OECD-FAO Agricultural Outlook 2008-2017

HIGHLIGHTS

OECD

ORGANISATION FOR ECONOMIC
CO-OPERATION AND DEVELOPMENT

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 30 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

This work is published under the responsibilities of the Secretary-General of the OECD and the Director General of FAO. The views expressed and conclusions reached in this report do not necessarily correspond to those of the governments of OECD member countries, or the governments of the FAO member countries. The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Also available in French under the title:
Perspectives agricoles de l'OCDE et de la FAO 2008-2017

Foreword

This is the fourth time that the Agricultural Outlook report has been prepared jointly by the Organisation for Economic Co-operation and Development (OECD) and the Food and Agriculture Organization (FAO) of the United Nations. The report draws on the commodity, policy and country expertise of both Organisations in providing a longer-term assessment of future prospects in the major world agricultural commodity markets.

The report is published annually, as part of a continuing effort to promote informed discussion of emerging market and policy issues. This edition of the Agricultural Outlook offers an assessment of agricultural markets covering cereals, oilseeds, sugar, meats, milk and dairy products over the period 2008 to 2017. For the first time, it also includes an analysis of and projections for global biofuel markets for bioethanol and biodiesel, facilitating the discussion of interactions between these markets and those for the main agricultural feedstocks used in their production. The market assessments for all the commodities are based on a set of projections that are conditional on specific assumptions regarding macroeconomic factors, agricultural and trade policies and production technologies; they also assume average weather conditions and longer-term productivity trends. Using the underlying assumptions, the Agricultural Outlook presents a plausible scenario for the evolution of agricultural markets over the next decade and provides a benchmark for the analysis of agricultural market outcomes that would result from alternative economic or policy assumptions.

This year's Outlook is set against a backdrop of exceptional increases in prices for many agricultural commodities, and this has posed a considerable challenge in preparing the projections and assessing the "durability" of the various influences shaping these prices. That is, which of the factors that are driving up prices are temporary and which will prove to be more permanent influences? How will they individually and collectively affect price levels, price trends and price volatility in the future? How will markets react to currently high prices and a more uncertain price outlook? What are the appropriate policy responses? This report comes at a very timely moment and provides important information, with a view to enlightening the discussion on food-price increases, their causes and their likely consequences for agricultural markets as well as for the policy-formulation process.

The projections and assessments provided in this report are the result of close co-operation between the OECD and the FAO Secretariats and national experts in member and some non-member countries, and thus reflect the combined knowledge and expertise of this wide group of participants. A jointly developed modelling system, based on the OECD's Aglink and FAO's Cosimo models, facilitated the assurance of consistency in the projections. The fully documented Outlook database, including historical data and projections, is available through the OECD-FAO joint Internet site www.agri-outlook.org. Within the OECD, this publication is prepared by the Trade and Agriculture Directorate, while at FAO, the Trade and Markets Division was responsible for the report.

Table of contents

Figures

Acronyms and abbreviations

ACP	African, Caribbean and Pacific countries
AMAD	Agricultural Market Access Database
AUSFTA	Australia and United States Free Trade Agreement
AI	Avian Influenza
BNGY	Billion gallons per year
BNLY	Billion litres per year
BSE	Bovine Spongiform Encephalopathy
Bt	Billion tonnes
BTL	Biomass to liquid
CAFTA	Central American Free Trade Agreement
CAP	Common Agricultural Policy (EU)
CCC	Commodity Credit Corporation
CET	Common External Tariff
CIS	Commonwealth of Independent States
CPI	Consumer Price Index
CRP	Conservation Reserve Program of the United States
CMO	Common Market Organisation for sugar (EU)
Cts/lb	Cents per pound
cwe	Carcass weight equivalent
DBES	Date-based Export Scheme
DDA	Doha Development Agenda
DDG	Dried Distiller's Grains
dw	Dressed weight
EBA	Everything-But-Arms Initiative (EU)
ECOWAP	West Africa Regional Agricultural Policy
ECOWAS	Economic Community of West African States
EISA Act	Energy Independence and Security Act of 2007 (US)
EPAs	Economic Partnership Agreements (between EU and ACP countries)
ERS	Economic Research Service of the US Department for Agriculture
est	Estimate
E85	Blends of biofuel in transport fuel that represent 85 percent of the fuel volume
EU	European Union
EU-15	Fifteen member states of the European Union
EU-10	Ten new member states of the European Union from May 2004
EU-27	Twenty seven member states of the European Union (including Bulgaria and Romania from 2007)
FAO	Food and Agriculture Organization of the United Nations

FMD	Foot and Mouth Disease
FOB	Free on board (export price)
FR	Federal Reserve (US central bank)
FSRI ACT	Farm Security and Rural Investment Act (US) of 2002
FTA	Free Trade Agreement
GDP	Gross Domestic Product
G-10	Group of 10 countries (see Glossary)
G-20	Group of 20 developing countries (see Glossary)
GDPD	Gross Domestic Product Deflator
GHG	Green House Gases
GMO	Genetically modified organism
HFCS	High Fructose Corn Syrup
HS	Harmonised Commodity Description and Coding System
IEA	International Energy Agency
kt	Thousand tonnes
LAC	Latin America and the Caribbean
La Niña	Climatic condition associated with temperature of major sea currents
LDC's	Least Developed Countries
LICONSA	Leche Industralizada
lw	Live weight
MERCOSUR	Common Market of the South
MFN	Most Favoured Nation
Mha	Million hectares
MPS	Market Price Support
Mt	Million tonnes
MTBE	Methyl Tertiary Butyl Ether
NAFTA	North American Free Trade Agreement
OECD	Organisation for Economic Co-operation and Development
OIE	World Organisation for Animal Health
PCE	Private Consumption Expenditure
PIK	Payment in kind programme (US)
PROCAMPO	Mexican Farmers Direct Support Programme
PPP	Purchasing Power Parity
PRRS	Porcine Reproductive and Respiratory Syndrome
PSE	Producer Support Estimate
pw	Product weight
R&D	Research and Development
rse	Raw sugar equivalent
rtc	Ready to cook
RFS	Renewable Fuels Standard in the US, which is part of the Energy Policy Act of 2005
rwt	Retail weight
SEAC	Spongiform Encephalopathy Advisory Committee
SFP	Single Farm Payment scheme (EU)
SMP	Skim milk powder
SPS	Sanitary and Phytosanitary measures
STRV	Short Tons Raw Value

t	Tonnes
t/ha	Tonnes/hectare
TRQ	Tariff rate quota
UK	United Kingdom
UN	The United Nations
URAA	Uruguay Round Agreement on Agriculture
UNCTAD	United Nations Conference on Trade and Development
US	United States of America
USDA	United States Department of Agriculture
VAT	Value added tax
v-CJD	New Creutzfeld-Jakob-Disease
WAEMU	West African Economic and Monetary Union
WMP	Whole milk powder
WTO	World Trade Organisation

