

Chapter 3. Cereals

This chapter describes the market situation and highlights the medium-term projections for world cereal markets for the period 2019-28. Price, production, consumption and trade developments for maize, rice, wheat and other coarse grains are discussed. The chapter concludes with a discussion of important risks and uncertainties affecting world cereal markets during the coming ten years.

3.1. Market situation

Global supplies of major cereals have exceeded total consumption in recent years, leading to a significant build-up of inventories and much lower prices in international markets as compared to the previous decade. However, world production of cereals is expected to decrease for the second consecutive year in the 2018 marketing year, due to smaller harvests of wheat and other coarse grains. Wheat and barley output decreased largely due to bad weather conditions in the European Union, the Russian Federation, and Australia. In contrast, the maize harvest is expected to be larger given the favourable growing conditions in Ukraine, Brazil, and Argentina. Rice output is also expected to be higher in 2018 owing to continued growth in Asia and a production recovery in the United States. Due to a decrease in the level of production and sustained growth in demand, short-term global cereal stocks are expected to fall for the first time in six years, resulting in modest gains in prices. Overall, trade in cereals is expected to increase as higher shipments of maize will likely offset lower shipments of wheat, rice and other coarse grains from some major exporting countries.

3.2. Projection highlights

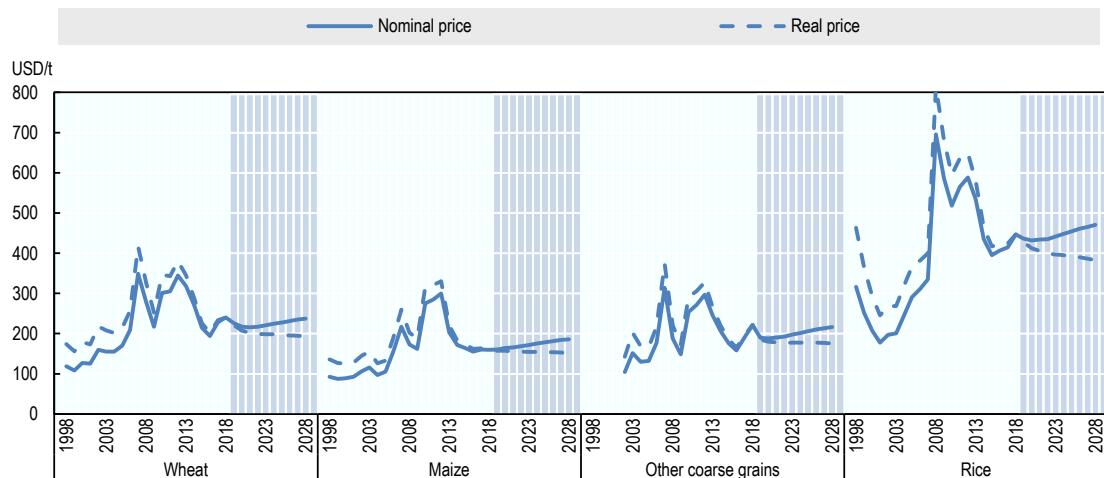
Following several years in which growth in production outpaced that of consumption, resulting in large stocks, international cereal prices in the near term are expected to remain low (Figure 3.1). Over the outlook period, prices are projected to fall in real terms (but increase nominally) as large stocks and slower growth in demand compared to the previous decade will continue to exert downward pressure on cereal markets. The anticipated lower prices may affect producer revenues, influencing planting decisions and supply responses.

Global cereal production is projected to increase by 367 Mt to reach 3 053 Mt in 2028, mainly due to gains in yields. Maize production is projected to increase the most (+181 Mt), followed by wheat (+86 Mt), rice (+66 Mt), and other coarse grains (+35 Mt). Improved seed varieties will continue to drive increases in yield and the increasing number of commercial farms, particularly in Africa and the Black Sea region, will facilitate access to new technologies, including machinery and extension services. Large farms could also improve productivity, particularly through more efficient use of inputs such as fertilisers and farm chemicals. Accordingly, the global average of cereal yields is projected to grow at 1.1% per year over the outlook period, below the 1.9% of the previous decade. A modest in the total area planted is projected, mostly due to new agricultural land (Africa, the Russian Federation, and Latin America), multi-cropping (Latin America), and conversion of pasture to cropland (India). These changes are partly the result of national food self-sufficiency policies.

Global cereal use is projected to grow by 382 Mt between the base period and 2028, reaching 3 036.0 Mt in 2028. Over the medium term, growth in overall cereal demand should be more subdued than the previous decade as feed demand within the People's Republic of China (hereafter "China") is expected to slow down. An increase in the industrial use of cereals, most notably that of starch and biofuels, is likely to be more modest. On the food side, per capita consumption of most cereals has reached saturation levels around the world; nevertheless, food demand is expected to be strong, driven by rapid population growth in Africa and Asia, where cereal staples remain the main diet components. Wheat consumption is projected to increase by 93 Mt compared to the base period, and will continue to be largely consumed by humans. The use of maize is projected to increase by 189 Mt, driven by an expanding livestock sector in China, the Americas, and

Southeast Asia. Maize for human consumption is projected to increase by 27 Mt, especially in Sub-Saharan Africa where white maize is an important food staple and the population is growing rapidly. The use of other coarse grains is projected to increase by 32 Mt, with higher food use expected in Africa. Global consumption of rice is projected to increase by 67 Mt by 2028, with Asia and Africa accounting for most of the projected increase, and direct human consumption remaining the main end-use of this commodity.

Figure 3.1. World cereal prices



Note: Wheat: US wheat, No.2 Hard Red Winter, fob Gulf; maize: US Maize, No.2 Yellow, fob Gulf, other coarse grains: France, feed barley, fob Rouen, rice: Thailand, 2nd grade milled 100%, fob Bangkok.

Source: OECD/FAO (2019), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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World trade in cereals is projected to increase by 76 Mt to reach 503 Mt by 2028. The Russian Federation has evolved as a major player in international wheat markets over the past few years, surpassing the European Union in 2016 to become the top exporter. It is expected to maintain this lead throughout the projection period, with 20.3% of global exports in 2028. For maize, the United States will remain the lead exporter; however, its market share will decrease as Brazil, Argentina, Ukraine, and the Russian Federation gain significance in the global maize markets. The European Union, Australia and the Americas are expected to continue to be the main exporters of other coarse grains (mainly barley and sorghum), although growth in these exports will be restrained by trade protection and increased competition from maize in feed markets. India, Thailand, Viet Nam, and Pakistan will continue as the top global suppliers of rice, with Cambodia and Myanmar playing a more important role.

Due to China's efforts in particular to reduce its stockpile of maize, world cereal inventories are projected to contract over the outlook period. This would result in world cereal stocks-to-use ratio shrinking from 33% in the base period to 27 % in 2028. While this decline may point to prospects for higher prices, global cereal stocks will generally still be high over the outlook horizon, even increasing for wheat and other coarse grains. China's demands for feed, as well as its overall level of domestic supplies and associated changes in stocks are among the main uncertainties during the projection period.

