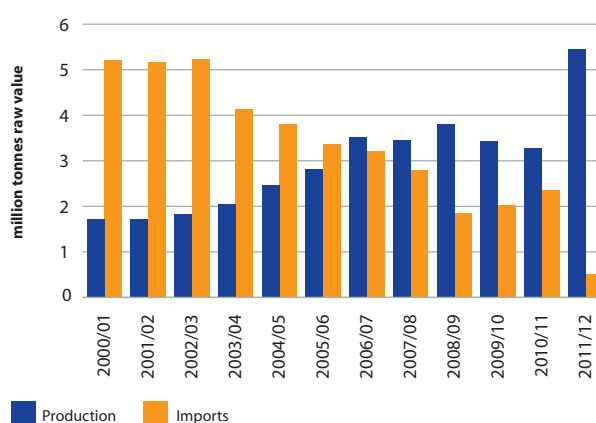
From 2003/04 onwards, production of sugar in Russia exhibited a rising trend (see Figure RU.1). During this period, a number of large, local beet processing companies with multiple factories became involved in beet production, recognising the potential for

improving field performance and capturing extra value in addition to the margin available from beet processing.

High domestic prices during this period (the result of high world prices and/or high tariff barriers) encouraged these investments, and in general, prompted improvements in performance. Upgrading and selective expansion of processing capacity was also encouraged. The combination of developments in both the field and factory sectors boosted beet and sugar production.

As a result of rising beet sugar production, coupled with a gradual and long-term decline in local sugar consumption, Russia's import requirement has declined over the last ten years. Indeed, when local sugar production broke records in the 2011/12 season,

Figure RU.1: Russia—Sugar production and imports, 2000/01–2011/12



Source: F.O. Licht, 2012

exceeding 5 million tonnes raw value, Russia's imports fell below the 1 million tonne mark.

At present, there are some 90 beet factories operating in Russia, concentrated in the central federal district (Belgorod and Voronezh) and the southern federal district (Krasnodar). Many of these factories process sugar beet during the autumn and refine imported raw cane sugar during the off-season.

The recent trends in Russian sugar production, particularly the spectacular results achieved in 2011/12, have prompted speculation regarding the extent that Russia will be able to sustainably increase its sugar production over the next ten years. This will in turn determine Russia's contribution to global sugar import demand over this period.

Outlook for sugar production

Beet area

As an annual crop, area for Russian sugar beet competes with alternative crops every year. In order to maintain or expand beet area, the margin per hectare available to farmers has to be at least equal to, if not better than, the margins from alternative crops. In recent years, beet area in Russia has fluctuated between 800,000 hectares and 1 million hectares.

Beet prices in Russia are linked to local sugar prices, which have benefited from considerable protection from world market prices via a system of variable tariffs (the variation depending on the level of prevailing world prices). This has led to high import parity prices. The situation is unlikely to change substantially as a result of Russia's accession to the WTO in August 2012, after which the tariff on raw sugar imports will be effectively fixed at USD 140/tonne and will only be higher than this when prices are

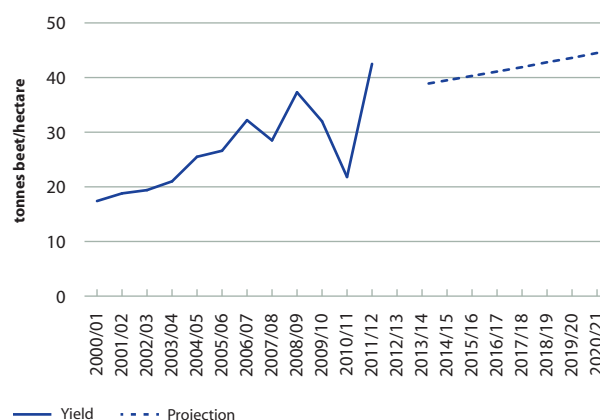
extremely low (below US\$ 9/lb). As a result, there is good reason to believe that sugar and beet prices over the long term are likely to continue to be supportive of beet production in Russia. For this reason, our base assumption is that in the coming years, beet area will rise very gradually (1 percent per year).

Beet yields

In Russia, the weather has always had a particularly important influence on the level of beet and sugar production in any one year. The growing season in most Russian beet regions is shorter than in western Europe—spring arrives later and winter can arrive early and on occasion can be extremely harsh (to the point that, in the worst cases, beets cannot be lifted because the soil is frozen). For these reasons, the yield potential of sugar beet in Russia is always likely to lag that of western Europe, and the crop will continue to be vulnerable to harsh weather that can either impact yields or impact the ability of the industry to harvest the entire crop. Nevertheless, a perfect season (such as 2011/12) can produce spectacular results (i.e. high levels of beet production and high yields, plus a harvesting season that is long enough to process the entire crop). However, perfect seasons are not by definition normal seasons. For this reason, in our projections to 2021, we regard the 2011/12 season as an outlier in a series that exhibits a rising trend of around 2 percent per year (see Figure RU.2).

With respect to beet yield improvement, plant breeders are confident that considerable scope remains for improving the yield potential of sugar beet in Russia, although to fully realise this potential there must be a parallel evolution of field techniques towards best practices that are common in the world's

Figure RU.2: Russia—Beet yields, 2000/01-2020/21



Source: F.O. Licht, 2012

leading beet sugar industries, such as reducing losses at harvest.

Beet quality and factory efficiency

In recent years, the Russian beet industry has achieved an average tonnes of beet per tonne of sugar (TBTS) ratio of 7.2, based on the white value of sugar (see Figure RU.3). For the purposes of projections, we have assumed modest reductions in the TBTS ratio of 0.3 percent per year, via improved beet quality and efficiency gains in factory operations.

The assumption of a rising trend in industrial efficiency appears reasonable given that the protection provided by the import tariff system allows efficient processors in the local market to make good profits in most years. Indeed, in recent years this has prompted a steady flow of incremental investment in processing capacity (i.e. factory upgrades and expansions rather than the construction of new factories), with companies aiming to improve the technical efficiency of operations as well as the cost structure by taking advantage of economies of scale. These developments have been supported by government incentives—for example, in 2011, the government provided RUR 126 million (USD 4 million) in subsidies for interest payments on investments in the sector totalling RUR 4.5 billion (USD 139 million).

Sugar production

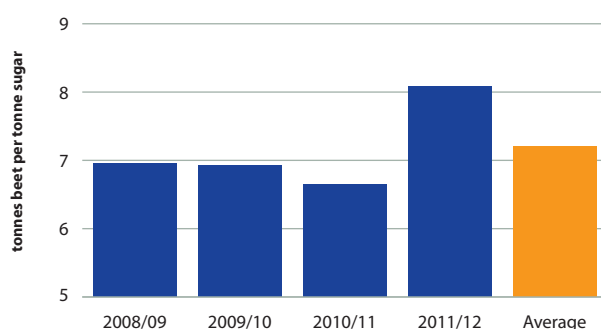
Using ten-year trend values for beet yield and beet area in 2012 (to minimise the impact of the 2011/12 season on projections), and assuming an increase in average beet yield of 2 percent per year and an increase in beet area of 1 percent per year, plus modest gains in industrial yields of 0.3 percent per year, sugar production in 2021 could be as high as 5.8 million tonnes white value.

Again, this might not appear to be an ambitious goal for the industry—it is only 5 percent to 10 percent above the output in 2011/12—but it is 45 percent above the five-year average of sugar production from 2007/08 to 2011/12. The investment in additional processing capacity and logistics should enable this production target to be achieved in 2020 without stretching the system to the limit (or being contingent on good weather), as was the case in 2011/12.

The government's own ideas on the development of the industry over the next ten years have been indicated in a Ministry of Agriculture draft agricultural development programme for the period of 2013 to 2020, which highlights beet production goals for 2020 of 42 million tonnes of beet and 5.9 million tonnes of beet sugar production (raw value).

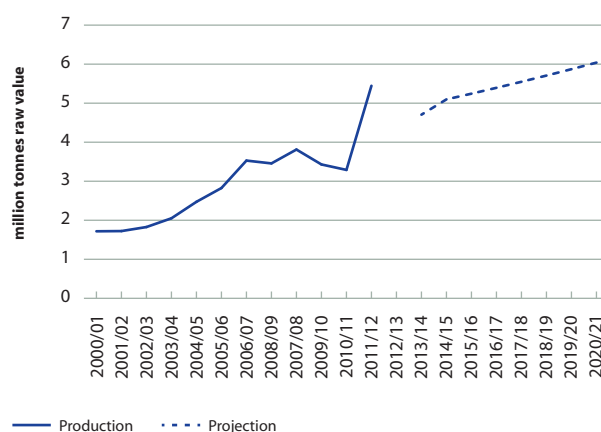
This goal appears modest in comparison with the industry's spectacular performance in the 2011/12 season, but it is more realistic in a longer term context. Furthermore, given that there is little prospect of substantial growth in sugar consumption in Russia, the goal is realistic in terms of preserving a favourable economic environment for the sugar sector, because it implies that Russia will continue to be a (modest) net importer. Under these circumstances, the industry is far better able to take advantage of the protection provided by import tariffs—in other words, domestic prices should reflect import parity. If production were to grow such that the country became a net exporter, domestic prices could switch to reflect export parity for at least some part of the year, a situation that would imply a reduction in unit revenues and margins for the industry.

Figure RU.3: Russia—TBTS ratio, 2008/09–2011/12



Source: International Sugar Organisation, Rabobank calculations, 2012

Figure RU.4: Russia—Sugar production, 2000/01–2020/21



Source: F.O. Licht, Rabobank, 2012

Production of starch-based sweeteners that compete with sugar, such as high fructose corn syrup (HFCS), is currently modest in Russia, despite the support provided to domestic sugar prices. Our estimate is that HFCS production in Russia currently amounts to some 100,000 tonnes, and is projected to double over the forecast period. As such, starch-based sweeteners are expected to continue to offer little competitive threat to sugar in Russia.