Symbols

AUD	Dollars (Australia)		KRW	Korean won
ARS	Pesos (Argentina)		lb	Pound
Bn	Billion		Mn	Million
BRL	Real (Brazil)		MXN	Mexican pesos
CAD	Dollars (Canada)		NZD	Dollars (New Zealand)
CNY	Yuan (China)		p.a	Per annum
EUR	Euro (Europe)		RUR	Ruble (Russia)
gal	Gallons		THB	Thai baht
Ha	Hectare		USD	Dollars (United States)
hl	Hectolitre		ZAR	South African rand
INR	Indian rupees			

THE OUTLOOK IN BRIEF

- World reference prices in nominal terms for almost all agricultural commodities covered in this report are at or above previous record levels (see Fig. 2.1). This will not last and prices will gradually come down because of the transitory nature of some of the factors that are behind the recent hikes. But there is strong reason to believe that there are now also permanent factors underpinning prices that will work to keep them both at higher average levels than in the past and reduce the long-term decline in real terms. Whether transitory or permanent, appropriate policy action for agricultural development and for addressing the needs of the hungry and the poor needs to take account of both these characteristics.

- The dramatic increase in prices since 2005/06 is partly the result of adverse weather conditions in major grain-producing regions in the world, with spill-over effects on crops and livestock that compete for the same land. In a context of low global stocks, these developments alone would have triggered strong price reactions. These conditions are not new; they have happened in the past and prices have come down once more normal conditions prevail and supply responds over time. The Outlook sees no reason to believe that this will not recur over the next few years.

- Once they have fallen from their current peaks, however, prices will remain at higher average levels over the medium term than in the past decade. But the underlying forces that drive agricultural product supply (by and large productivity gains) will eventually outweigh the forces that determine stronger demand, both for food and feed as well as for industrial demand, most notably for biofuel production. Consequently, prices will resume their decline in real terms, though possibly not by quite as much as in the past (see Figures 1.1, 1.4 and 1.5 in the Overview section).

- On the supply side, the Outlook expects continued yield growth for crops to be more important than new areas brought into cultivation in determining crop supply. Slowly increasing dairy and livestock yields also support the increase in milk and meat production. A key assumption in the Outlook is some strengthening of the US dollar against most currencies. In the countries affected by this change, this will reinforce domestic price incentives to increase production. These factors combine to sustain the growth of global agricultural production, although some of that impetus is abated by the supply-reducing effect of high oil prices that raise production costs.

- On the demand side, changing diets, urbanisation, economic growth and expanding populations are driving food and feed demand in developing countries. Globally, and in absolute terms, food and feed remain the largest sources of demand growth in agriculture. But stacked on top of this is now the fast-growing demand for feedstock to fuel a growing bioenergy sector. While smaller than the increase in food and feed use, biofuel demand is the largest source of new demand in decades and a strong factor underpinning the upward shift in agricultural commodity prices.

- As a result of these dynamics in supply and demand, the Outlook suggests that commodity prices – in nominal terms – over the medium term will average substantially above the levels that prevailed in the past 10 years. When the average for 2008 to 2017 is compared with that over 1998 to 2007, beef and pork prices may be some 20% higher; raw and white sugar around 30%; wheat, maize and skim milk powder 40 to 60%; butter and oilseeds more than 60% and vegetable oils over 80%. Over the Outlook period, prices will resume their decline in real terms, albeit at a slower rate. However, the impact of various supply and demand factors on prices will differ across commodities.

- In addition, prices may also be more volatile than in the past: stock levels are not expected to be replenished substantially over the Outlook; demand is becoming less sensitive to price changes at the farm level as the commodity share in the final food bill falls and as industrial demand grows; weather conditions and agricultural product supply may become more variable with climate change; and speculative non-commercial investment funds enter or leave agricultural futures markets as profit opportunities dictate.

- Within this overall context, the epicentre of global agriculture will further shift from the OECD towards developing countries. Both consumption and production are growing faster in developing countries for all products except wheat. By 2017, these countries are expected to dominate production and consumption of most commodities, with the exception of coarse grains, cheese, and skim-milk powder.

- Corresponding shifts are also occurring in global trade patterns. Imports are growing most in developing countries, and an increasing share of this growth is captured by larger exports from other emerging and developing countries. Export growth in developing countries is greater, and sometimes very much so for almost all products. However, while the share of OECD countries in world exports falls, these countries continue to dominate export trade for wheat, coarse grains, pork and all dairy products.

- High prices are good for some and bad for others. They are beneficial for many commercial producers in both developed and developing countries. However, many farmers in developing countries are not linked to markets and will draw little or no benefit from currently higher prices. But the poor, and in particular the urban poor in net food importing developing countries, will suffer more. In many low-income countries, food expenditures average over 50% of income and the higher prices contained in this Outlook will push more people into undernourishment.

- For the Least Developed Countries, especially the food-deficit group, the projections thus show greatly increased vulnerability and uncertain food supplies during an era of high commodity prices and high price volatility. This underscores the importance of developing their domestic supply capacity by improving the overall environment in which agriculture operates through enhancing governance and administrative systems and investing in education, training and extension services, research and development and physical infrastructure. While these are longer-term remedies, it is important in the short term that commodity trade functions efficiently to facilitate the allocation of available commodity supplies.

- This Outlook assumes unchanged agricultural and trade policies. The actual evolution of agricultural commodity and food prices, however, hinges importantly on future policy developments. In this context, increased humanitarian aid is needed to reduce the negative impact of high prices on the very poor, and this could be done without any major impact on markets.

- Such effects would result, however, from trade-restricting policies such as export taxes and embargos. These may in the short term provide some relief to domestic consumers but in fact impose a burden on domestic producers and limit their supply response, as well as contribute to global commodity market uncertainty. Similarly, measures to protect domestic producers of agricultural commodities through border measures imposes a burden on domestic consumers; it would also restrict growth opportunities for producers abroad.

- Policy support, as well as oil-price developments, will strongly influence the evolution of future demand from biofuel for agricultural commodity feedstocks. In this context, neither the US Energy Independence and Security Act (EISA) nor proposals for a new EU bioenergy directive are taken into account. Changes in either, or new technological developments would also have a strong impact on projected world prices for agricultural commodities and for the availability for food and feed use. In this report, second generation biofuels are not expected to be produced on a commercial basis over the Outlook period.

- Finally, over the longer term, agricultural supply is facing increased uncertainties and limitations to the amount of new land that can be taken into cultivation. Public and private investments in innovation and increasing agricultural productivity, particularly in developing countries, would greatly improve supply prospects by helping to broaden the production base and lessen the chance of recurring commodity price spikes.

- This year's Outlook has been prepared in an environment characterised by increased instability in financial markets, higher food price inflation, signs of weakening global economic growth and food-security concerns. Although projections for agricultural commodity markets have always been subject to a number of uncertainties, these have taken on more importance in this year's edition.