3.3. Prices

The world wheat price, as measured by the benchmark US wheat No. 2 Hard Red Winter fob Gulf, is expected to increase to USD 241/t in 2018, the second consecutive yearly increase following a downward trend that had begun in 2013. With assumed low (and flat) real oil prices, average harvest expectations, and moderate growth in exports, the world wheat price is projected to decline in real terms over the outlook period, but to slightly increase relative to the base period, reaching USD 238/t in 2028 (Figure 3.1).

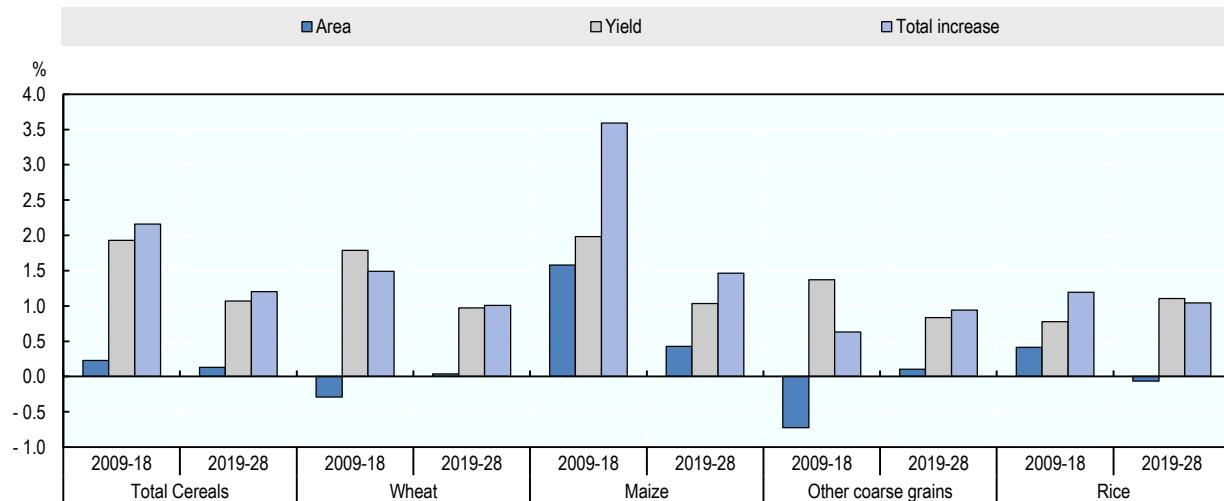
The world maize price, as measured by the benchmark US maize No. 2 Yellow fob Gulf, is projected to average USD 160/t in 2018, thus unchanged from 2017. Although global maize stocks are declining, de-stocking efforts in China, assumed lower energy and input prices, and projected slower growth in export demand compared to the previous decade will limit real gains in the international maize price. Accordingly, while the nominal price is projected to increase to USD 186/t by 2028, this growth will lag behind inflation and as a result the real price will fall.

The world market price for other coarse grains, as measured by the price for feed barley (France, fob Rouen), is projected to increase to USD 221/t in 2018, the second successive yearly increase following the downward trend that began in 2013. Over the medium term, the world market price for other coarse grains is projected to decrease in real terms, reaching USD 216/t in 2028, as trade protection measures and increased competition from maize impede import demand growth in China.

The world price for rice (Thailand grade B milled 100%, fob Bangkok) increased to USD 447/t in 2018, the highest level since 2014. Over the outlook period, rice import demand in Sub-Saharan Africa (where population is increasing rapidly) is expected to be strong; however, large policy-driven production gains in major importing countries in Asia are expected to limit global rice import growth to less than half the rate seen in the previous decade. Consequently, growth of the nominal price will lag behind inflation, reaching to USD 470/t by 2028.

3.4. Production

Global cereal production is projected to grow by 1.2% p.a. between the base period and 2028, reaching 3 053 Mt in 2028; with much of the growth due to gains in yields (Figure 3.2). Over the outlook period, the global average of cereal yields is projected to increase by 1.1% per year (slower than the 1.9% seen in the previous decade), driven by advances in biotechnology, structural changes towards larger farms, and improved cultivation practices. Total area is projected to increase only marginally, principally due to additional new agricultural land (Africa, Eastern Europe and Latin America), multi-cropping (Latin America), and conversion of pasture to cropland (India). In the developed world, growth in cereal area will be limited by constraints on converting forest or pasture into arable land, ongoing urbanisation, and low cereal prices relative to other crops. Most of the increase in global cereal production is projected to occur in Asia, Latin America, Africa and Eastern Europe (Figure 3.3), where national food self-sufficiency policies will drive not only area expansion but also research in seed varieties to increase yields at a faster rate. In the past, such policies – which also included input subsidies, support prices, direct payments, agricultural loans, insurance at preferential rates, access to improved seed varieties, and extension services – did have a certain impact in increasing production. However, their success were largely dependent on the timing and implementation of the policy itself.

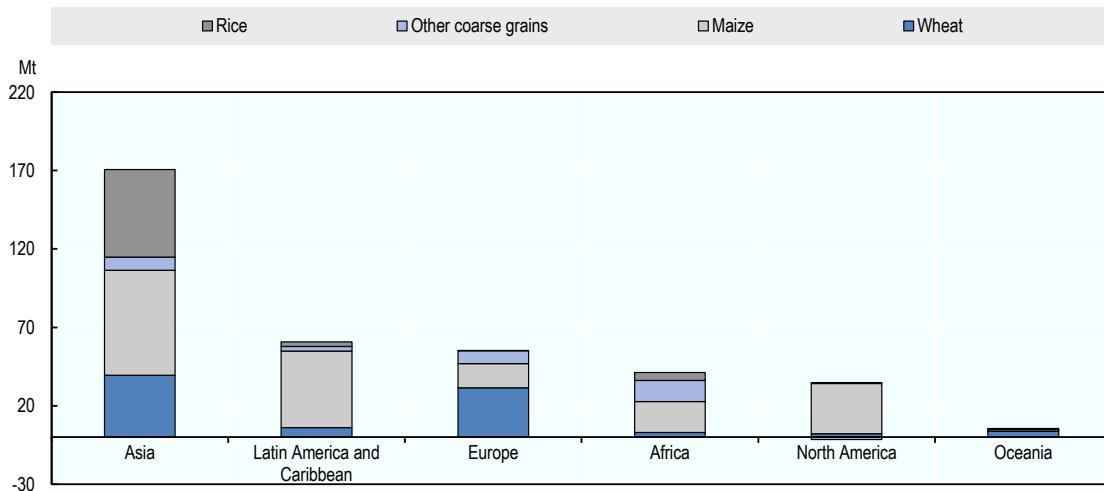
Figure 3.2. Global growth rates of harvested areas and yields for cereals

Source: OECD/FAO (2019), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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Global wheat production is projected to increase by 86 Mt to 838 Mt by 2028, a more moderate pace compared to the last decade. Among the developed countries, increases in wheat production is expected to be the highest in the European Union in view of its high yields, competitive prices, and grain quality. While developed countries are projected to increase production by 41 Mt by 2028, developing countries are projected to add 45 Mt to global output, a marginal increase of their share of global production. India, the world's third largest wheat producer, is projected to increase its wheat production by 15.5 Mt by 2028. This increase is largely sustained by its minimum support price policy that guarantees farmers a stable income through the country's public procurement programme. This *Outlook* assumes that irrigated land will continue to comprise more than 95% of the production area. In addition to India, other countries are also projected to have significant production increases: European Union (+13 Mt), the Russian Federation (+9 Mt), China (+8 Mt), and Ukraine (+6 Mt). Production increases in the Russian Federation and Ukraine are due to their domestically-produced hybrid seeds and fertilisers, low energy costs, and large commercial farms.