Outlook for sugar consumption

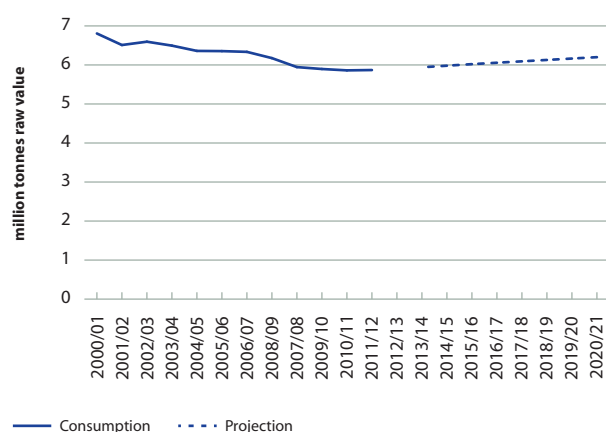
For much of the last ten years, Russia's population and its sugar consumption were in decline. Per capita sugar consumption trended gradually downwards but remained at relatively high levels (>40 kilogrammes raw value per capita) in global terms. Projections for the underlying economic circumstances of the country for the coming ten years suggest that the population will continue to decline, though at a much lower rate than between 2000 and 2010. At the same time, GDP and thus per capita GDP are expected to grow steadily. Given that per capita sugar and sweetener consumption levels in Russia are already high, growth in per capita consumption to 2020 is projected to be modest but sufficient to offset the impact of the continuing slow decline of population on total sugar consumption (see Figure RU.5).

As previously mentioned, although starch-based sweetener production and consumption is projected to double between 2012 and 2020, the absolute volumes are low and the impact on sugar consumption is projected to be small.

Outlook for sugar trade

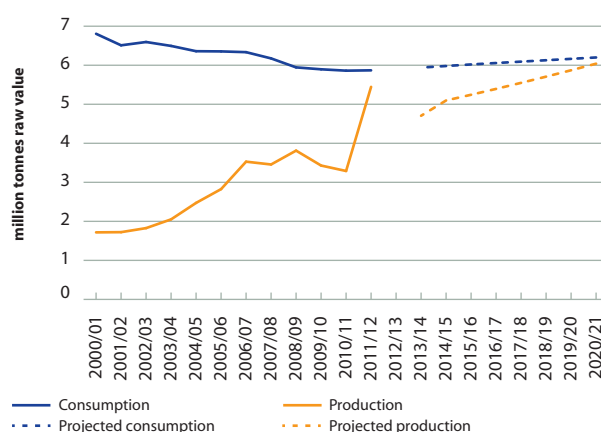
The combination of rising production and flat consumption forecasts will inevitably result in a significant decline in Russia's import requirement over the forecast period. Indeed, the combined projections suggest that by 2021 Russia's trend import requirement will have dwindled to less than 0.5 million tonnes (see Figure RU.6). Of course, the volatility in output historically caused by variable weather conditions is likely to continue in the future, which would create volatility for Russia's import needs on a year-to-year basis. Nevertheless, the projections suggest that Russia is unlikely to regain its status as the world's largest importer, and that there is likely to be continued growth and investment in the local beet sugar industry.

Figure RU.5: Russia—Sugar consumption, 2000/01-2020/21



Source: F.O. Licht, Rabobank, 2012

Figure RU.6: Russia—Sugar production vs. sugar consumption, 2000/01-2020/21



Source: F.O. Licht, Rabobank, 2012



9 NAFTA region—Mexico

Recent trends and current situation

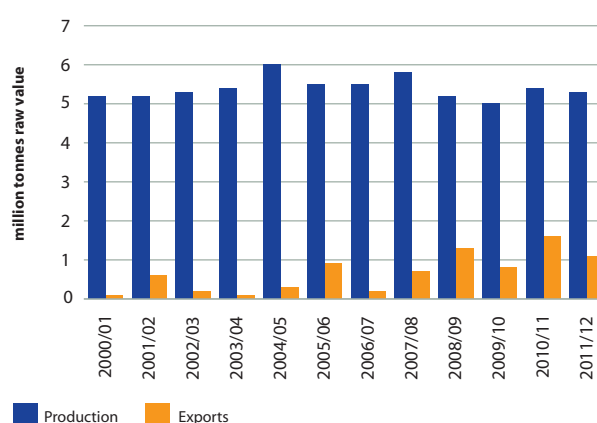
Mexico is the eighth largest sugar producer and consumer in the world. Policy measures, at both the national and North American Free Trade Agreement (NAFTA) levels, provide considerable support for the local sugar industry.

The rationale for local policy support for the industry stems from the fact that the Mexican cane industry is one of the most important food and agricultural industries in the country. According to the Mexican federal government, the cane industry represents around 11.6 percent of agricultural GDP, 2.5 percent of manufacturing GDP and 0.35 percent of total GDP. In addition, it generates 930,000 direct jobs and 2.2 million indirect jobs. Because all of this employment is created in rural areas around sugar mills,

it is estimated that as many as 12 million people are in some way linked to the cane industry in Mexico.

Support for the cane industry is principally provided through the maintenance of high domestic sugar prices plus a cane pricing mechanism that ensures that high sugar prices result in high cane prices for growers. In addition, owing to NAFTA, most of Mexico's excess domestic sugar production can be exported to the US market—also a protected, high-priced market—free of any duties or volume restrictions. The exportable surplus of Mexican sugar has grown in recent years because, under NAFTA, Mexican food and beverage producers have unlimited duty-free access to US high fructose corn syrup (HFCS) (see Figure MX.1).

Figure MX.1: Mexico—Sugar production and exports, 2000/01–2011/12



Source: F.O. Licht, USDA, 2012

Sugar is currently produced in a total of 54 sugar mills spread throughout 15 of the country's 31 states and the Federal District. Of the total mills, 41 are owned by 15 private business groups, which operate two or more mills each. In addition, there are four privately owned independent mills. Although there are currently nine state-owned mills, in July of 2012, the government announced its intention to sell these mills to private sector players.

Outlook for sugar production

Cane area

From 2002/03 to 2011/12, Mexico's planted area for cane grew at a modest annual rate of 1.1 percent. In 2011/12, it reached a historical high of 779,000 hectares versus 682,300 hectares in 2002/03. Of the 15 states that produce cane, Veracruz currently accounts for the largest share of planted area at 36 percent, followed by Jalisco with 9 percent.

Analysis by the Mexican government suggests that there is a total of 1.1 million hectares of land with high potential for growing cane in Mexico. However, even though total cane area has grown modestly over the last decade, it remains well below this level as some of the land evaluated as being highly suitable is a long distance from any of the 54 mills currently in operation. Under these circumstances, the current maximum area of land suitable for cane is estimated at 850,000 hectares.

Looking ahead, Mexico's cane area is expected to continue to grow modestly in the coming years, reaching close to 800,000 hectares by 2020/21. The key driver of this growth is likely to be the attractiveness of cane versus

alternative crops, due not only to relative prices and margins, but also to the fact that many of the mills have an increasing interest in collaborating with growers on technology advancements and finance options, and because of the ease of marketing (cane effectively requires no marketing) compared with other crops.

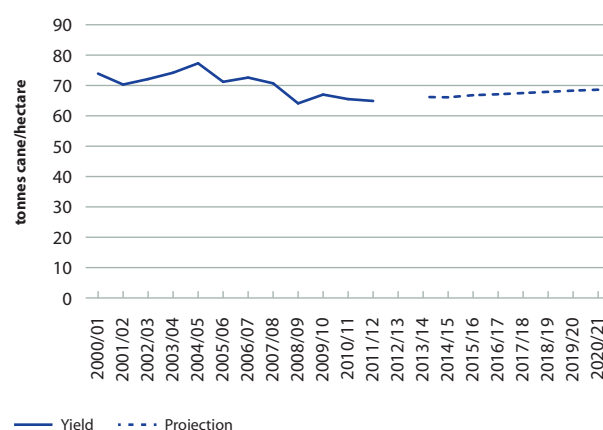
Cane yields

Mexico's cane yields vary significantly from region to region. While Veracruz, the leading cane producing state, registered an average of 67 tonnes/hectare in the last ten years, the states of Morelos and Puebla (located in Central Mexico) achieved the highest average yields, each exceeding 100 tonnes/hectare. Part of the difference is explained by differing levels of irrigation from state to state (e.g. 100 percent of the cane in Morelos is irrigated). In total, over 40 percent of Mexico's cane land is irrigated.

Over the last decade, average cane yields in Mexico have actually exhibited a modest downward trend of 0.8 percent per year (see Figure MX.2). The decline is attributed to a lack of investment in field technology associated with fragmented ownership of cane land.

However, one of the developments expected to change this situation over the coming ten years is greater collaboration and coordination between mills and their growers, including increased pre-harvest financing and the financing of improved irrigation infrastructure, such as the replacement of furrow irrigation systems with drip irrigation technology. This is conservatively expected, at the very least, to arrest the recent declining trend in national yields.

Figure MX.2: Mexico—Cane yields, 2000/01-2020/21



Source: Ministry of Agriculture, Rabobank, 2012

Cane quality and factory efficiency

Over the last decade, the sugar recovery rate from Mexico's cane mills averaged 11.3 percent, equivalent to a tonnes of cane per tonne of sugar (TCTS) ratio of 8.9. During this period, the minimum and maximum range was 10.8 percent (TCTS of 9.3) and 11.7 percent (TCTS of 8.6), respectively. This recovery rate reflects the combination of the quality of cane delivered to the mills and the ability of the mills to extract sugar from the cane delivered to them.