Chapter 1

Overview

This version of the *OECD-FAO Agricultural Outlook* is set against a background where world reference prices for most agricultural commodities covered in this report are at or above previous record levels, at least in nominal terms. While some of the reasons for these high prices are transitory, there is strong reason to believe that there are now also permanent factors underpinning prices that will work to keep them at higher average levels than in the past (Figure 1.1).

Figure 1.1. **World commodity prices at higher average levels**
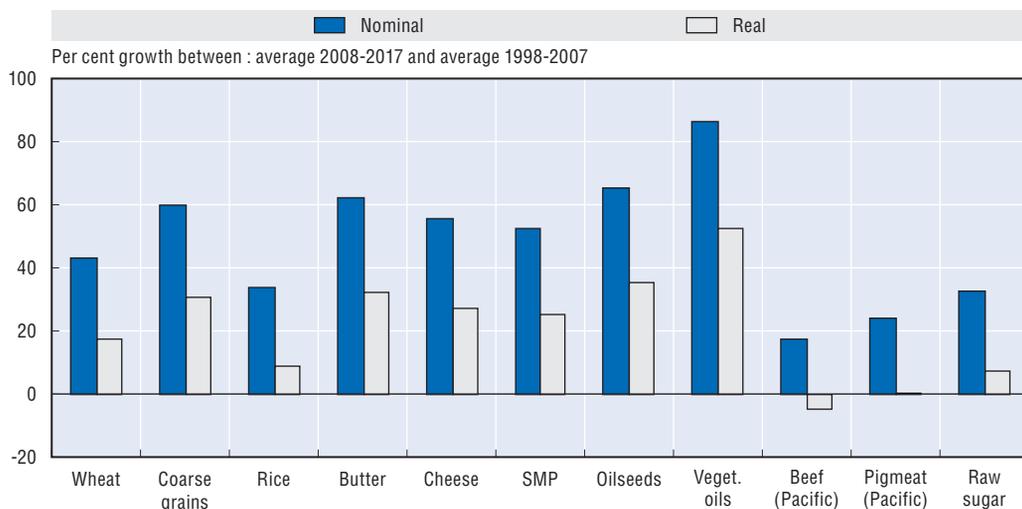
Source: OECD and FAO Secretariats

The *Outlook* paints a picture of a further gradual shift in the epicentre of agricultural production, consumption and trade from OECD to developing countries. This happens against a backdrop of record high prices of almost all agricultural products at the beginning of the *Outlook*. The *Outlook* indicates that current price levels can be explained by both transitory and permanent factors. There is strong reason to suspect that the more permanent factors will result in a structural upward shift in real agricultural commodity prices. But from these sometimes substantially higher average levels, when compared to the past decade, real prices will again begin to decline, though at a more gradual rate than in the past.

The *Outlook* is set in a context of assumed sustained economic growth around the globe, high crude oil prices, contained inflation, constant real exchange rates and unchanged policies. Markets are assumed not to be influenced by "abnormal" weather conditions, and any possible impacts of climate change and water shortages are not considered. Deviations from these assumed conditions would lead to potentially much different market outcomes.

The principal underlying assumptions

Lower but sustained economic and population growth underpins demand

Economic activity at the beginning of the *Outlook* is slowing most notably in the US, the world's leading economy. The slowdown in the US and some other OECD economies is occurring despite continuing robust economic conditions in many other parts of the world. Within this context, growth prospects for OECD countries in the short and longer term are just above 2% (annual average). Robust activity levels in the main emerging economies are projected to remain a major driver of global economic expansion in the near term. In the medium and longer term a modest deceleration is projected. China and India will remain growth leaders among developing countries, with substantial market expansion and GDP growth anticipated for both countries as they become further integrated into the global economy and world trade.

Population dynamics are important determinants of the future global economic environment, directly affecting demand for agricultural commodities. Population growth over the next decade will decline relative to the last 10 years to an average of 1.1% annually to reach approximately 7.4 billion in 2017. The fastest population growth is expected in Africa (annual average above 2%), whereas in Europe, population is expected to essentially stabilise over the coming decade (Table 1.1).

Table 1.1. **Some decline in population growth**

Average annual growth over 10 year period, percentage

	Population growth	
	1998-2007	2008-2017
World	1.23	1.12
Africa	2.37	2.21
Latin America and Caribbean	1.28	1.14
North America	1.01	0.88
Europe	0.30	0.10
Asia and Pacific	1.27	1.11
Oceania developed	1.18	0.92

Note: Average annual growth is the least-squares growth rate.
Source: UN World Population Prospects (2006 Revision).

No major hike in inflation despite continued high oil prices

Despite recent hikes in food prices, sustained global growth and world trade expansion, general price levels in many countries have remained remarkably stable. This situation has reinforced expectations that inflation in OECD countries will remain low over the longer term. Measured by the Private Consumer Expenditure (PCDE) deflator, inflation will remain low in the coming decade. For OECD countries as a whole, inflation is assumed to be just above 2% per year. High consumer price inflation continues to plague some emerging and developing countries such as the Russian Federation and India with levels above 5% per annum. Inflation in Russia is, nevertheless, expected to fall to less than half the prevailing rate during 2005-07. A significant decline is also assumed for Argentina, with inflation at below 5% per year.

The world oil price assumption underlying this year's *Agricultural Outlook* is based on that published in the *OECD Economic Outlook* n° 82 (December 2007). It assumes prices to slowly increase over the outlook period from USD 90 per barrel in 2008 to USD 104 per barrel by 2017. This does not exclude the possibility of substantial variations around these

levels througout the period or within any given year. However, future oil prices are a major uncertainty in the *Outlook*. Some analysts emphasise that high oil prices will slow demand, ultimately reducing the price of oil. Others argue that consumption, production and processing capacities are relatively inelastic in the short term, sustaining continued high, or even further increasing, prices. This year's *Agricultural Outlook* is based on the high-price scenario. Pressure on oil prices has been maintained thus far as geopolitical tensions combine with processing capacity constraints to keep global supply from the major oil producers below effective demand.

Conditions remain favourable for further growth in biofuel production

For the first time, this *Outlook* specifically includes projections for supply, demand, trade and prices of ethanol and biodiesel derived from agricultural feedstock. The main forces driving further growth in biofuel production are high crude oil prices and continued public support, in particular in OECD countries. However, the latest bioenergy policy changes in the EU and the US are not taken into consideration. Neither do the projections and the assessed impacts on commodity markets take account of the possibility of changes in production technologies. Such changes would modify the economics of biofuel production and affect the market and trade outcomes.