Global maize production is projected to grow by 183 Mt to 1311 Mt over the next decade, with the biggest increases in China (+47 Mt), the United States (+31 Mt), Brazil (+25 Mt), Argentina (+17 Mt), and Ukraine (+6 Mt). Maize production in China is projected to grow more slowly (2.1% p.a.) than over the previous decade (4.5% p.a.) as policy changes in 2016 eliminated maize price support and the concurrent stockpiling programme; these were replaced with direct farm subsidies and market-oriented purchasing. As a result, in the near term, area in China will shift away from maize to other commodities, such as soybeans and wheat, but may shift back into maize in few years as stocks decline to more sustainable levels. In the United States, maize planted area will remain stable and production increases due mainly to higher yields. Increased production in Brazil and Argentina will be sustained by both larger planted area (new agricultural land and multi-cropping) and productivity increases, motivated by favourable domestic policies (e.g. loans at preferential rates) and the depreciation of national currencies. Ukraine's production will be largely sustained by high yield domestic varieties grown in rain-fed systems.

Figure 3.3. Regional contribution of growth in cereals production, 2016-18 to 2028

Source: OECD/FAO (2019), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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Global production of other coarse grains, such as sorghum and barley, is projected to reach 325 Mt by 2028, up 34 Mt from the base period. Ethiopia is projected to account for 16% of the increase in global production; its other coarse grain production will increase by 5 Mt to reach 19 Mt by 2028, with teff and sorghum accounting for most of this increase. A similar increase is expected to occur in the European Union (+5 Mt), followed by India, Turkey, and China (+1.9 Mt each). Production of other coarse grains in the United States (particularly sorghum) will continue to decline over the outlook period, influenced by trade protection measures and the elimination of maize price supports in China, which decreased the price competitiveness of feed substitutes relative to maize. Overall, the contribution of the developed world to the global increase in production will be limited (+9 Mt), due in part to slower growth in feed demand and increased competition from maize in the feed markets. In contrast, production gains will be robust in developing countries (+25 Mt), especially in Africa where higher food demand due to its growing population and feed sector.

Global rice production is projected to grow by 65 Mt to reach 578 Mt in 2028. While production in developed countries is projected to increase marginally (+1 Mt), production in developing countries is projected to be relatively robust, increasing 64 Mt. Asia is projected to contribute the majority of the additional global production, accounting for 56 Mt of the increase during the outlook period. The highest growth is expected in the world’s second largest rice producer India (+21 Mt), followed by Least Developed Asian countries (+11 Mt), Indonesia (+7.6 Mt), China and Viet Nam (+4 Mt each), and Thailand (+3 Mt).

India’s rice production gains are expected to be sustained through yield improvements. The government actively promotes the implementation of new seed varieties and the expansion of irrigation facilities. This *Outlook* assumes this trend will continue, thus helping to reduce India’s yield gap relative to other major producers. The maintenance of the minimum support price over the outlook period should support planting. In China, the world’s top

producer of rice, production is projected to grow at a slower pace than the previous decade as area planted to rice is anticipated to decrease, in line with government efforts to address oversupply problems.

Production gains in Thailand and Viet Nam, two leading global suppliers of rice, will depend on yields improvements, assuming government efforts to promote a shift towards alternative crops are effective. Nonetheless, as with other rice producers, further to infrastructural and input-related aspects, much will depend on the varietal structure of plantings and the adoption of improved seed strains. Efforts to promote production of higher quality but lower yielding varieties could have implications on the future rate of productivity improvements in both countries.

In developed markets, production will stagnate or fall below the base period's level in Korea, Japan, and the European Union, but expand in the United States and Australia, although not exceed the 2010 peak for the United States nor the 2001 peak for Australia. Least Developed Asia – comprised of Myanmar, Cambodia, the Lao People's Democratic Republic, and Bangladesh – are expected to continue to increase their productivity levels as they adopt higher-yield varieties and implement better agricultural practices. While production is expected to increase in many African countries, its full potential will be restrained as the outlook assumes they will continue to rely on rain-fed systems, limited use of inputs, and inadequate farm infrastructure.

3.5. Consumption

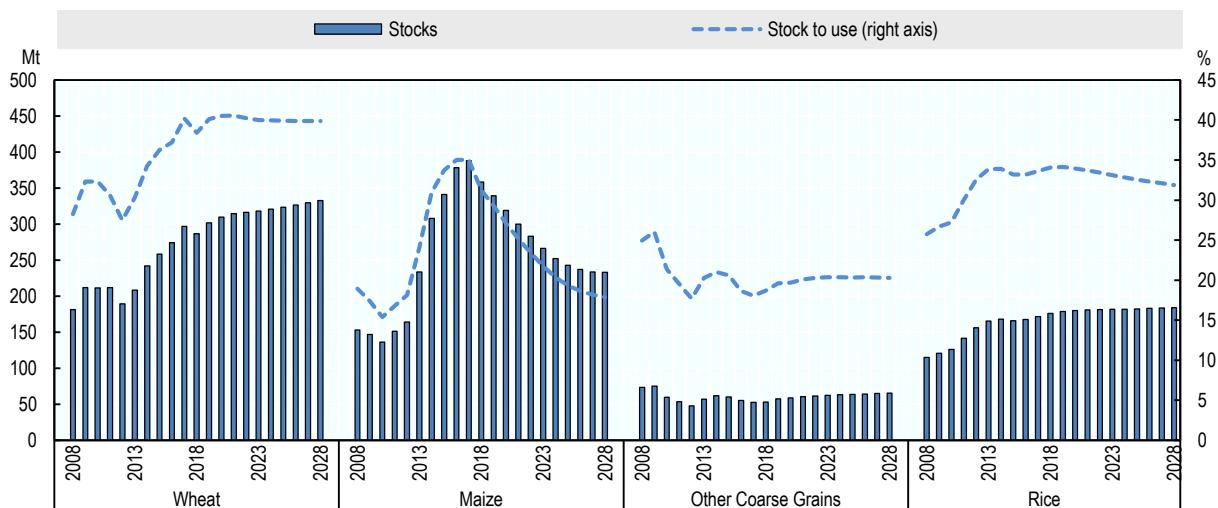
Global consumption of cereals is projected to grow at 1.2% p.a. over the outlook period. This growth is more less than the 2.1% p.a. seen in the previous decade as demand in China, which was responsible for 32% of the growth in the last decade, is expected to be slower and to account for only 22% of the projected increase. In the base period, food consumption accounts for the largest share of global cereals use (42%), followed by feed (37%) and industrial use (21%). Over the outlook period, absolute growth in cereal feed consumption (+156 Mt) is projected to exceed growth in food use (+147 Mt), increasing the share of feed in total consumption slightly by 2028. The bulk of additional food demand is expected to come from Africa and India, where cereal staples remain the main components of national diets and where populations are growing rapidly. In addition, while the average per capita consumption of cereals has reached a saturation level globally, it is increasing robustly in Africa, particularly in Ethiopia with per capita intake gains of about 20 kg per capita and LDC Sub-Saharan Africa with 10 kg per capita. Parts of Asia, particularly India and Indonesia, are projected to add more than 5 kg of cereals to per capita annual consumption by 2028. In Latin America, gains are projected to be more modest at about 6 kg over the projection period.