A modest improvement in the average industry TCTS is expected over the coming ten years (see Figure MX.3). In the field, it is expected that better collaboration and coordination between mills and their growers will have beneficial impacts on the quality of cane entering the mills. Meanwhile, with respect to cane processing, Mexican mills have recently gone through a period of economic stability and are well placed to make investments to improve technical efficiency.

As a result of these developments, it is projected that by 2020/21 the average industry recovery rate will reach 11.7 percent (TCTS of 8.6).

Sugar production

Over the last decade, Mexico's sugar production has varied from as low as 5 million tonnes raw value (2009/10) to as much as 6 million tonnes raw value (2004/05). The general trend in sugar production over this period has been slightly negative.

Combining the forecasts for cane area, cane yields and TCTS ratios points to a sugar production projection of 6.1 million tonnes raw value in 2020/21 (see Figure MX.4).

Outlook for sugar consumption

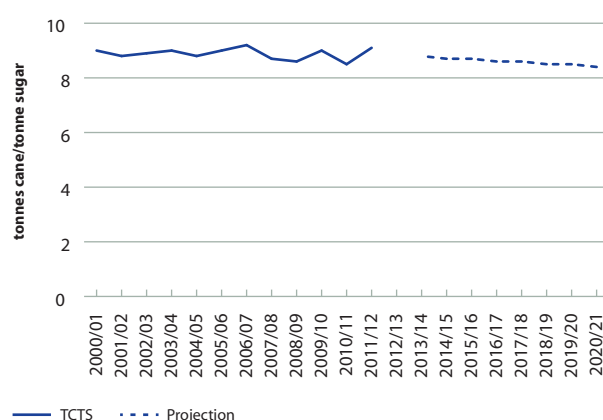
Mexico's sweetener market has been through a profound period of change in recent years. Many of the country's most important food and beverage processing sectors, such as carbonated soft drinks, bakery and dairy, have substituted a large share of their sugar purchases with purchases of HFCS, either locally produced or imported from the US.

To highlight the degree to which this substitution has taken place, in 2005, HFCS use was some 698,000 tonnes; by 2009 it had reached 1.4 million tonnes and by 2011 it was at an estimated 1.6 million tonnes.

However, looking ahead, we believe that growth in Mexico's HFCS consumption will ease for several reasons. First, the adoption of HFCS by major end users is now more or less complete. Second, consumers appear to prefer the taste of sugar to the taste of HFCS in some products. Third, given expectations for corn price levels and volatility in the future, the competitiveness of HFCS versus sugar is expected to be challenged from time to time.

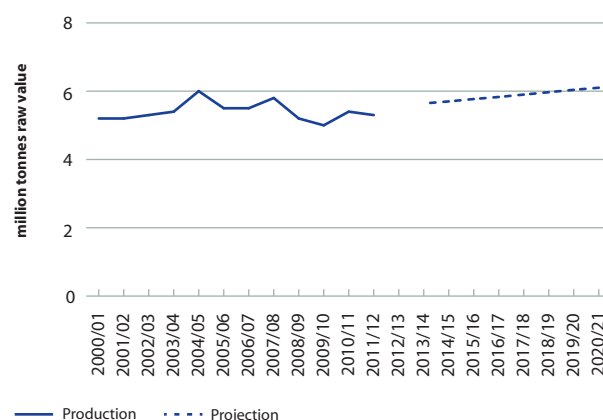
With the further substitution of sugar by HFCS expected to be limited, we expect the future growth of sugar and HFCS consumption to reflect the overall growth of the Mexican sweetener market. As a result, after declining to 34.7 kilogrammes white value per year in 2010/11, we project a gradual increase in per capita sugar consumption to 36.3 kilogrammes white value (38.6 kilogrammes raw value) per year by 2020/21, equivalent to total consumption of 5 million tonnes raw value (see Figure MX.5).

Figure MX.3: Mexico—TCTS ratio, 2000/01-2020/21



Source: Ministry of Agriculture, Rabobank, 2012

Figure MX.4: Mexico—Sugar production, 2000/01-2020/21



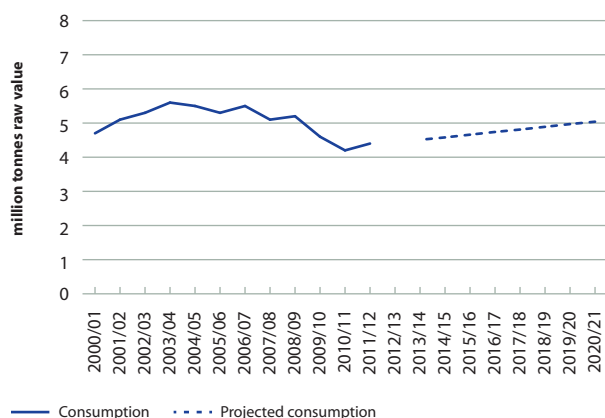
Source: Ministry of Agriculture, Rabobank, 2012

Outlook for sugar trade

The gap between Mexico's sugar production and domestic demand has widened considerably in recent years due to the growth in industrial use of HFCS. This development has had a profound impact on Mexico's trade in sugar and HFCS. Trade in sweeteners is principally with the US under NAFTA, since as of 1 January 2008, all duties and quotas were removed on trade of sugar and other sweeteners between Mexico and the US.

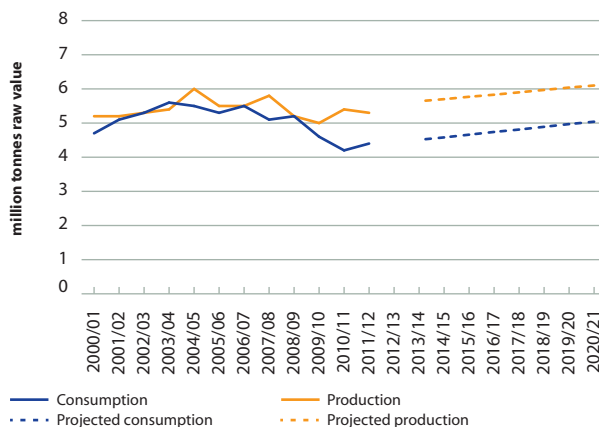
As a result, Mexican sugar exports to the US have increased enormously in recent years. From 2000 to 2007, exports to the US averaged around 250,000 tonnes. In 2008, exports increased sharply to 1.2 million tonnes. Our projections suggest that Mexico's sugar exports to the US will reach 1.5 million tonnes by 2020/21, while at the same time, Mexico's HFCS imports are projected to average 1.2 million tonnes (see Figure MX.6).

Figure MX.5: Mexico—Sugar consumption, 2000/01-2020/21

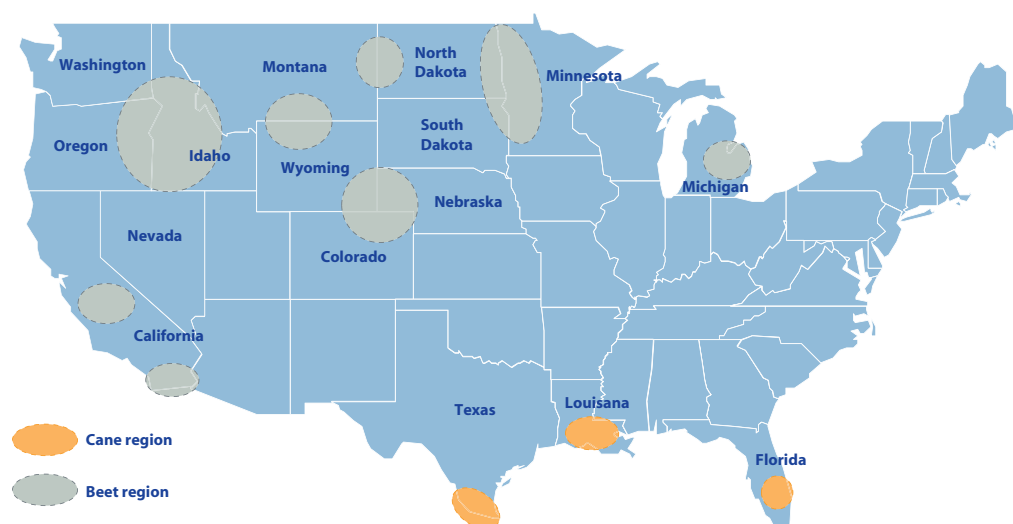


Source: Ministry of Agriculture, Rabobank, 2012

Figure MX.6: Mexico—Sugar production vs. sugar consumption, 2000/01-2020/21



Source: Ministry of Agriculture, Rabobank, 2012



10 NAFTA region—US

Recent trends and current situation

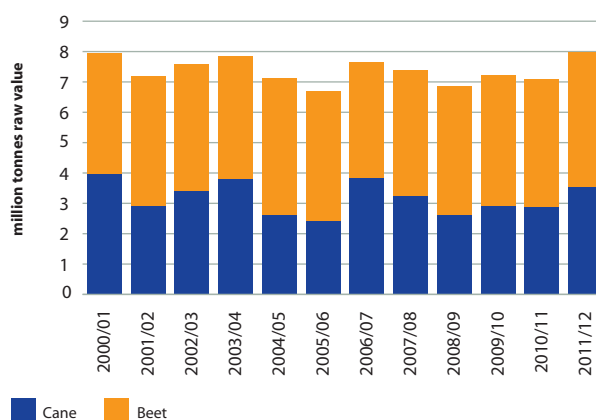
The US is the sixth largest sugar producer in the world, with an industry that produces both cane and beet sugar (see Figure US.1). However, sugar consumption is significantly higher than local sugar production, and the country is a significant net importer. Furthermore, although the US is technically the world's fifth largest consumer of sugar, if consumption of all sweeteners, most notably high fructose corn syrup (HFCS) is taken into account, it is the largest consumer in the world.