The US dollar is expected to strengthen against most currencies

Under an assumption of constant real exchange rates, inflation differentials *vis-à-vis* the United States are the primary determinant of projections for exchange rates over the *Outlook* period. This implies a strengthening of the US dollar against most currencies, even if currently there are signs of a further weakening of the dollar in the short term. Over the course of the *Outlook* period, the euro exchange rate is projected to remain stable. However, very low levels of inflation in Japan relative to the United States mean that the Yen is expected to appreciate further. The currencies of high growth/high inflation countries such as Brazil, India, Turkey and South Africa will depreciate most over the medium term.

The Outlook reflects policies in place in early 2008

Agricultural and trade policies play an important role in both domestic and international markets for agricultural commodities and food products. While agricultural policies are becoming increasingly decoupled from production decisions, non-agricultural policies, such as those for instance with respect to energy, or the environment, are having a growing impact on the agri-food sector. Policies influence the composition and levels of both production and consumption, thereby creating (or sometimes correcting) market distortions and influencing prices. There is a tendency towards increased price responsiveness on the supply side with ongoing policy reform in some OECD countries. Also, relatively elastic supply and demand in a growing number of developing countries, coupled with an increasing share of these countries in world trade, is improving adjustments in agricultural markets. As in the past, this *Outlook* assumes constant policies over the period to 2017. This implies, notably, that any changes in the new US farm legislation to replace the current FSRI Act, or in the EU's Common Agricultural Policy as a result of the scheduled "health check" or changes in trade policies reflecting a conclusion of the negotiation under the Doha Round, are not considered in this report. In addition, neither the US Energy Independence and Security Act (EISA) nor proposals for a new EU bioenergy directive have been taken into account. However, recently increased export taxes in Argentina are taken into consideration.

Main trends in commodity markets

Grain markets set to remain tight

Despite record wheat and coarse grain crops in 2007/08 and a sustained moderate rise in production thereafter, grain markets are expected to remain tight in the period to 2017. The prolific demand for maize arising from the rapidly expanding ethanol sector in the United States has profoundly affected the coarse-grain market. By 2017, approximately 40% of the country's maize crop could be destined for energy production. Growth in grain-based ethanol industries, in particular in North America and Europe, as well as rising feed requirements for flourishing livestock sectors, look set to further pressure the already critically low global grain stocks-to-use ratio over the course of the *Outlook*.

Owing to currently low stocks and high prices there will be an incentive to plant more land for grain production. In addition to a foreseen sustained recovery in production in drought-stricken Australia, the area under cereals is projected to rise for a number of reasons. There will in particular be some reallocation of land from other crops in the main OECD producers such as Canada, the US or the EU. In addition, land is taken out of set-aside in the EU for 2008. Finally, new land will be taken into cultivation, particularly in South and Latin America, Sub-Saharan Africa and the Commonwealth of Independent States (CIS). However, overall there will be constraints in expanding new arable areas in many countries and competition for land and resources among grain and oilseed crops is set to intensify with those crops offering the highest returns gaining the most ground. As a result, beyond the initial years of the *Outlook*, much of the growth in world grain output is expected to stem from productivity gains, but yield growth is not expected to match the rate attained in the previous decade.

Grain trade to reach new heights

Wheat exports have remained subdued in recent years, reflecting adverse weather in several important countries, especially in Australia and successively poor harvests in the EU. But global wheat trade is projected to expand at an average annual rate of less than 1% over the *Outlook* period. Australia is foreseen to resume the mantle of being the second-largest wheat exporter after the United States. As for coarse grains, the recuperation of traditional export sources will be supplemented by an export expansion in Ukraine.

Developing countries, such as those situated in South and East Asia, as well as Nigeria and Egypt, will continue to fuel global wheat demand. Saudi Arabia is also projected to become a major importer in view of the recent change in its policy to gradually phase out production subsidies. Although the *Outlook* projects expanding exports from OECD countries, most of the growth in import demand will be satisfied through larger shipments from emerging and developing countries, particularly Ukraine and Argentina. Rising per capita incomes and developing food markets are behind increased global demand that has outpaced domestic production capacity. But more generally, growth in per capita food consumption of wheat is expected to remain modest or even to decline, notably in China, as diets slowly shift towards more value-added processed foods given the strong rise in incomes. The growth in international demand for coarse grains will be predominantly driven by increased feed demand from thriving livestock industries in developing economies. Imports by these countries as a group are projected to grow to 94 million tonnes, representing nearly 75% of the world total, which compares to less than 70% over the base period.

Productivity gains underpin rice supply

Global rice production could expand on the order of 10% by the end of the *Outlook*, fuelled by larger crops in South and South-East Asian countries. The overall trend of rising output masks an expected fall in area, which gathers momentum from 2011-12 onwards, reflecting lower plantings in Asian countries due to rivalry with other crops and non-agricultural sectors for land, which leads to an intensification of competition for water and labour resources. Developed countries are also foreseen to plant less by 2017-18, as a reflection mainly of ongoing policies in Japan and the EU. Owing to the dissemination of improved varieties and better production practices, yield growth over the next decade will assume greater prominence in supporting the sector, and this is expected to surpass the growth witnessed over the previous 10-year period.

Rice remains a basic food commodity, and its importance has extended beyond Asia. However, rapid income growth and diversification of diets is expected to depress per capita rice consumption, especially in Asia. In contrast, rice is expected to gain importance in African diets, where per capita consumption rises from 22 kg to more than 24 kg over the 10-year period. As a share of world production, rice trade is expected to fall slightly, indicating a lessening reliance on the global market that is consistent with a return to more stringent rice self-sufficiency policies in several countries. Much of the expansion in world imports is fuelled by demand in Africa and in Asia, with Thailand forecast to account for around one-third of all rice exports. The tendency for declining global rice stocks could be reversed over the course of the *Outlook*, as recent concerns over supply availability and price volatility foster a rebuilding of reserves.

Strong demand drives the oilseed complex

Increasing world livestock production will continue to be the driving force behind the consumption of oilseed-derived protein meal, with most of the growth taking place in non-OECD countries. Comparing 2017 with the 2005-07 base period, oilseed meal consumption in the developing region will rise by almost 50%, with China accounting for roughly half the growth alone, to satisfy its burgeoning livestock sector. While the EU should continue to hold its position as the largest importer of oilseed meals, its import dependency is likely to fall as a growing proportion of the region's protein meal consumption comes from domestically produced and crushed oilseeds, in particular rapeseed meal.

Notwithstanding the foregoing world oilseeds crush is projected to be mainly driven by vegetable oil demand. Largely sustained by income growth, vegetable oils, both from oilseed crops and from palm, will remain the fastest growing commodity in terms of consumption covered in this *Outlook*. Most of the demand growth is for food use, but bioenergy mandates will play an increasing role. Over the *Outlook* period, again comparing 2017 with the 2005-07 base period, the derived demand for vegetable oil in biodiesel production could increase by 14.3 million tonnes, about one third of the total increase in global vegetable oil consumption. The use of vegetable oils for bioenergy purposes is expected to grow strongly, and may alter trade patterns and the consumption mix in diets in some countries depending on policies in place. This may be particularly the case in the EU, where bioenergy use of vegetable oils has been mostly oriented to the use of rapeseed oil and could reach over 8% of worldwide and 41% of domestic vegetable oil consumption by 2017. In addition, biodiesel industries are expected to develop in several other countries, notably in Canada and Australia. Emerging biodiesel production will increase the consumption of domestically produced palm oil in Indonesia and Malaysia and soyabean oil in Brazil at the expense of exports of vegetable oil or oilseeds originating from those countries.