On the feed side, China is still expected to account for a considerable share (25%) of the additional demand; however, the Americas, a leading producer and exporter of meat, is expected to increase its feed uptake considerably and to contribute 17% of the additional demand. Southeast Asia, the Middle East, North Africa, and Eastern Europe will see higher feed consumption, driven by expanding livestock and dairy sectors. Finally, growth in the industrial use of cereals, notably in the production of starch and biofuels, will be modest as existing policies will not likely support further expansion.

Wheat consumption is projected to increase by 94 Mt compared to the base period, and to be largely used for human consumption. It is projected that China (+21 Mt), India (+12 Mt), continental Africa (+17 Mt) and the Middle East (+9 Mt), will account for over two-thirds

of the increase in total consumption, reflecting their wheat-based diets and growing population. Food use, which will remain stable at about two-thirds of total consumption, will represent 55% of the total demand increase, with the slower increase attributed to the slight decrease in global per capita consumption and moderate pace of population growth. Feed use is also projected to grow more slowly, increasing by 21 Mt compared to the base period as global livestock production slows and maize feed becomes more competitive. Global production of wheat-based ethanol is projected to increase by 3 Mt, supported by efforts in China to boost ethanol production. In the European Union (a major user of wheat in ethanol processing in the past decade), biofuel policies are assumed to no longer support further growth of first generation biofuels. With global wheat production consistently higher than consumption throughout the projection period, the global stocks-to-use ratio is expected to reach 40% in 2028, up 1 percentage point from the base period.

Figure 3.4. World cereal stocks and stocks-to-use ratios



Source: OECD/FAO (2019), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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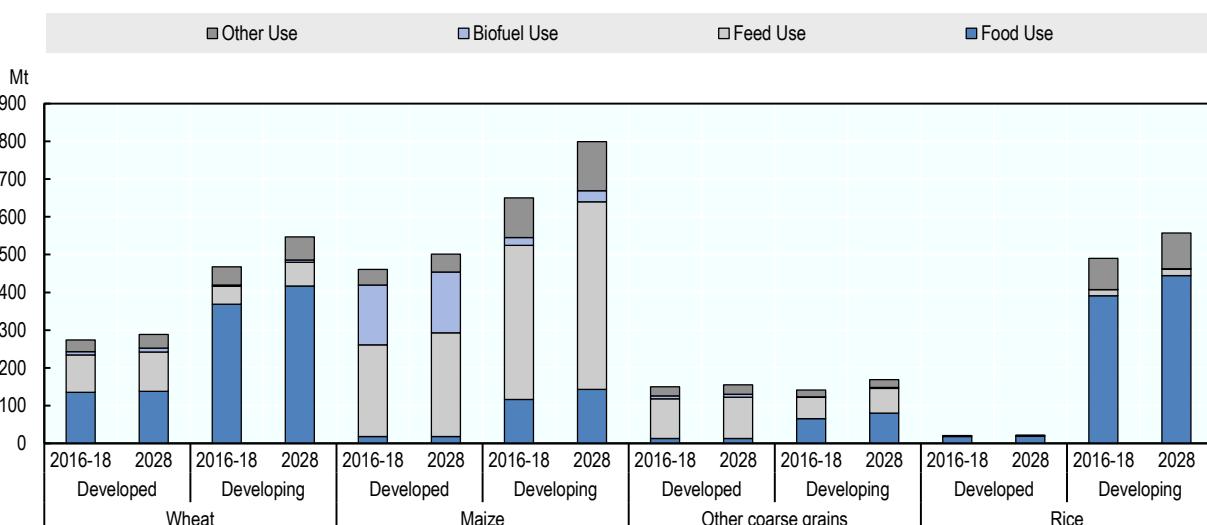
Global maize consumption is projected to increase by 189 Mt over the projection period, a smaller increase compared to the 265 Mt of the previous decade. As maize is principally a feed crop (59% share in the base period), this slower growth is linked to developments in feed demand, which during the outlook period is characterised by gains in feed-use efficiency and slower growth in livestock production. In addition, growth of maize for biofuel production, which more than doubled over the last decade, is expected to be limited, as current biofuel policies will not likely support further expansion in major producers. Of the projected increase, feed use accounts for the largest share (63%), owing to the expanding livestock sectors in China, the Americas, and Southeast Asia. Maize for human consumption is projected to increase by 27 Mt, driven by both population growth and increasing global per capita consumption. Sub-Saharan Africa, where white maize is an important staple and populations are growing rapidly, is projected to have the strongest food consumption growth (+13 Mt).

In 2016, China changed its maize policy, eliminating the market price support system that was in place since 2008. The reasons for the policy change included the need to reduce the

extremely large (and deteriorating) maize stocks, unsustainable farming practices, and environmental concerns. As an alternative, China adopted a direct maize subsidy policy and replaced its stockpiling programme with market-oriented purchasing. This *Outlook* assumes this policy change will result in the release of China's accumulated stocks over the projection period, with stocks reaching a more sustainable stocks-to-use ratio of 17% by 2028. Given this assumption, the global stocks-to-use ratios are expected to decline from 34% in the base period to 18% in 2028 (Figure 3.4).