The US sweeteners market is influenced by a comprehensive set of policy measures. These include price support, domestic marketing allotments (i.e. domestic sales quotas for beet and cane sugar producers), plus a tariff rate quota for imports—other than sugar imports

from Mexico, which have unlimited duty-free access under NAFTA—that effectively regulates domestic sugar supply and is therefore a key influence on prices. As a result of policy intervention, US domestic sugar prices are higher than international prices.

A new US Farm Bill (a comprehensive package of agricultural policies, including sugar policy, generally reviewed every five years) was due to be passed in 2012, but lawmakers failed to reach an agreement after the November 2012 elections, and commodity programmes in the existing Farm Bill were extended until September 2013. Nevertheless, looking beyond this date, it seems very unlikely that the sugar programme will change. Currently, all proposed amendments have been rejected, although an amendment to

Figure US.1: US—Beet and cane sugar production, 2000/01–2011/12



Source: F.O. Licht, USDA, 2012

materially change the sugar programme was only narrowly defeated in the Senate, by 53 votes to 46, in June 2012. Assuming no change to the US sugar programme in the coming years, we would expect current US market conditions to continue, with sugar prices remaining above international prices.

With respect to the geography of sugar production, Louisiana and Florida account for over 90 percent of US cane area. In these states, much of the industry is integrated (i.e. the same business entity is responsible for both growing and processing cane). This means that the threat of lost area for cane due to alternative land uses is diminished in comparison with industries where growers and processors are separate entities. Similarly, the US beet sector is dominated by grower cooperatives that own processing facilities in the midwest and northwest of the country, providing a corresponding degree of security regarding raw material supply in the face of competition for area from alternative crops.

Outlook for production

Beet and cane area

In the past ten years, US cane and beet areas declined by an average annual rate of 1.6 percent and 1.5 percent, respectively. There are two main drivers of this trend. First, a decline in area is the logical consequence of a combination of steady gains in yields achieved by both the beet and cane sectors, with marketing allotments (i.e. sales quotas) imposed on beet and cane sugar producers by US sugar policy. As yields rise, less area is required to produce a given quantity of beet or cane. Second, in certain regions outside the strongholds of Louisiana and Florida (for cane) and the midwest and northwest (for beet), beet and cane have lost competitiveness, either temporarily or permanently, against alternative crops or alternative land uses. Regions that have experienced a permanent decline in output as a result of shifts in land use are Hawaii (cane) and California (beet).

As an annual crop, beet production is more susceptible to year-to-year fluctuations in area in response to changing relative prices for beet versus alternative crops such as grains.

Over the coming years, it seems likely that with no policy change on the horizon, the overall trend in US beet and cane area will continue to be modestly negative, with policy providing upper limits to production and sales in each region via marketing allotments, while at the same time, beet and cane

growers will continue to pursue yield increases that will help to boost their revenue per hectare. In addition, the erosion of beet and cane areas in regions where alternative land uses are particularly competitive is likely to continue.

Volatile prices for alternative crops, particularly grains, may create variations around this trend from one year to the next, but such developments are inherently unforeseeable.

Beet and cane yields

US beet yields have exhibited steady gains over the last ten years, and indeed over the last 30 years. In recent years, plant breeders have provided the sector with a regular stream of new varieties with enhanced potential, including genetically modified (GM) varieties.

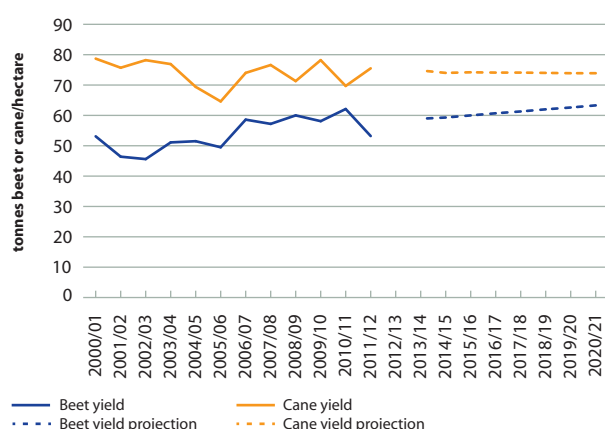
Over the long term, average US cane yields have been on a modest downtrend, but this is mainly a result of the redistribution of US cane production. It particularly reflects the diminishing contribution of Hawaii, where cane yields are extremely high. In Florida and Louisiana, the other major cane producing regions in the US, the long-term trend in cane yields has been modestly positive, with an average annual gain of around 0.5 percent per year since the early 1980s.

For both the US beet and cane sectors, it is assumed that yields in major growing regions will continue to make modest gains in the future as a result of both better varieties and improvements in field techniques and field technology (see Figure US.2).

Beet and cane quality and factory efficiency

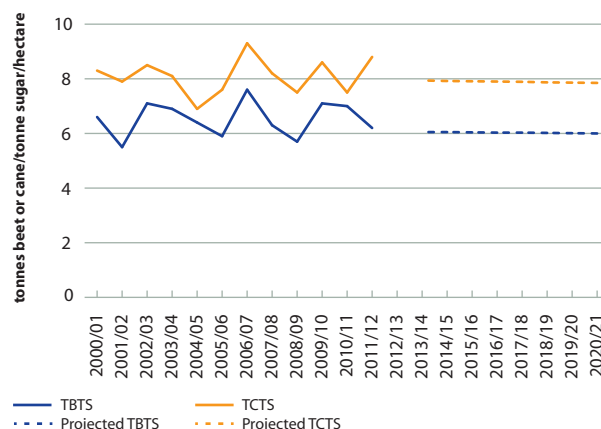
Deriving historical tonnes of beet per tonne of sugar (TBTS) and tonnes of cane per tonne of sugar (TCTS) ratios from USDA data indicates that both the US beet sector and the US cane sector have been successful in gradually diminishing the number of tonnes of raw material required to produce a tonne of sugar (see Figure US.3). Without separate data sets for raw material quality and for factory recovery rates, it is not possible to determine the separate contributions that improvements in raw material quality and factory industrial efficiency have provided in the achievement of declining TBTS and TCTS ratios in the US sugar industry. For the purposes of forecasting, it is assumed that both the beet and cane sectors will continue to achieve very gradual reductions in TBTS and TCTS ratios respectively, in line with historical trends.

Figure US.2: US—Beet and cane yields, 2000/01-2020/21



Source: Rabobank, USDA, 2012

Figure US.3: US—TBTS and TCTS ratios, 2000/01-2020/21



Source: Rabobank, USDA, 2012

Sugar production

Combining the projections made for area, yield and industrial efficiency generates a projection of US sugar production to 2020/21. As the basis of the forecast for US sugar production is a continuation of current US sugar policy, it is expected that production will remain steady over the coming years at close to the upper end of its range over the last decade, equivalent to between 7.8 million tonnes and 8 million tonnes raw value (see Figure US.4).

Outlook for sugar consumption

Total US per capita consumption of sweeteners, including sugar, is expected to decline over the coming ten years. However, HFCS should account for much of this decline owing to expectations of continuing erosion of regular (non-diet) soft drink sales.

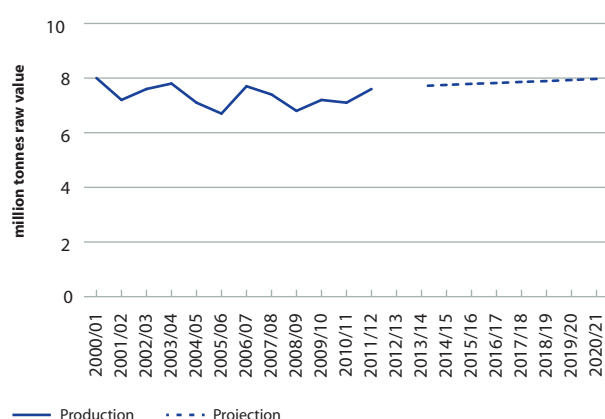
At the same time, the US population is projected to expand, and the net impact of these two projections is a projected increase

in total US sugar consumption, which is forecast to rise to 11.2 million tonnes raw value by 2020/21, some 8 percent above the 10.4 million tonnes raw value estimated to have been consumed in the US in 2011/12 (see Figure US.5).

Outlook for sugar trade

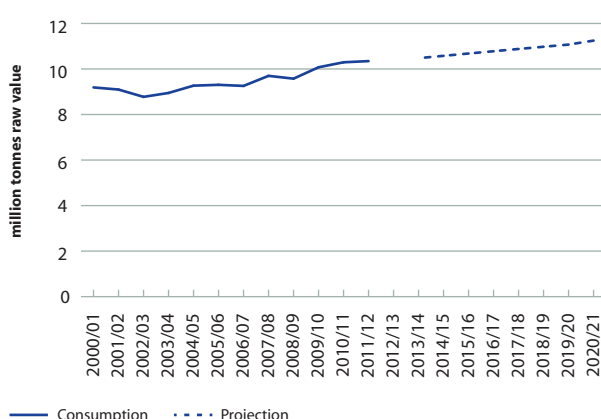
As a result of the forecast development of US sugar production and consumption, over the next ten years, the country's sugar deficit (consumption minus production) is expected to gradually increase, rising from an average of 2.8 million tonnes raw value over the five-year period between 2007/08 and 2011/12 to some 3.2 million tonnes raw value by 2020/21 (see Figure US.6). Mexico is expected to remain the main source of US imports, with further supplies coming from Central America and the Caribbean under the Central American Free Trade Agreement (CAFTA-DR) and from traditional suppliers of raw sugar to the US such as Brazil and the Philippines.