In addition to continued fast growth in feed use, biofuels look set to become a more significant long-term driver of the global oilseed complex, both directly through demand for vegetable oils in the bio-diesel production process and indirectly as increased cereal demand for ethanol production affects the relative prices of oilseeds and thereby the competition for arable land between these crops, especially in the United States. Furthermore, given the relative scarcity of maize, the share of oilmeals in total feed use may well be increasing over the *Outlook* period, even as a source for energy.

Buoyed by higher relative prices, land reallocation from competing crops, diverted pasture lands and new arable land could pave the way for global oilseed output to expand by 28% by 2017 when compared to the base period. Much of the foreseen expansion will be concentrated in Brazil, the EU and Argentina. Bolstered by a differential export-tax system, Argentina looks set to consolidate its position as a regional hub for oilseed crushing, despite a slowdown in the expansion of domestic crushing capacity. The country is expected to reaffirm its status as the world's major centre for shipments of soybean meal and oil, in a context of growing global import demand. China continues to import seeds and crush them domestically to capture the value added from processing oilseeds into protein meals and vegetable oil. Reflecting diminishing consumption growth, China's crushing industry is expected to develop at an average rate of 3.5% per annum compared to 8.5% in the previous decade. By 2017, China will have become the world's second-largest importer of oilseed meals and vegetable oils, after the EU, and it will have further reinforced its position as the leading importer of oilseeds. Brazil's share of global oilseed exports is expected to grow from 30% in 2008 to almost 40% in 2017, when the country easily surpasses the United States as the world's foremost oilseeds exporter.

Steadfast consumption growth and policy reform could lead to some tightening in sugar markets

Brazil is and will remain the world's leading sugar and ethanol producer and exporter, and the major centre of international price discovery for sugar. With the composition of Brazil's private-vehicle fleet increasingly being dominated by flex-fuel vehicles over the *Outlook* period, the derived demand for sugar cane from ethanol is expected to surge over the projection period, especially in the context of high projected crude oil prices. As a result, the projected share of the sugarcane crop going to ethanol increases from 51% on average in 2005-07 to 66% in 2017-18. Nevertheless, this development is not expected to unduly constrain the amount of cane available for sugar production and sugar exports, since sugarcane production in Brazil is foreseen to rise by over 75% from the base period to 2017. However, in the wake of steadfast domestic and international demand, there will be a propensity for sugar prices to strengthen over the projection period.

On the ethanol front, a number of other sugar producing countries are currently embarking on, or reinvigorating existing, renewable energy programmes, such as the EU, Japan, Malaysia, Indonesia, India, South Africa, Colombia, and the Philippines, particularly for use in the transport-fuel sector. Most of these fledgling fuel ethanol programmes, however, are expected to use molasses or starch sources rather than raw sugarcane juice as the preferred feedstock. As molasses is produced as a by-product of the sugar refining process, molasses-based bio-ethanol production should not greatly impair sugar production in these countries and may even stimulate further growth in cane and sugar output. Furthermore, in some regions, such as the EU, specific sugar crops (industrial beets) are being separately designated and developed for non-food uses such as bio-ethanol production.

Following reform of its sugar regime, the EU is expected to reduce production in the context of rising imports and World Trade Organisation (WTO) bound controls on subsidized exports and may eventually emerge as the world's leading sugar importer. Total sugar imports by the EU are expected to increase sharply by 2017-18, driven mainly by preferential exports from least-developed countries (LDCs) under the Everything But Arms (EBA) initiative and from the Africa-Caribbean-Pacific (ACP) group. However, the level of EU preferential imports from the latter group remains an important uncertainty. Mexican sugar exports to the higher priced United States market should increase with duties and restrictions eliminated under NAFTA on 1 January 2008. When considering shipments from third countries in addition to those from Mexico, United States purchases may exceed the import volume trigger for suspending the marketing allotments program of the 2002 FSRI Act, in all years of the projection period. As a result, public stock purchases (CCC) are expected to be required in each year out to 2017-18 to defend the US sugar loan rate price support system with domestic prices driven down to minimum loan-rate levels.

Developing countries account for virtually all the increase in world sugar production and consumption over the *Outlook*, due to faster population growth and rising incomes. India and China account for the lion's share in the increase in global consumption. Demand for sugar in China has been growing rapidly in the current decade from relatively low per capita consumption levels. With tightening government controls on artificial sweeteners, sugar consumption in China is projected to increase by 1.5% per year, implying rising imports that exceed the tariff quota of 1.95 Mt from 2008 onwards.

Despite increasing feed costs, world meat production continues to grow

Against a backdrop of high feed costs, low profit margins and competition for land resources, the global outlook for meat is characterised by substantial increases in production and consumption in developing countries and a more stable path of development in the mature OECD markets; though overall growth is expected to take place at slower pace than witnessed in the past decade.

Over the *Outlook* period, world meat production is expected to grow on average by 2% per year, but this trend disguises marked differences in growth rates of the different economic regions. Meat production among OECD members is expected to rise annually by around half a per cent, while growth in non-OECD countries could reach around 2.5% annually. Continuing investment, capacity building, better infrastructure and the dissemination of improved production technologies, are the main factors spurring such growth in meat and meat products, particularly in the more dynamic developing economies such as China, Brazil and – for pork and poultry predominantly – also in Argentina. As a result, some of them have been able to increase substantially their presence in supplying international meat markets. Brazil is a prime example of this feat. Given abundant land resources, capital and technology in combination with policy reforms, Brazil is expected to assume a 30% share of total world meat exports by the end of the projections. However, there are lingering concerns about the sustainability of this expansion. With trade recovering from the effects of animal-disease outbreaks, a small number of major exporters including the United States, Canada, Argentina and Australia alongside Brazil will remain dominant in world markets. However, in contrast, the export share of the EU is expected to further deteriorate over the *Outlook*.

Fuelled by greater purchasing power and urbanisation, diets in developing countries are increasingly shifting away from staple foods of vegetal origin towards proteins of animal

origin. Meat consumption in developing countries is expected to account for more than 80% of global growth. Much of this expansion will take place in Asia and the Pacific region, and will reflect in particular the rise in consumption of cheaper sources of animal protein, mainly poultry and pork. Consumption of pork in particular is expected to rise in China where pork is traditionally the most important meat and where 2007 consumption was reduced due to an outbreak of Porcine Reproductive and Respiratory Syndrome (PRRS). Import dependency in meat products is likewise expected to grow in many dynamic developing countries as burgeoning demand surpasses the domestic capacity for meat production throughout the duration of the *Outlook*. Among the developed countries, the Russian Federation is set to remain the world's largest net meat importer by 2017, followed closely by Japan.