World utilisation of other coarse grains is projected to increase by 32 Mt or 1% p.a. over the outlook period, a faster pace than the 0.5% p.a. seen over the past decade. Similar increases are projected for food and feed use (+14 Mt each). As utilisation in developed countries is expected to remain stable due to slower growth in feed demand, developing countries, particularly those in Africa, are expected to account for a large share of the additional use (Figure 3.5). The main source of growth in African countries is increasing food demand, underpinned by gains in per capita consumption and rapid population growth. On the feed side, countries in the Middle East (particularly Iran and Turkey) and Latin America are expected to contribute substantial shares to the additional use, driven by expanding livestock and poultry sectors. Given that food demand growth is expected to exceed that of feed demand, the food share of global consumption is projected to increase from around 27% in the base period to 29% in 2028. In addition, with utilisation lagging behind production, the global stocks-to-use ratio is projected to increase from 18% in the base period to 20% by 2028.

Figure 3.5. Cereal use in developed and developing countries



Source: OECD/FAO (2019), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

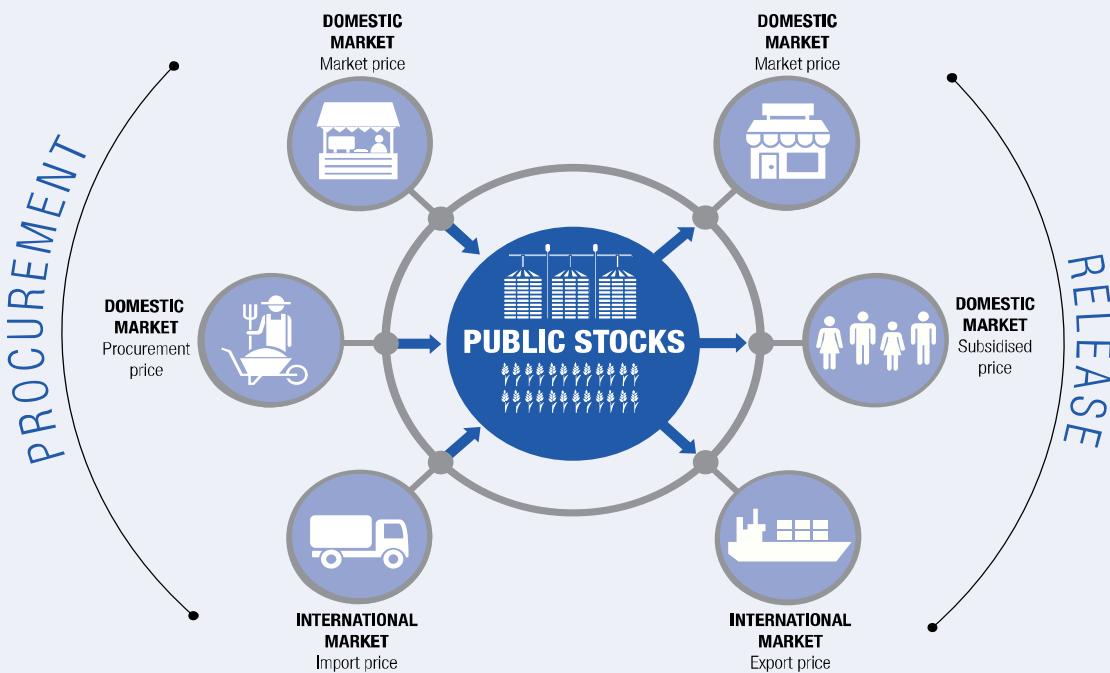
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Box 3.1. Economic effects of public stockholding policies for rice in Asia

Over the course of the last decade, a number of countries across the globe have increased their use of public stockholding programmes, whereby the government purchases, stockpiles and distributes staple foods. The objectives of these programmes range from stabilising prices to supporting regular food distribution programmes and providing assistance during transitory food crises. However, not all public stockholding programs are able to achieve these objectives. Most “buffer stock” programmes (public stocks which aim to stabilise prices) have not been successful in reducing price volatility and some have even been found to increase volatility, implying that allocating public funds to these programmes comes at the expense of more effective policies (Deuss, 2015; World Bank, 2012).

In addition to having varying successes in achieving their goals, public stockholding programmes may also have additional and unforeseen impacts on domestic and international markets alike. Effects on prices, production, consumption and trade can, moreover, be compounded by impacts on both public budgets and private sector activity. The extent of these impacts depend not only on the size, but also on the functioning of these programmes; i.e. the channels through which public stocks are procured and released (Figure 3.6).

Figure 3.6. The general functioning of public stockholding programmes



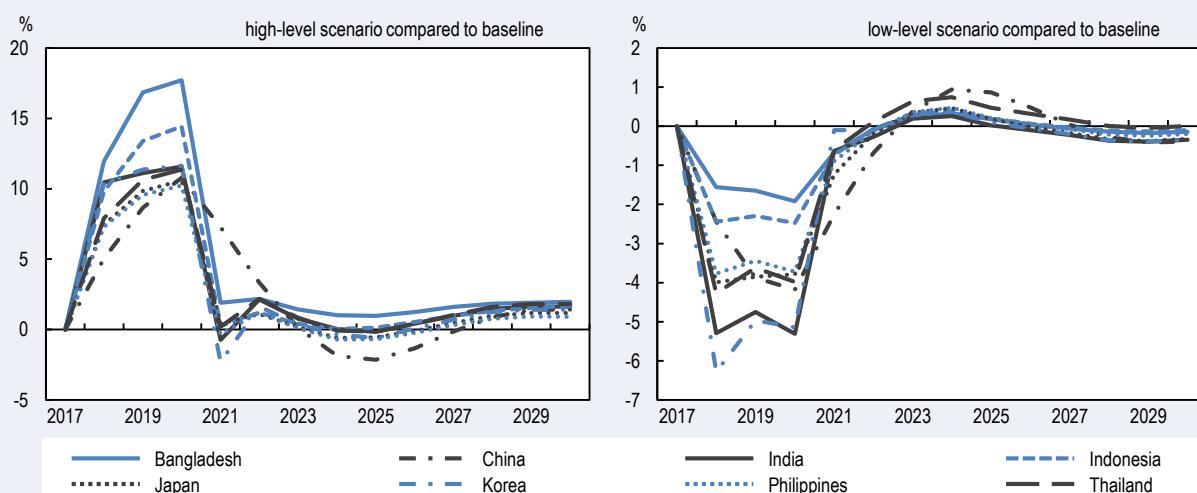
Source: OECD (2018).

The report *The Economic Effects of Public Stockholding Policies for Rice in Asia* (OECD, 2018) compares the functioning of public stockholding programmes for rice in eight Asian countries – Bangladesh, China, India, Indonesia, Japan, Korea, the Philippines, and

Thailand – and examines their economic effects. The analysis simulates, against a baseline of unchanged existing policies, the impacts of a future collective change to a high public stock level (“high-level” scenario) or a low public stock level (“low-level” scenario) in the medium term (2018-2030). The level of public stock norms under the high-level scenario is set at three months of national domestic rice consumption, and at two weeks under the low-level scenario.