Figure US.4: US—Sugar production, 2000/01-2020/21



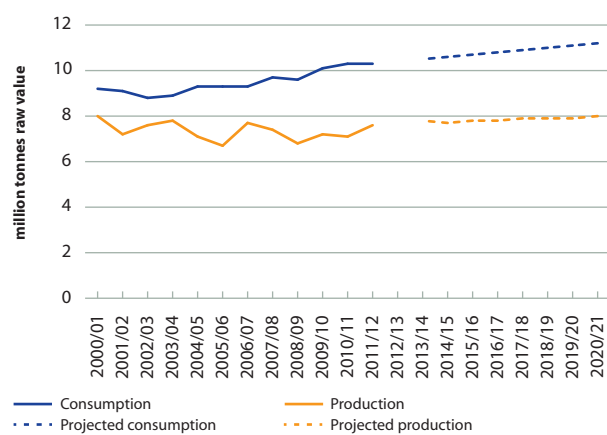
Source: Rabobank, USDA, 2012

Figure US.5: US—Sugar consumption, 2000/01-2020/21



Source: Rabobank, USDA, 2012

Figure US.6: US—Sugar production vs. sugar consumption, 2000/01-2020/21



Source: Rabobank, USDA, 2012



11 Brazil

Recent trends and current situation

Brazil's cane industry is the biggest in the world, and unlike any other, produces both sugar and ethanol directly from cane. The country has been the world's leading sugar producer and exporter since the mid-1990s, and also has a large and fast-growing domestic ethanol market, comprising a mandated blend of anhydrous ethanol in gasoline and hydrous ethanol, a substitute for gasoline in flex-fuel cars.

Cane is produced in two very distinct regions: the Centre/South, which accounts for around 90 percent of current output and practically all of the sector's recent growth, and the North/Northeast. The sector comprises 430 mills owned by approximately 150 companies; many of the top 15 companies are either listed or owned by international players (traders or oil companies). Of the rest, the vast majority is largely family owned.

The industry in the Centre/South enjoys a number of advantages due to structural factors such as excellent agroclimatic conditions and large-scale integrated field and factory operations. Approximately 70 percent of the cane processed in Brazil is produced by the mills themselves on land they own or rent. The remaining 30 percent is produced by some 70,000 independent growers. The price of cane is established by an industry formula, which takes into account the sales prices of sugar and ethanol and the quality of cane delivered by individual growers.

Over the last decade, investment in new capacity in the industry has been considerable—115 new cane mills have been constructed in the last six years, raising cane milling capacity by some 60 percent. This growth was largely driven by an expansion in ethanol production, triggered by the opportunity created in the domestic market as a result of the development of flex-fuel cars, which first emerged in 2003. Between 2005/06 and 2010/11, ethanol production rose by 72 percent, while sugar production rose by 47 percent (*see Figure BR.1*). Nevertheless, during these years, Brazil averaged a 43 percent share of world market sugar exports.

The wave of investment in new capacity began in 2005 and reached its peak in 2008/09 (a season in which 30 new mills were commissioned), but it has since slowed, with only two new mills commissioned in 2012/13 (April/March). Despite the impressive increase in cane production since 2005, investment slowed due to a series of difficulties that the sector encountered in recent years, which have together generated increased uncertainty regarding future prospects. Among the most important of these difficulties are the following:

- The financial crisis in 2008 drastically reduced the availability of credit to the sector.
- A reduced rate of replanting of cane in response to tight financial conditions post-2008 negatively impacted the productive potential of cane in subsequent years.

- Abnormal climatic conditions in 2010 and 2011 impacted cane production and quality.
- Rising costs of production, associated with higher labour costs and adapting to increasing mechanisation of cane planting and harvesting.
- An effective ceiling on hydrous ethanol prices (alleviated at least temporarily by a modest increase in gasoline prices in January 2013), via the control of gasoline prices, prevented ethanol prices from accompanying rising production costs, and hence compressing margins for ethanol.
- An increase in government intervention in the local ethanol market.

Some of these challenges have been addressed by the sector in recent years (e.g. replanting rates have increased significantly), but other challenges remain. For example, even with the modest increase in gasoline prices that the government announced in January 2013, the long-term profitability of hydrous ethanol continues to be uncertain. A decline in the electricity prices on offer for long-term contracts in recent years has also impacted the profitability of cogeneration projects (i.e. the generation of surplus electricity from bagasse for sale to the grid), which was a key element of many of the projects launched between 2005 and 2008. As a result of the uncertainties in the ethanol and electricity markets, the outlook for cane industry expansion continues to be, as of early 2013, very uncertain. This is not only of concern in Brazil—as the world's largest exporter of sugar, heightened uncertainty about long-term developments in Brazil translates

directly into heightened uncertainty regarding the long-term supply of sugar to the world market.

Outlook for sugar production

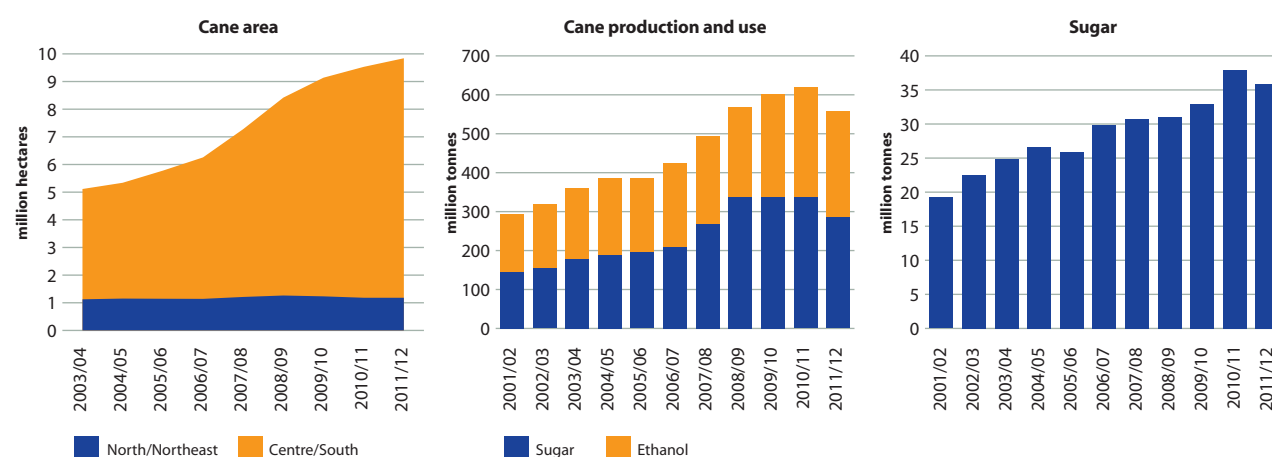
Cane area

Brazil is one of the few countries in the world with an abundance of untapped agricultural land resources. Currently, Brazil's total land area used for agriculture is around 70 million hectares, and it is estimated that as much as another 100 million hectares (mostly natural savannah or pasture) could ultimately be brought into agricultural use over the long term.

It is estimated that in 2011/12 there were some 9.8 million hectares of land under cane in Brazil. The Brazilian government carried out a country-wide agro-ecological zoning exercise for cane production in 2009, prohibiting the expansion of cane production in ecologically sensitive regions such as the Amazon, the Pantanal and the basin of the Alto Paraguai River. The zoning exercise identified 34 million hectares of land currently used as some form of pasture that could be converted to cane land in the future.

As a result, availability of land for expansion of cane production in Brazil is unlikely to be an obstacle to industry growth over the coming ten years. Much of future growth in cane area is likely to take place in the so-called frontier states of Goiás, Mato Grosso do Sul and parts of Minas Gerais, which have been the focal points of the recent wave of industry expansion. However, cane production is also expected to continue to grow in the traditional heartland of Brazil's cane production: the state of São Paulo.

Figure BR.1: Brazil—Cane area, cane production and sugar production, 2001/02–2011/12



Source: Canasat; UNICA; Ministry of Agriculture, Anuário Estatístico da Agroenergia, 2012

Cane yields

Average cane yields in Centre/South Brazil are high by global standards, at around 84 tonnes/hectare (achieved with no irrigation). In recent seasons, the sector has struggled to maintain this historical standard (see Figure BR.2). Besides the impact of several years of reduced replanting coupled with unfavourable weather conditions, the sector has experienced structural changes that have had an important impact on productivity.

Much of the recent increase in planted area took place in the frontier states, where agroclimatic conditions are different from the traditional cane lands of São Paulo state. In many cases, the cane varieties that were planted in the frontier states were varieties that had a history of good performance in the traditional cane regions, but failed to achieve similar yields in the frontier regions, owing to the difference in agroclimatic conditions. Efforts are being made to develop and introduce varieties specifically suited to the frontier regions, but the entry of such varieties into commercial use will be gradual, owing to the time required for new variety development and the fact that replanting generally only takes place once every six years.

The widespread shift to mechanised harvesting in the Centre/South over the past ten years has also had an impact on cane productivity. In 2001, some 30 percent of cane in the Centre/South was harvested mechanically. By 2011, this figure was close to 80 percent. This transition has brought with it a series of operational challenges (e.g. finding or developing sufficient skilled labour to operate harvesters without undue damage to cane, and modifying cane planting patterns to better accommodate mechanised

harvesting). In addition, some traditional varieties have proven to be less suited to mechanised harvesting than manual harvesting, and their productivity has suffered as a result. For all these reasons, the swift advent of mechanised harvesting has an impact on field productivity that will only be gradually remedied as the industry passes through a learning curve regarding field technology and varieties.