Tightness in dairy market to ease

A pressing issue for the projections concerns how the global dairy industry will react to the unprecedented price spikes across dairy products that were observed in 2007. There is broad consensus that the industry has undergone structural change, where international markets have shifted from a supply-driven paradigm supported by distorting policies which used these markets as a dumping ground for excess supplies, to a more demand-driven paradigm, responsive to market signals and consumer wants. The growing relative importance of demand factors is further explained by urbanisation and higher incomes which have shifted diets in some developing economies towards a more diversified basket of dairy products, encouraged by growth in dairy marketing and retailing channels.

The *Outlook* foresees that high international prices of dairy products will transmit strong signals for supply response from both traditional and emerging exporters. More importantly, where trade linkages allow higher prices to be transmitted to producers in developing countries, they may create incentives for investment, expansion and restructuring. This will help to reshape their industries, which will be increasingly geared towards higher value-added processing of dairy products. Rising supply potential will enable future production growth and improved domestic marketing linkages, placing these countries in a stronger competitive position in regional and global markets.

Milk production gains over the *Outlook* period will be overwhelmingly driven by output growth in non-OECD countries. Dairy expansion in India, the largest producing country in the world, will be especially marked, where surging demand growth will stimulate a strong increase in milk and butter production. Driven by substantial yield gains, strong growth in milk production is also expected in China. This contrasts with moderate growth in the OECD area, where milk production increases mainly due to gains from Oceania and the United States and is chiefly constrained by domestic production controls in many other countries. These supply developments constitute one of the more prominent trends in the *Outlook* for dairy markets.

Supply response, however, could be checked by higher production costs induced by both higher feed and energy prices. These affect production, processing and distribution of milk products, and will encourage the competitiveness of pasture-based systems. They also will affect trade, as higher transportation costs put local production at greater advantage. The evolution of world dairy markets will also be influenced by extensive policy interventions and by internal food-security concerns, but also increasingly by environmental constraints linked to high livestock populations, water availability and competition for pasture land. Increasingly, a higher production response in many countries will come from higher yields as opposed to increased cattle numbers. A key for the dairy

outlook is the potential for dairy markets to adjust in the presence of increased price volatility and low global stock levels of dairy products.

OECD countries continue to dominate world dairy exports

World exports of dairy products are expected to grow for all products, with only a few developing countries able to affect the shares of traditional OECD exporters of Australia, New Zealand and the EU. In the latter, export shares could decline substantially, in light of a tight domestic market. Among the new exporters, Argentina is emerging as a dominant player in markets for whole-milk powder (WMP) and cheese, supported by its rising milk production capacity. Similarly, Ukraine is expected to increase its presence on the export markets mainly for cheese.

Import markets will remain rather fragmented compared to those for exports. The six largest importers of dairy products are expected to cover less than 50% of the world market. In China, despite a strong increase in milk-production, demand will continue to outpace supply and imports are expected to grow over the *Outlook*, in particular for milk powders, where China will become one of the leading importers. Russia is foreseen to remain as the world's most prominent importer of butter and cheese, with imports rising by more than 60% over the *Outlook* period compared with the 2005-07 base. Driven by milk-reconstitution needs, global imports of milk powders will grow by over 3% annually over the medium term, mostly in Asia and the Middle East.

Biofuel production and use on an upswing

Production and use of both ethanol and biodiesel have increased significantly in recent years. Production of fuel ethanol tripled between 2000 and 2007, with the US and Brazil accounting for the majority of this growth. However, a large number of other countries either commenced renewable energy programmes or increased fuel ethanol production in this period as well. Biodiesel output witnessed an even more pronounced expansion over the same period, having grown from less than one billion litres to almost 11 billion litres. Initially the EU accounted for more than 90% of global biodiesel production, but with increased biodiesel output in many other countries, in particular the US, its share has declined to less than 60% in 2007.

Near-record prices for maize, wheat and vegetable oils at the start of the *Outlook* have reduced the economic viability of biofuel production in many countries, despite strong public support and increasing fossil fuel prices. Public support in the form of tax concessions and tax credits, blending obligations and regulations, and import tariffs are widely applied to help offset higher production costs of biofuels compared to fossil fuels. The one exception is bio-ethanol production from sugarcane in Brazil. In this case, lower world sugar prices associated with a large global surplus have improved the economic viability and profitability of ethanol production in Brazil, which remains competitive with gasoline at a crude oil price of around USD 35 per barrel. Most commodity prices are expected to fall from current highs over the *Outlook* period with larger crop production. Coupled with expected high crude oil and biofuel prices over the next few years, the economic situation of biofuel producers should improve compared to the situation in 2007 but remain less favourable than in 2005 and 2006.

Ethanol production to grow as prices stabilise at higher levels

Global ethanol production is projected to increase rapidly and to reach some 125 billion litres in 2017, twice the quantity produced in 2007. World ethanol prices are

expected to exceed USD 55 per hectolitre in 2009 as crude oil prices rise, but should fall back to levels around USD 52-53 per hectolitre over the remainder of the projection period as production capacity expands in a number of countries. Following increased mandates international trade in ethanol is expected to grow rapidly to reach 6 billion litres in 2010 and almost 10 billion litres by 2017, despite continuing trade protection. Most of this trade will originate in Brazil, and will be destined for markets in the EU and the US.

Global biodiesel production and use to be driven mainly by public policy

Global biodiesel production is set to grow at slightly higher rates then for bioethanol – which maintains the largest share – to reach some 24 billion litres by 2017. This growth in output occurs despite the fact that world biodiesel prices are expected to remain well above production costs of fossil diesel, and to stay within the range of USD 104-106 per hectolitre, for most of the projection period. As in the case of ethanol, increased blending mandates should stimulate demand and boost international trade in the initial years of the *Outlook*. World trade is, however, projected to remain largely unchanged in following years due to technical constraints in the use of palm-oil based biodiesel in the colder climates and as production in the main consuming countries increases. Most of the trade should originate in Malaysia and Indonesia with the EU as the main destination.[1]

Main developments in trade in agricultural commodities

Rapid expansion of world trade overall, dominated by developing countries

When measured by imports, world trade is expected to grow for all commodities covered by the *Outlook*. The weakest growth is projected for wheat, with total world imports by 2017 exceeding the average for 2005/07 by nearly 15%. The highest growth rates of between 40 and 50% over this period are projected predominantly for vegetable oils and for certain livestock products (Figure 1.2).