The findings reveal that such changes can have extensive impacts on domestic and international markets: under the high-level scenario, the availability of rice on markets would be reduced, leading to higher domestic (Figure 3.7) and international rice prices compared to the baseline, while the reverse would occur under the low-level scenario. These impacts are projected to be most pronounced during the three-year transition period in which changes to the programmes are implemented; nevertheless, there will also be structural impacts that will persist – albeit at a lower intensity – over the medium term. These would not only include shifts in procurement levels (e.g. maintaining higher levels of stocks requires a continued higher procurement) and impacts on domestic and international prices and availability, but also on public expenditure and private stock levels. Under the high-level scenario, for example, private stocks would be lower in the medium term compared to the baseline, as the private sector is crowded out from stockholding activities. The reverse would apply under the low-level scenario.

Figure 3.7. Percentage change in producer prices



Source: OECD simulations using the OECD-FAO Aglink-Cosimo model.

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A final key finding relates to the capacity of public stocks to shield markets from supply shocks. The analysis reveals that whereas maintaining higher levels of public stocks might initially lessen the impact on price and availability from a global production shock, maintaining low levels of public stocks facilitates faster recovery towards the no-shock situation. Furthermore, keeping low levels of public stocks significantly reduces the public expenditure bill, which frees up funds that can be used for other mitigation strategies to deal with (emergency) food shortages.

What should governments do?

When considering changing levels of public stocks, governments should carefully evaluate not only the potential short-term market impacts but also the persisting medium-term impacts on domestic and international markets. Governments should also recognise that increasing public stock levels raises fiscal costs and can discourage private sector engagement in stockholding activities.

Deuss, A. (2015), “Review of the performance and impacts of recent stockholding policies”, in *Issues in Agricultural Trade Policy*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264233911-5-en>.

OECD (2018), *The Economic Effects of Public Stockholding Policies for Rice in Asia*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264305366-en>.

World Bank (2012), “Using Public Food Grain Stocks to Enhance Food Security”, Report No. 71280- GLB, September 2012.

World rice consumption is expected to increase by 67 Mt by 2028. With direct human consumption remaining the main end-use, rice continues to be a major food staple in Asia, Africa, Latin America and the Caribbean. Largely due to population growth over the next decade, total utilisation of rice is projected to expand by about 1.1% p.a. compared with 1.4% p.a. in the last decade. The expected additional consumption is almost entirely attributable to increasing food demand in developing countries (Figure 3.5), particularly in Asia (+35 Mt) and Africa (+17 Mt). Owing to diversification of diets due to higher incomes, per capita rice consumption in most Asian countries, where the majority of production is consumed domestically, is expected to stagnate or rise marginally. The exception is India, where 4 kg are added to the annual per capita consumption over the next ten years, partly driven by the government’s social policy to improve food security of vulnerable households through the public distribution of food grains. In Africa, where rice is gaining importance as a major food staple, per capita rice consumption is projected to grow faster, increasing by about 5 kg over the outlook period (Table 3.1). Globally, the average food per capita consumption of rice is projected to increase by 1 kg to reach 55 kg per year. With rice utilisation projected to grow at a slightly faster pace than world supply, the global stocks-to-use ratio is expected decrease marginally, from a high of 34% in the base period to 32% by 2028.

Table 3.1. Rice per capita consumption

	KG/person/year		
	2016-18	2028	Growth rate (% p.a.)
Africa	26.1	30.7	1.26
Asia and Pacific	77.8	78.7	0.11
North America	12.8	12.9	0.23
Latin America and Caribbean	28.6	28.4	-0.03
Europe	5.8	6.1	0.42

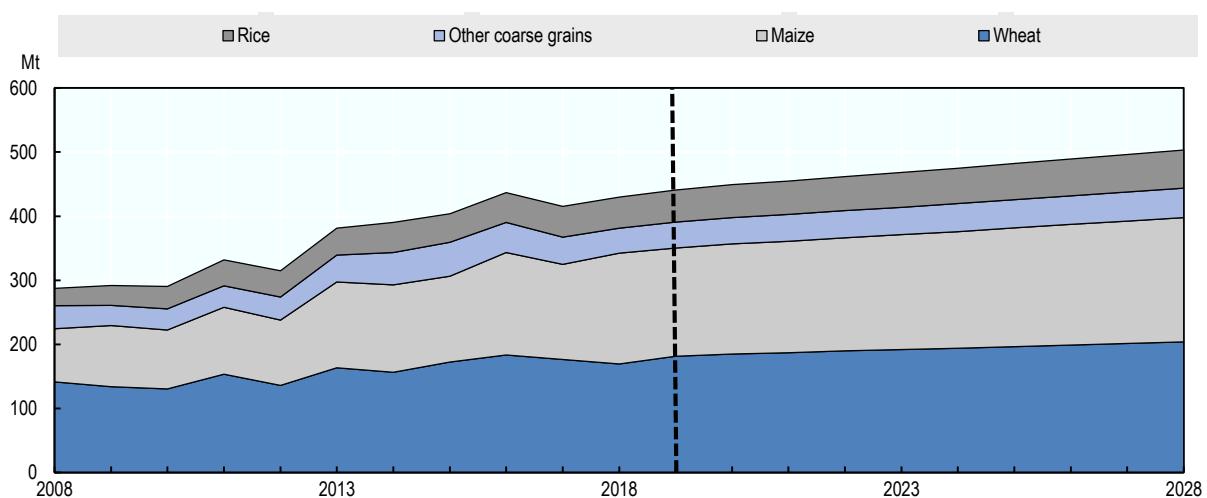
Source: OECD/FAO (2018), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-data-en>.

3.6. Trade

World trade in cereals is projected to expand by 76 Mt over the outlook period to reach 503 Mt by 2028 (Figure 3.8). Consistent with the projected slower growth of demand, cereal trade volumes will grow at 1.5%, a slower pace than the 5.0% p.a. seen over the previous decade keeping the share of trade in global consumption at about 16% throughout the projection period. Generally, the Americas, the Black Sea Region, and Australia will supply cereals to countries within and outside their geographical regions where growing food and feed demands cannot be met domestically. This situation is expected to continue over the next decade as the combined export share of the top five cereals exporters is expected to remain stable.

Wheat exports are projected to grow by 27 Mt to 203 Mt by 2028. The Russian Federation surpassed the European Union as the top exporter in 2016, driven by competitive prices and geographical proximity to major importing countries in the Middle East and North Africa. Egypt, the largest wheat importer in the world, recently reduced the protein content requirement of imported wheat, signalling its preference for Black Sea wheat. In the past decade, supply in the major wheat-producing countries of the Black Sea region – the Russian Federation, Kazakhstan, and Ukraine – has been volatile mainly due to yield fluctuations. Nonetheless, production growth has been outpacing consumption growth due to the adoption of improved seed varieties. As a result further increases in production are expected from these countries, increasing their share of global wheat exports (Figure 3.9). The Russian Federation is projected to remain the lead wheat exporter, accounting for about 20% of global wheat exports by 2028, followed by the European Union (15%), the United States (13%), Canada (12%), and Ukraine (11%). The export share of the European Union is expected increase slightly, given its competitive prices, grain quality, and proximity to major export markets in Africa and Asia. Wheat imports are expected to be spread more widely among many importing countries, with the top five – Egypt, Indonesia, Algeria, Brazil, and the Philippines – accounting for a combined share of about 25-27% over the outlook period.