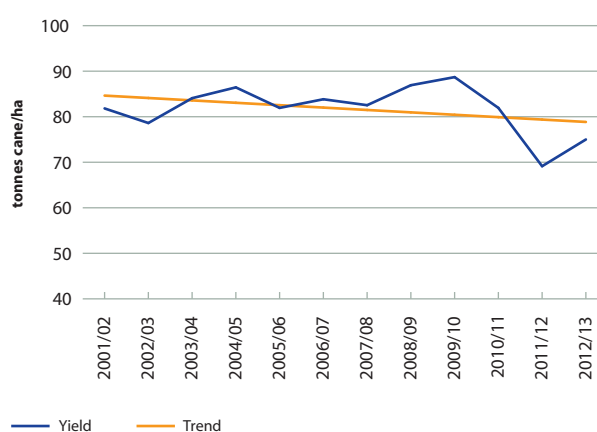
Nevertheless, for 2013 and beyond, the industry is expected to recover from the sharp decline in field performance in 2011 and 2012. In the last couple of years, the rate of replanting cane has returned to normal levels, and the unfavourable weather conditions of 2011 and 2012 are unlikely to be repeated year after year. Furthermore, the industry will continue to advance along the learning curve with respect to optimising performance in the frontier regions and adjusting to mechanical harvesting.

As a result of these developments, cane productivity is expected to return to the historical average of 84 tonnes/hectare in the near future. After that, a small and gradual increase should be achievable year on year, reversing the recent negative trend as genetic improvement of cane progresses and new cane varieties are developed. In addition, considerable research is now being dedicated to investigating improved systems of cane planting. In general, it is expected that the level of investment in R&D directed towards the sector will increase, via the industry-owned Centro de Tecnologia Canavieira (CTC) and players such as Syngenta.

Cane quality and factory efficiency

The volume of tonnes of cane needed to produce 1 tonne of sugar is an important technical indicator for any cane sugar

Figure BR.2: Centre/South Brazil—Cane yields, 2001/02-2012/13



Source: UNICA, 2012

industry and is dependent on two factors, the sucrose content of the cane, and the mills' efficiency in extracting the sucrose from the cane.

In the Centre/South, the tonnes of cane per tonne of sugar (TCTS) ratio has actually been trending upwards in recent years (see Figure BR.3). This trend is predominantly a result of field operations rather than milling operations, which are generally efficient by global standards. The rising TCTS ratio has been driven by cane quality issues resulting from the shift from manual to mechanised cane harvesting (and thus the milling of more green cane and less burnt cane) and the increase in the duration of the harvest, which is associated with a decline in the seasonal average sucrose content. The declining technical performance of field operations has significant implications for the sector's cost structure, and addressing this trend will be a focus of industry effort in the coming years.

Regarding the outlook for cane quality and factory efficiency in the future, industry sources suggest that it may be a challenge to materially improve average cane quality, given that it is already relatively high. Meanwhile, factory performance is already good, but some modest gains may be expected given that further expansion of the industry will boost the number of new mills as a share of total mills operating in the industry. On the other hand, if in the future there were to be sufficient incentives to increase electricity production from bagasse, this could actually encourage interest in marginally raising the fibre content of cane, which in turn could potentially limit the scope for boosting sucrose extraction rates.

Sugar production

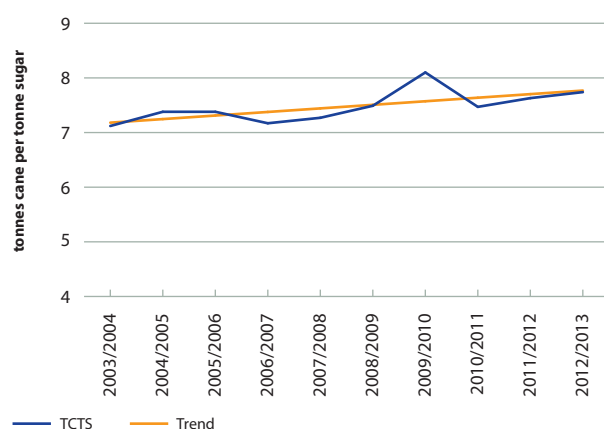
It is clear that Brazil has considerable potential to substantially increase sugar production by 2021. Given the abundance of suitable land resources, there is no shortage of space for the industry to grow. It is also clear that after the difficult period the industry endured in recent years, there will be a renewed focus on increasing productivity, which could generate steady gains in output in the coming years.

Indeed, as long as the current uncertainty regarding the profitability of investments in new mills continues, it is likely that in the short to medium term the industry will focus much more on raising output by boosting productivity (and hence reducing unit costs) rather than on initiating a new wave of greenfield mill projects.

Ultimately, the attractiveness of increasing sugar production in Brazil will largely depend on the development of the domestic and export markets for ethanol and on the development of world market sugar prices.

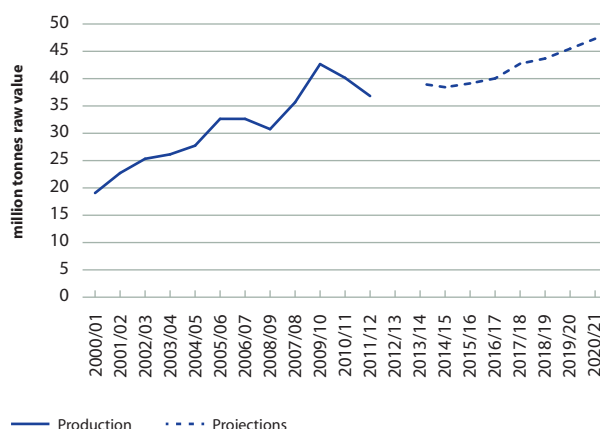
There is tremendous scope for domestic ethanol sales to grow in the coming years. To date, much of the potential growth in ethanol demand has been unrealised, at least in part because the government has kept a lid on domestic gasoline prices (which in turn provide a ceiling for the hydrous ethanol that is a substitute for gasoline in flex-fuel cars). However, the domestic fuel system is now under considerable stress—the fuel market has been growing rapidly and refining capacity is stretched to the limit, prompting increasing gasoline imports, which have generated losses totalling billions of dollars owing to the gap between world market

Figure BR.3: Centre/South Brazil—TCTS ratio, 2003/2004-2012/2013



Source: Ministry of Agriculture, 2012

Figure BR.4: Brazil—Sugar production, 2000/01-2020/21



Source: Rabobank, 2013

prices and government-determined local market prices. Looking ahead, there appears to be no respite in sight—new refineries planned to come on stream in the coming years will have little or no gasoline capacity. Thus, with flex-fuel vehicles now accounting for over 50 percent of the light vehicle fleet, stimulating increased ethanol use would seem to be the government's best way out of this conundrum.

World market sugar prices will be influenced by global production and consumption and the volume of exportable sugar that the market will require from Brazil, given that it is likely that Brazil will remain the supplier of the marginal tonne of sugar to the world market over the long term. Applying this logic, our projections of world supply and demand suggest that by 2020/21, the world's increasing import demand (plus rising local demand) will require Brazil's sugar production to reach close to 50 million tonnes raw value. Thus, in the next ten years, the growth rate of Brazilian sugar production is expected to be lower than growth in the 'boom years' of the previous decade; expansion of production is likely to be more balanced and more in line with the gradually increasing requirements of the world market (see Figure BR.4).

However, there is more than one way for Brazil to increase this sugar production. Under circumstances that are highly favourable to new investment in both ethanol and sugar, there is clearly scope for growth via the expansion of area under cane, the expansion of existing mills and the construction of new mills. The renewed focus on productivity, which is expected to be a key focus for the industry in the next ten years, should help to control costs and support margins, which

would further encourage the expansion of area and milling capacity under these circumstances. In contrast, under less favourable circumstances, where a high degree of uncertainty regarding the future of ethanol in particular continues to exist, it is still possible that significant increases in sugar production could be achieved, by simply substituting ethanol production with sugar production (via the addition of increased crystallisation capacity in existing mills).

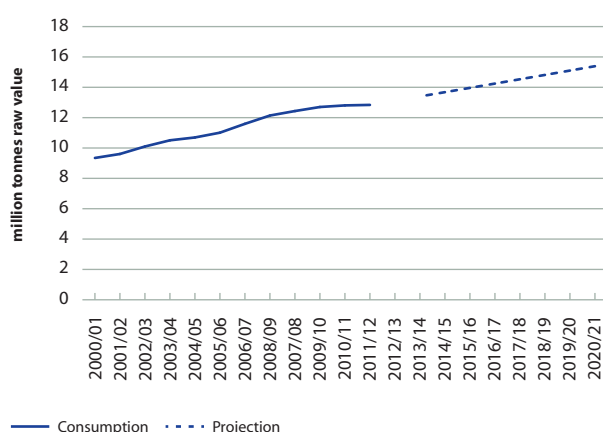
Outlook for sugar consumption

Our model for sugar consumption in Brazil is based on per capita consumption. Given that Brazil's per capita sugar consumption is already very high by global standards, we expect the future rate of growth to be relatively modest. Accounting for projected population growth, we arrive at a projected annual rate of 2 percent growth between 2012 and 2021, implying sugar consumption of 15.4 million tonnes raw value by 2020/21 (see Figure BR.5).

Outlook for sugar trade

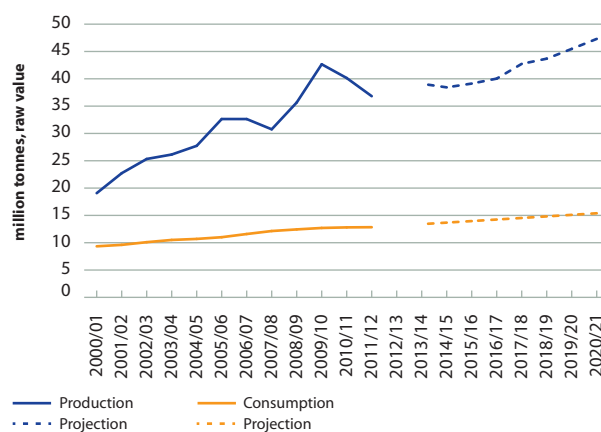
As a result of the projections for Brazil's sugar production and consumption, Brazil's exportable surplus of sugar is expected to grow from an estimated 22.3 million tonnes in 2011/12 to over 30 million tonnes by 2020/21 (see Figure BR.6). This will be sufficient to maintain the country's status as the world's leading exporter by far. However, unlike the last decade, when Brazil's share of world sugar exports grew from 25 percent to 45 percent, our projection suggests that in the next ten years Brazilian sugar exports will grow at a rate sufficient to raise Brazil's market share to 50 percent by 2020/21.