Figure 1.2. **Overall strong growth in world trade**

Imports in 2017 compared to the 2005-2007 average
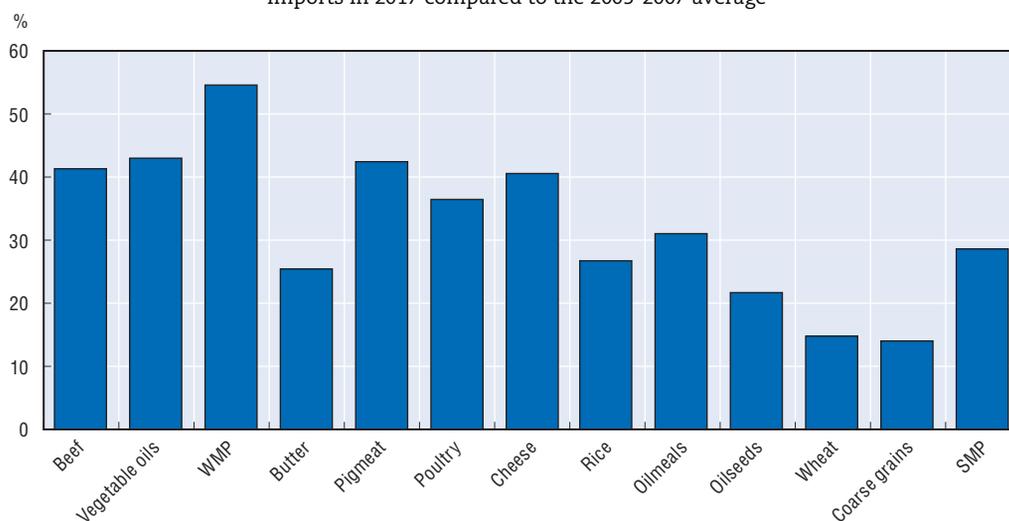
Source: OECD and FAO Secretariats.

When the focus is on crop imports, the projections show that for all crop products in the *Outlook*, except vegetable oils, developing countries dominate the picture of trade expansion. For wheat, sugar, oilseeds and oilmeals, most of the growth takes place in Asian developing countries. For oilseeds, import growth in Asia exceeds even total trade expansion and is offset to some extend by a decline in imports by OECD countries. For rice and coarse grains, most of the growth in imports takes place in African developing countries, and much of that in the LDCs.

Turning to imports of livestock products, the picture is much different. For the relatively expensive products such as beef, pork and cheese, import growth is dominated by OECD countries. For poultry and milk powders, most of the growth in global imports is explained by larger imports in Asian developing countries. While these countries also represent over 40% of import growth for butter, the largest contribution to the trade expansion for this product is due to larger imports in the CIS countries.

Emerging exporters challenge the dominance of OECD countries

Developing countries not only dominate import growth for most of the commodities in the *Outlook*, they also show with few exceptions the strongest growth rates for exports. For all products in the *Outlook* but rice, sugar and vegetable oils the growth in exports from developing country origin exceeds those from OECD countries. The leading growth position for the OECD for these products has to be seen in the context of trade growing from a small base, and in 2017, the OECD share in world exports is only 6% for vegetable oils and 14 and 10% for sugar and rice, respectively. Export growth in developing countries is greater – and sometimes much greater – for all other products, leading to declining shares of OECD countries in world exports for these products. Nevertheless, these countries continue to dominate the world export picture with shares of world trade ranging from 58 to 70% for wheat, coarse grains, pork and all dairy products. It is only for beef and poultry where the export share from developing countries of about 60% exceeds those of the OECD (Figure 1.3).

Figure 1.3. **Growth in world exports dominated by developing countries**
Exports in 2017 compared to the 2005-2007 average
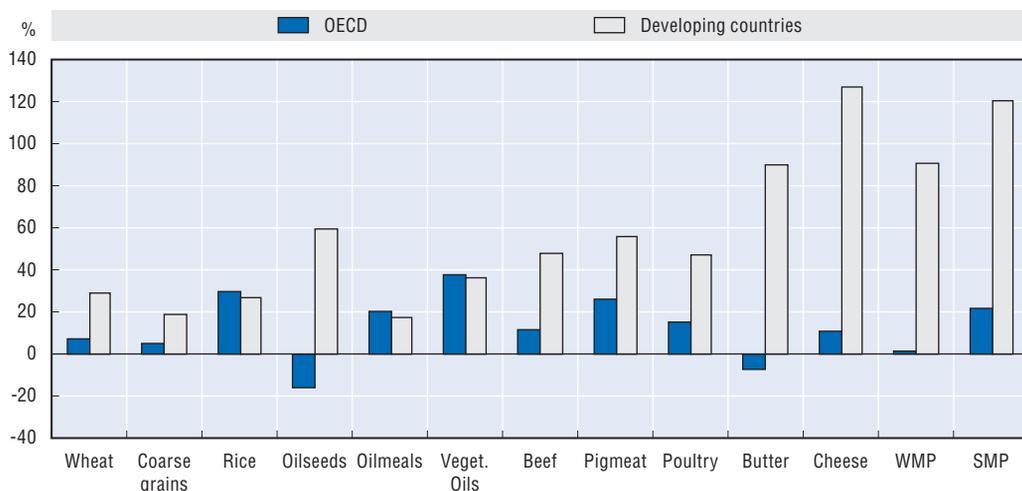
Source: OECD and FAO Secretariats.

The outlook for world prices

World prices to retreat from current highs but firmness expected to prevail over the medium term

In the context of generally lower global stocks in recent years, biofuels impose an additional dimension to global demand for grains, oilseed products and sugar. Coupled with sustained global income growth which is particularly underpinning demand for food and feed in certain developing and emerging countries, with limitations to land and productivity based increases in supply and with higher oil prices which raises production costs, this situation is expected to underpin international quotations. All three of these factors are expected to lift price levels for arable crops that are, on average, substantially higher than in past projections. Higher average crop prices and associated feed costs, in turn, lead to higher livestock product prices over the *Outlook* period as well. When compared to the average for 1998 to 2007, prices projected for the period 2008 to 2017 will – in nominal terms – on average be around 20% higher for beef and pork, some 30% for raw and white sugar, 40 to 60% for wheat, maize and skim milk powder, more than 60% higher for butter and oilseeds and over 80% higher for vegetable oils (Figures 1.4 and 1.5).