Figure 3.8. Global cereals trade volumes by commodity

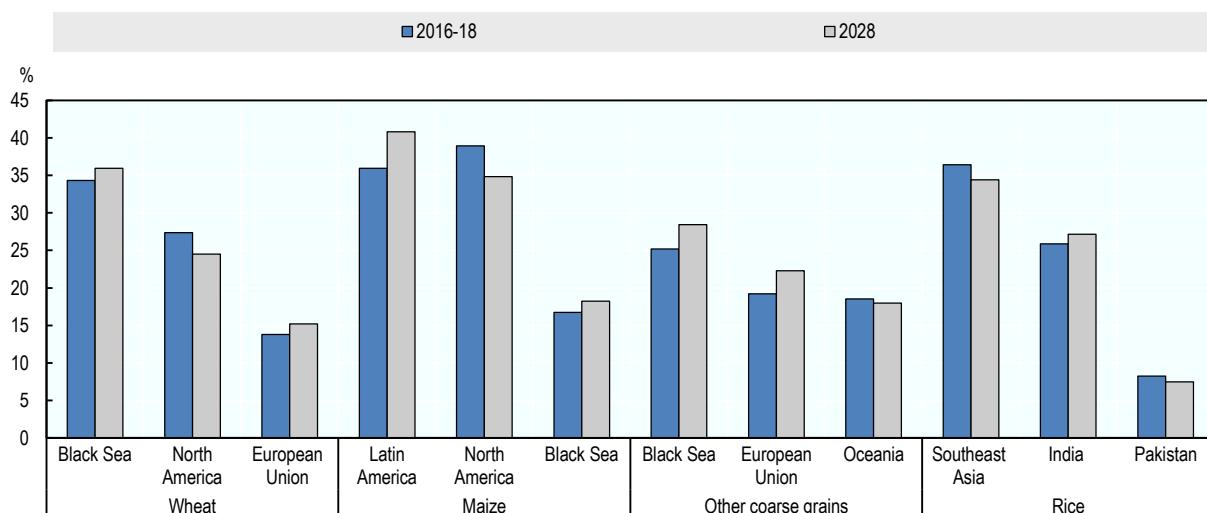


Source: OECD/FAO (2019), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

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Maize exports are projected to grow by 33 Mt to 193 Mt in 2028. The export share of the top five exporters – the United States, Brazil, Ukraine, Argentina, and the Russian Federation – account for 89% during the base period and will increase to 91% in 2028 due to expected higher exportable supplies in Brazil, Argentina, and the Ukraine. The United States is projected to remain the top maize exporter, with exports increasing by 5 Mt to 66 Mt by 2028, but the US export share will decline (from 38% to 34%) as traders in Southeast Asia signal preferences for South American corn due to perceptions over moisture levels and kernel hardness. As a region, Latin America is projected to increase its export market share from 36% in the base period to 41% in 2028 (Figure 3.9) owing to production gains supported by favourable domestic policies (e.g. loans at preferential rates) and the depreciation of local currencies. It is also expected that the Ukraine and the Russian Federation will be rising maize exporters, given that their domestic supplies are expected to increase faster than domestic consumption, leading to surpluses entering the global market.

Figure 3.9. World export shares of major exporting regions



Note: The Black Sea region comprises of the Russian Federation, Ukraine and Kazakhstan.

Source: OECD/FAO (2019), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

StatLink  <http://dx.doi.org/10.1787/888933958410>

The top five destinations for maize during the base period – Mexico, the European Union, Japan, Korea and Egypt – account for 43% of world imports. Viet Nam, which has experienced a surge in maize imports since 2012, is expected to replace Korea to become the fourth largest maize importer, driven by expanding livestock and poultry sectors. Malaysia is expected to further expand imports as it sustains growth in its livestock sectors. In China, given the policy change in 2016 that eliminated the price support system and associated stockpiling programme, growth in maize production is projected to slow down. As stocks decline to more sustainable levels, a tightening of supply is projected to support import growth to a level close to the tariff rate quota of 7.2 Mt in 2028.

Constrained by trade protection measures (particularly in China) and increased competition from maize in feed markets, the international trade volume of other coarse grains, such as barley and sorghum, is projected to increase by only 3 Mt over the outlook period,

compared to almost 10 Mt observed in the previous decade. Between 2012 and 2014, China's imports of other coarse grains grew from 2.9 Mt to 20.2 Mt, supported by high domestic maize prices (under the price support system) and limited border restrictions. Since then, the elimination of maize support price and the subsequent release of existing maize stock reserves, together with border tariffs, have reduced imports of other coarse grains into China. In the base period, the top five exporters – the European Union, Australia, Ukraine, Canada, and the United States – account for an export share of 72% of global trade; this share is projected to shrink to 71% as United States sorghum exports are curbed by Chinese import tariffs. Consequently, the Russian Federation is expected to replace the United States as the fifth largest other coarse grains exporter as Russian exports are sustained by preferential access to Iran and countries in Central Asia. In contrast to maize and wheat markets, imports of other coarse grains are much less widespread among countries. The five major importers – China, Saudi Arabia, the Islamic Republic of Iran, Japan, and the United States – absorb 66% of global trade, with China alone projected to account for 29% in 2028.

Global rice trade growth is projected to be 2.3% p.a. over the outlook period, with the volume exchanged increasing by 12 Mt to 164 Mt in 2028. The export share of the top five rice exporters – India, Thailand, Viet Nam, Pakistan, and the United States – is expected to decrease over the projection period from 77% to 75%. India is expected to remain the world's largest rice exporter of rice, with demand from its traditional African and Near Eastern markets expected to drive export gains. Thailand, whose shipments have traditionally been largely composed of higher quality rice, is projected to remain the second largest rice exporter, while in Viet Nam, expected growth is partly linked to ongoing efforts to diversify the varietal make-up of the country's rice shipments, which could underpin an increase in its deliveries to the Middle East, Africa and East Asia. All three countries could, however, face heightened competition for markets as Chinese rice exports to Africa are projected to expand, and the rise of Cambodia and Myanmar as important rice suppliers are projected to continue over the projection period. Given their competitive prices and the expectation of large exportable supplies, total base period exports of about 4 Mt from these countries is projected to increase to 7 Mt in 2028.