Figure BR.5: Brazil—Sugar consumption, 2000/01–2020/21



Source: Rabobank, 2013

Figure BR.6: Brazil—Sugar production vs. consumption, 2000/01–2020/21



Source: Rabobank, 2013

As this projection of Brazilian exports is linked to projected developments in production in many other countries around the world, if a number of these countries were to produce significantly less sugar over the coming ten years, then the market share of Brazil could rise correspondingly.

12 Conclusions

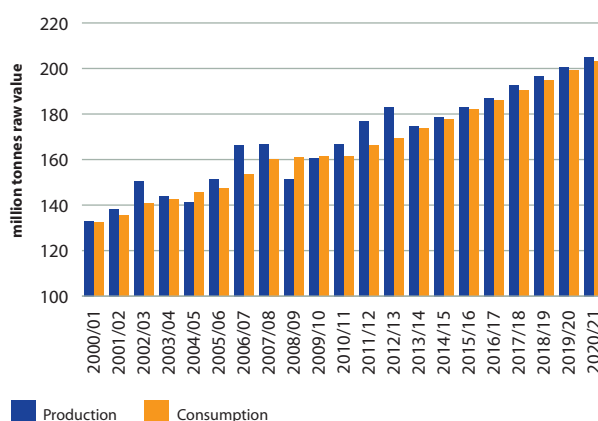
The preceding 11 chapters of this report provide detailed discussion of the outlook for countries or regions that we consider to be major players in the world of sugar—China, India, Indonesia, Thailand, Australia, Africa, the EU, Russia, NAFTA (i.e. the US and Mexico) and Brazil. In order to generate an overview of projected global trends, the results of the individual market analyses have been pooled together with projections for the rest of the world.

Global sugar production is projected to reach 204 million tonnes raw value by 2020/21 (see Figure CON.1). This is marginally above the projection for global sugar consumption for the same year (203 million tonnes raw value), simply because a condition of our model is that the global stocks/consumption ratio will

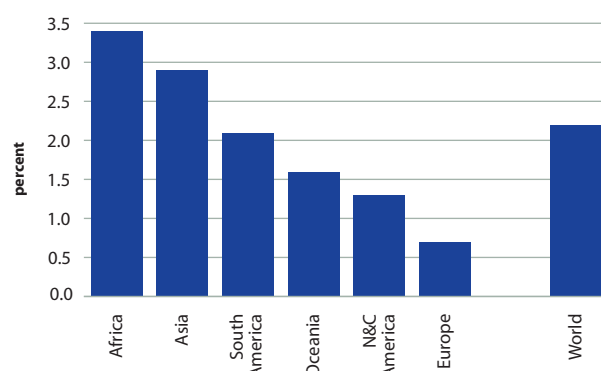
evolve to reflect the long-term average historical stocks/consumption ratio. For this reason, the model requires stocks to rise each year in parallel with rising global consumption.

The goal of this study is to identify trends in production, consumption, export availability and import demand, and not to try and predict the evolution of the global sugar cycle. As a result, the cyclical variation of sugar production that is amply evident in the historical data in Figure CON.1 is notably absent from the projections, because the projections are trend-based. The global sugar cycle will continue in the future. However, over the forecast period, we are most unlikely to be able to predict the cycle. Indeed, all the projections in this study should be viewed in this light—as an attempt to understand the

Figure CON.1: Global sugar production and consumption, 2000/01-2020/21



Source: F.O. Licht, Rabobank, 2013

Figure CON.2: Projected regional average annual growth rates of sugar consumption to 2020/21

Source: Rabobank, 2013

direction of change over the next ten years rather than any attempt at making specific year-by-year forecasts.

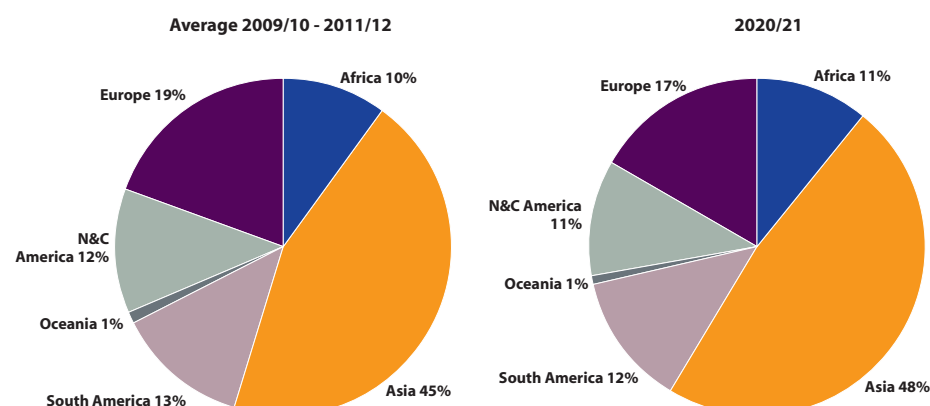
Projected growth in global sugar consumption is driven by varying degrees of growth in different regions (*see Figure CON.2*). Africa is projected to lead the world's regions in terms of average growth rate, but the real driver of global consumption is Asia, owing to its far greater share of total global sugar consumption (*see Figure CON.3*). Our projections suggest that sugar consumption in Asia will grow from a 45 percent share of global consumption over the 2009/10 to 2011/12 period to a 48 percent share by 2020/21.

Global sugar trade is expected to reach 64 million tonnes raw value by 2020/21, an increase of some 22 percent over estimated trade in the period 2009/10 to 2011/12 (*see Figure CON.4*). This growth is somewhat less than the projected growth of consumption over the same period

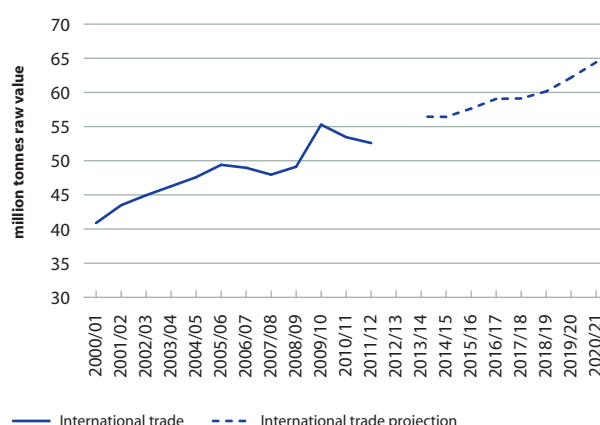
(25 percent), reflecting the general expectation that there should be significant growth of production in some parts of the world that have historically been substantial importers (e.g. Russia).

There are significant regional changes in the projected evolution of global sugar imports over the forecast period (*see Figure CON.5*). Asia is projected to maintain its dominant share of global imports, while South America's share of global imports is also expected to rise, driven by continued consumption growth in key countries where local production growth is not expected to be as robust (e.g. Chile and Venezuela).

Europe's share of imports is expected to decline very slightly, largely as a result of increasing production in Russia and the Ukraine—it is possible that this decline could be greater if EU sugar quotas were to be abolished at some point during the forecast period.

Figure CON.3: Regional distribution of global sugar consumption, 2009/10-2011/12 vs. 2020/21

Source: F.O. Licht, Rabobank, 2013

Figure CON.4: Global sugar trade, 2000/01-2020/21

Source: F.O. Licht, Rabobank, 2013

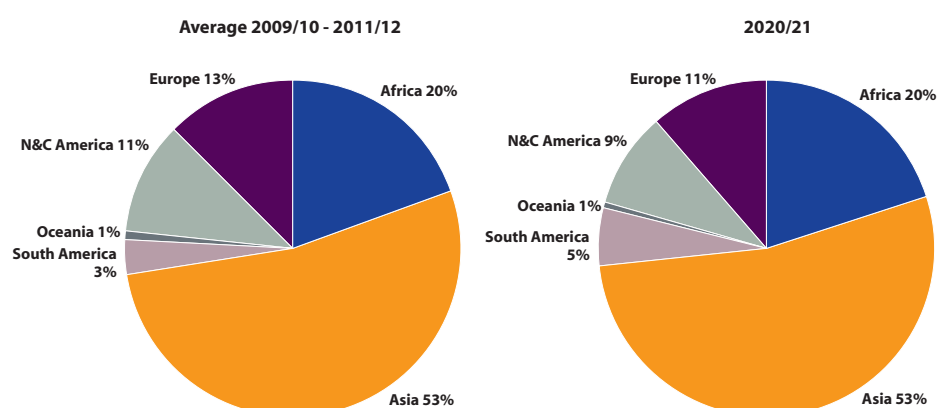
Our export projections suggest that Brazil will remain the world's most important exporter of sugar, achieving a modest increase in market share (from 46 percent to 50 percent) over the forecast period (*see Figure CON.6*). Thailand is also projected to increase its market share, from 11 percent to 14 percent, and Australia is expected to make modest gains. With the combined market share for the rest of the world's exporters projected to decline from 37 percent to 30 percent, our forecasts effectively point to a continuing concentration of global sugar exports over the next ten years.