The largest import growth will be in African countries where demand, driven by per capita gains and rapid population growth, is expected to outpace production. Total imports in this region is projected to increase from 17 Mt in the base period to 29 Mt in 2028. This would increase Africa's share of world rice imports from 35% to 49%, and the region would become the prime destination of global rice flows. Nigeria, in particular, is projected to more than double its rice imports by 2028, almost reaching the same import quantities projected for China, the world's largest rice importer. LDC Sub-Saharan Africa is projected to see a steep growth in imports, from 8 Mt in the base period to 14 Mt in 2028. With its large stockpiles and significant efforts to control rice smuggling through its southern border, China's rice imports are expected to decrease slightly; it will remain, however, a large rice outlet during the outlook period. In addition to China and Nigeria, the group of five major importers includes the Philippines, the European Union, and Iran, which together account for about 26% of global rice imports in the base period.

The outlook for the Philippines does not account for the recent replacement of quantitative restrictions on rice imports with import tariffs, following the February 2019 passage of the Republic Act No. 11203. This is so given that implementation aspects of the law are still forthcoming, including those related to public rice stockholding and distribution, as well as those concerning the 10 bln PHP Rice Competitiveness Enhancement Fund it established, and through which assistance to local rice producers will be channelled for six years.

Indica varieties account for the bulk of global rice trade. The Japonica variety, which is cultivated in more temperate climates, represents about 13% of global rice output and roughly 7% of trade. Japan, Korea, Egypt, and Turkey almost exclusively produce and consume the Japonica variety and hence projections for these countries constitute the medium-term outlook for Japonica rice. The largest exporters include the United States, Australia, the European Union and China, where Japonica represents about 21%, 80%, 77% and 35% of rice production respectively. On the import side, northeast Asia (Japan, Korea, and Chinese Taipei) remains the top destination for japonica rice, followed by the Middle East and North Africa region, where import demand is growing. Rice trade is increasingly involving LDC, specifically Asia as an exporter and Africa as an importer. It is a unique case where a group of LDC are expected to contribute to improve the food security of other LDC's outside their geographical proximity.

3.7. Main issues and uncertainties

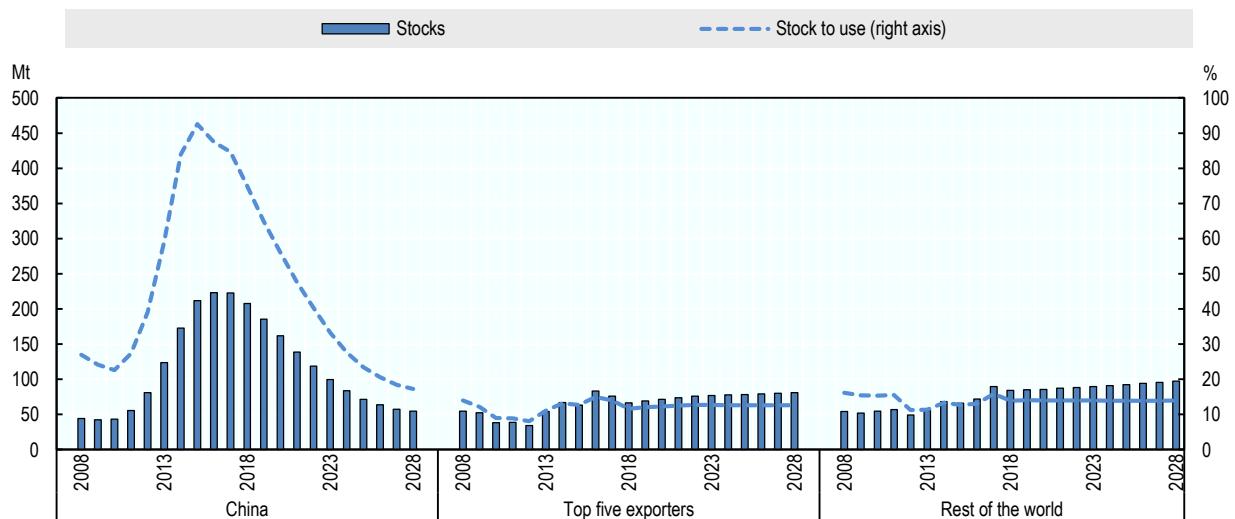
While normal assumptions for weather lead to positive production prospects for the main grain-producing regions, pests, plant diseases and adverse weather events that are accentuated by climate change may cause higher volatility in crop yields, thereby affecting global supplies and prices. Historically, deviations of crop yields from trends have been more pronounced in Australia, Kazakhstan, the Russian Federation, and Ukraine. Crop yields in South American countries, such as Argentina, Brazil, Paraguay and Uruguay, also show high variability. Over the last few years, the increasing participation of the Black Sea region in global cereal markets has decrease some of the risks associated with crop shortages in major exporting countries. Its continued increase in export participation over the next decade may mitigate the risks of volatile yields in certain regions. In addition, the impact of plagues such as the fall army worm, in large producing and exporting countries could be severe for world markets.

The future development of global maize and wheat markets is uncertain since major exporting countries in South America face significant price increases given their assumed exchange rate depreciations. In these countries, international prices could fall in dollar terms, and farmers and export companies could experience rising prices due to their weakening domestic currency, which could stimulate production. Uncertainty in exchange rates in this region could affect production response and exportable supplies.

China's feed demand and its overall level of domestic supplies and associated changes in stocks are among the major uncertainties. At present, a complete and official market balance for China is missing. In 2018, based on its third National Agricultural Census, the Chinese authorities revised crop production estimates, with significant changes reported for maize (+266.0 Mt) in the last ten years. Feed and stocks figures, however, were not provided. In the current baseline, USDA estimates are used, where additional output was distributed between previous estimates of stocks and feed use. Nonetheless, even with this revision, maize production in China has been decreasing over the last three years owing to the 2016 policy change, which replaced the market price support system with a direct maize subsidy programme. It is assumed this policy change will result in the release of China's accumulated stocks over the projection period (Figure 3.10). However, if the actual level of stocks are considerably below the current estimates, there is a possibility that China could become a major maize importer and thereby greatly influence future developments in the global cereal markets. Furthermore, recent changes on the policy implementation to support rice farmers could affect planting decisions that would lead to the release of rice

stocks. The magnitude of such a release is uncertain and could divert from the trend assumed in this *Outlook*.

Figure 3.10. Global maize stocks and stocks-to-use ratios



Note: Top five exporters (2016-2018): the United States, Brazil, Argentina, Ukraine and the Russian Federation.

Source: OECD/FAO (2019), “OECD-FAO Agricultural Outlook”, OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

StatLink  <http://dx.doi.org/10.1787/888933958429>

Cereal prices could be affected by a potential further slowdown in economic growth of fast growing economies and lower energy prices caused by the uptake of new energy sources and new extraction technologies. Moreover, the reinforcement of food security and the sustainability criteria in the reform and design of biofuel policies (i.e. the European Union, Brazil, and the United States) may also impact the demand for cereals.

The international trade environment for cereals also faces increasing uncertainty which may influence trade flows. Further trade protection, the resolution of existing trade tensions (e.g. United States-China trade tension), and the emergence of new regional trade agreements may have important implications for future developments in cereal markets.