While it is difficult to forecast the development of future global trade flows, our projections enable us to project the distribution of surpluses and deficits (i.e. sugar production minus sugar consumption) on a regional or country basis, which provides some insight into projected changes in the magnitude of

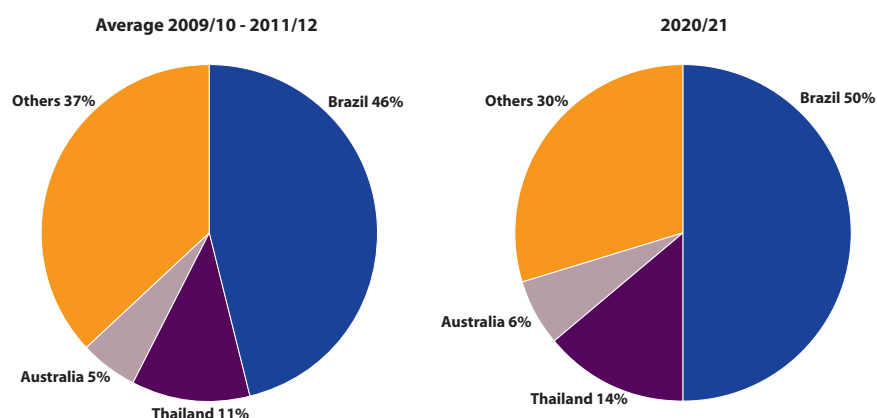
export availability and import demand between 2011/12 and 2020/21.

Looking at projections on a regional basis shows that the Asian region's net deficit is projected to expand by some 5 million tonnes compared to the region's average deficit in the years 2009/10 to 2011/12. Africa's regional deficit is also projected to deepen by close to 2.5 million tonnes raw value. Europe's deficit is expected to remain more or less constant— Influenced by opposing trends in the EU and Russia—while North America is expected to move from a neutral trade status in the period 2009/10 to 2011/12 to a modest deficit by 2020/21.

The total deficit in these regions is currently balanced by surplus in South America (largely Brazil) and in Oceania (Australia), with Oceania expected to achieve a slightly greater increase in surplus than South America over the coming years (*see Figure CON.7*). This reflects the robust projected growth of sugar

Figure CON.5: Regional distribution of global sugar imports, 2009/10-2011/12 vs. 2020/21

Source: F.O. Licht, Rabobank, 2013

Figure CON.6: Regional distribution of global sugar exports, 2009/10-2011/12 vs. 2020/21

Source: F.O. Licht, Rabobank, 2013

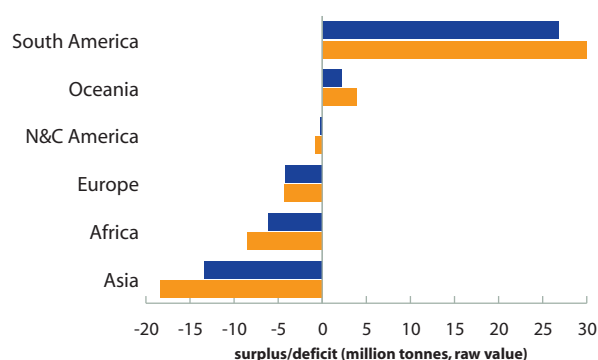
consumption in South America, which offsets much of the continent's projected increase in output; by contrast, only very modest growth in sugar consumption is expected in Oceania in the coming years.

The projected surpluses and deficits vary considerably between the countries and regions covered in this study (see Figure CON.8). Brazil, Thailand and Australia are expected to increase their contributions to global sugar export availability in 2020/21 by 5.4 million tonnes raw value, 2.5 million tonnes raw value and 1.6 million tonnes raw value, respectively. India, which was a net exporter on average during the period 2009/10 to 2011/12, is expected to be a balanced market by 2020/21, as is Russia.

Meanwhile, the trend import requirements of the US, Indonesia, the EU, China and Africa are all expected to be larger in 2020/21 than in the period 2009/10 to 2011/12, though for

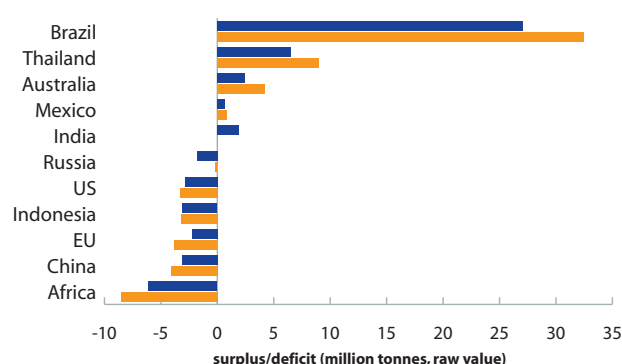
varying reasons. In the cases of Indonesia, China and Africa, although production is projected to grow significantly in the coming ten years, robust growth in consumption is expected to more than offset rising output. Meanwhile, the apparent increased import demand of the EU in 2020/21 is more due to the spectacular output achieved during the 2009/10 to 2011/12 period, which diminished the gap between local production and consumption, than any robust growth in consumption.

To round up this analysis, we include an analysis of projected average annual growth in production, consumption and trade (see Figure CON.9). Figure CON.9 illustrates the projected additional contribution of countries to global export availability or import demand to 2021, while at the same time highlighting the projected rates of growth in domestic production and consumption that these countries are expected to achieve over the same period. It highlights the dynamism of

Figure CON.7: Regional sugar surpluses and deficits, 2009/10-2011/12 vs. 2020/21

■ Average 2009/10 - 2011/12 ■ 2020/21

Source: F.O. Licht, Rabobank, 2013

Figure CON.8: Sugar surpluses and deficits for countries featured in this study, 2009/10-2011/12 vs. 2020/21

■ Average 2009/10-2011/12 ■ 2020/21

Source: F.O. Licht, Rabobank, 2013

Asian production and consumption—China, Thailand and Indonesia are all expected to see production and consumption grow at annual rates of between 3 percent and 6 percent. However, China's contribution to global import demand is expected to be much greater than Indonesia's, as displayed by the relative sizes of the bubbles for the two countries.

Meanwhile, Brazil's projected growth in sugar production and consumption is very much in the middle of the pack, given that we forecast a more modest rate of growth in sugar production in the coming ten years than in the previous decade. Nevertheless, as Figure CON.9 highlights, Brazil is expected to make the single biggest contribution to increased global export availability over the forecast period. India and Russia are not included in the projection as their trade growth is expected to be negative over the next ten years, with both countries projected to move towards a balance between local supply and consumption over the forecast period.

There are several compelling messages for global sugar production and trade that have emerged from this study.

Brazil

Brazil is projected to remain the world's most important exporter of sugar over the forecast period. However, unlike the last ten years, when Brazil's share of world sugar exports grew from 25 percent to 45 percent, our projection suggests that in the coming ten years Brazilian sugar production and export growth will be much more measured, raising Brazil's export market share to 50 percent by 2020/21. The Brazilian industry's technical performance is already very high by world

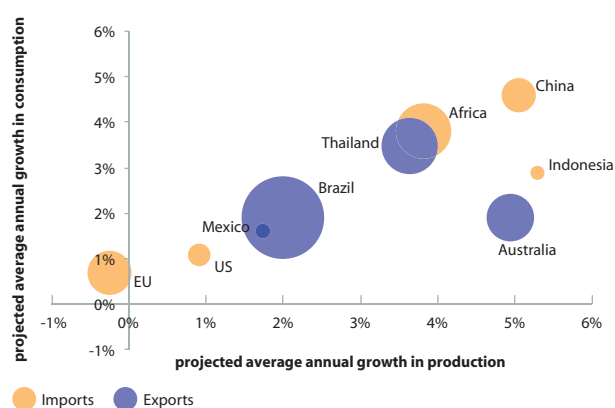
standards. However, the enormous expansion of output in regions with no history of cane production and the widespread switch to more mechanised field operations over the last ten years have brought the industry significant challenges. Indeed, looking at recent data, the industry in the Centre/South is currently challenged by a declining trend in cane yields and a rising trend in the TCTS ratio. Reversing these trends will be a priority for the industry in the coming years in order to help maintain and improve its cost structure and margins. However, given the region's long history of high cane yield and high cane quality by world standards, expressive growth in efficiency much beyond historical averages is unlikely to be achieved in the coming ten years without some sort of substantial new technological breakthrough. For this reason, the industry's investments in R&D are expected to increase significantly over the next ten years.

Asia

The Asian region is expected to remain the powerhouse of global consumption and imports, but local production in all key countries (China, Indonesia, Thailand and India) is projected to rise strongly. Given that the technical performance of all these industries (in terms of cane yields and TCTS) is relatively low, there appears to be plenty of scope to achieve gains, assuming a positive outlook for margins and for investment in technology, R&D, and extension services for farmers.

In the case of India, the net result of projections for production and consumption is a gradual decline in the modest exportable surplus that the country achieved over the

Figure CON.9: Projected average annual rates of growth of sugar production, consumption and trade to 2020/21*



Source: Rabobank, 2013

period 2009/10 to 2011/12. In the case of Thailand, the country's exportable surplus, and its role as an exporter, is expected to grow. In the cases of China and Indonesia, even with robust growth assumptions for local production, imports are projected to grow, especially in the case of China.

Africa

There is no shortage of interest in new sugar production projects in Africa, where consumption growth is high and the cost of freight from the coast to inland locations means that local market prices can be well above world market prices. Even allowing for a proportion of announced projects to fall by the wayside before completion, it is expected that African sugar production will grow significantly over the forecast period. The continent already boasts a number of technically efficient and profitable sugar operations in countries as diverse as Zambia and Sudan, and substantial private sector resources are being deployed in new investments in countries such as Mozambique and Angola. Given the availability of suitable land and the potential profitability of new operations, the political environment at the regional, national or local level will be a major determinant of the eventual extent of new investment over the coming ten years.