Figure 1.4. **Outlook for world crop prices to 2017**

Index of nominal prices, 1996 = 1
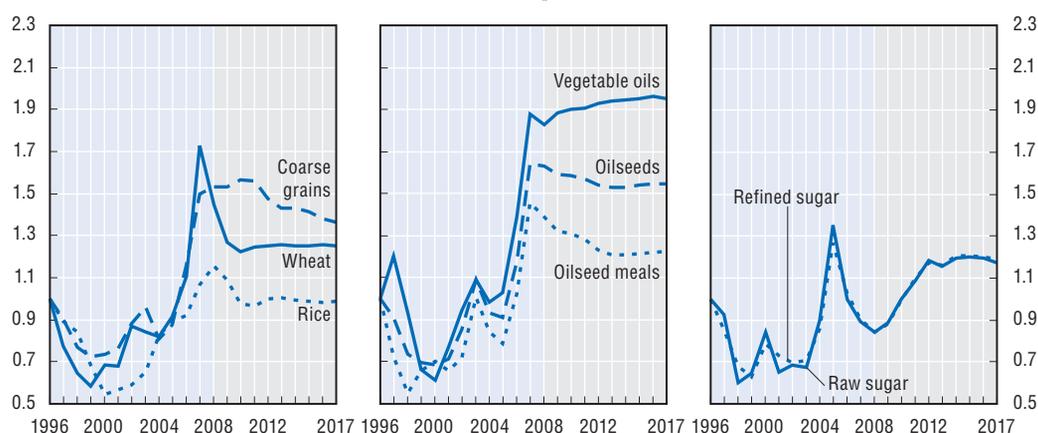
Source: OECD and FAO secretariats.

Figure 1.5. **Outlook for world livestock product prices to 2017**

Index of nominal prices, 1996 = 1
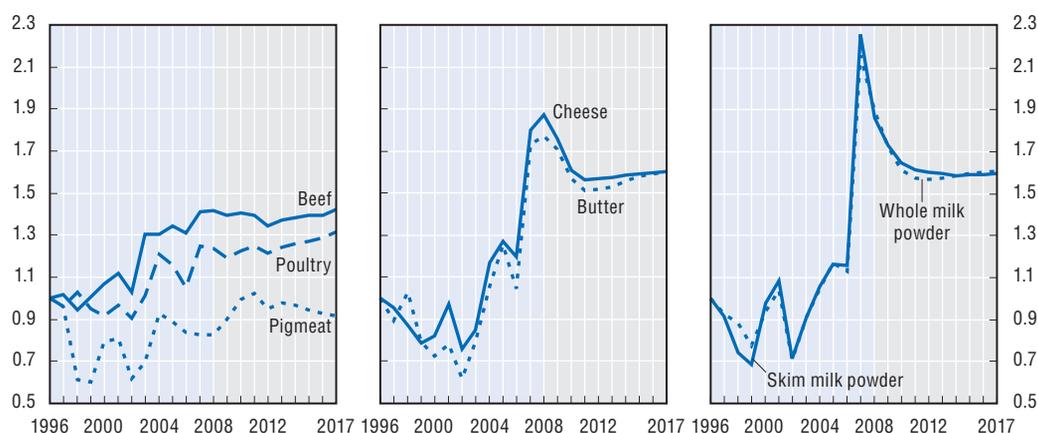
Source: OECD and FAO Secretariats.

When expressed in real terms, the decade-over-decade increase is obviously smaller, but remains very substantial for crops and dairy products.

Despite this rise in their average level, prices of most agricultural commodities fall and are expected to remain below current or recent peak levels by the end of the *Outlook*. In addition, there would not appear to be any structural changes in the functioning of markets that would suggest reduced price variability. On the contrary, a number of factors are at play that may well render market prices more variable than in the past. Such factors include continued low stock to use ratios, a possibility of more variable weather conditions, less responsive consumer demand to farm level price changes as the commodity share in the food bill falls, increased industrial demand for agricultural commodities, which also tends to be less price-sensitive than food and feed demand, and massive amounts of non-commercial investment funds that may enter or leave agricultural futures markets with either net long or net short positions as profit opportunities dictate.

Low stock-to-use ratios support cereal prices and prices in the oilseed complex

In spite of the expectation of a strong recovery in grain production in 2008, prevailing low stock levels suggest continued market tightness, especially when demand prospects for food, feed and fuels show no sign of abating. Cereal markets are expected to remain closely balanced over the *Outlook* as stock to use ratios are expected to remain low in the years to come and despite growth in cereal production. This implies high grain prices throughout most of the *Outlook*. However, continued productivity increases in line with their long-term trend and some increase in areas planted are expected to see prices below their 2007 peak levels. For wheat this is the case throughout the *Outlook* period, while for coarse grains prices are likely to remain high for some years to come before falling below present record levels. Despite this decline, grain prices will average above their mean levels of the previous decade, even in real terms. From that higher level, however, real prices continue their long-term downward trend.

International rice prices are anticipated to remain firm in the short term, as countries replenish rice inventories. While weaker prices are projected from 2010, they are unlikely to fall much in consideration of higher production costs. With lower buffer stock levels projected on thin world markets, world prices are likely to manifest much higher volatility than in the past, as the market becomes more vulnerable to supply and demand shocks.

Rising demand for vegetable oils, for both food and the growing biodiesel sector, is expected to weigh heavily over the medium term, leaving stock to use ratios in the oilseed complex under pressure. The combination of strong demand and low inventories will be extremely supportive to prices in the next few years, but from then on prices will gradually fall back as supply and demand adjust. As is the case for cereals, prices for oilseed and oilseed products, once corrected for inflation, are expected to decrease in real terms but to stay considerably above their long-term trend.

Sugar prices strengthen with increasing premium for white sugar

As the world market is brought into closer balance and excess sugar stocks drawn down, world indicator prices for raw and white sugar are projected to rise strongly in nominal terms, but will still trend downwards in real terms over the projection period. The margin between raw and white sugar prices should widen over the *Outlook* given expectations of increasing supply of raw sugar and rising costs of refining. With reforms having reined in the use of exports subsidies in the EU, reducing its role as a major white-

sugar exporter, the white-sugar premium in future years should reflect more the cost of further sugar refining.

Meat prices projected to stay above current averages, but dairy prices expected to gradually retreat from 2007 record levels

Given rising feed costs and strong meat demand in the major emerging economies, meat prices are expected to rise above historic levels in the medium term. Non-ruminant production is notably affected by high cereal and oilseeds prices as low-priced distiller's dry grains (DDGs) cannot easily be integrated into their feed rations. These higher input costs are expected to result in increased meat prices over the next decade.

World dairy prices are expected to weaken somewhat over the next two years as supply responds sufficiently to strong price incentives. While prices are anticipated to decline from currently high levels, the expectation is that they will remain firm over the entire outlook and stay higher compared to the previous decade. As with the majority of other agricultural commodity prices, when expressed in real terms the well-established longer term falling trend was reversed radically in recent years. However, dairy products are expected to resume a modest declining trend in future years, albeit from a much higher level than in the past.

Some major issues and uncertainties

This year's *Outlook* has been prepared in an environment characterised by increased instability in financial markets, higher food price inflation, signs of weakening global economic growth and food-security concerns. The commodity markets have shown dramatic rises in prices across a range of commodities on a weekly basis, attracting the attention of the daily press and stimulating discussion on the food-feed-fuel debate. Although projections for agricultural commodity markets have always been subject to a number of uncertainties, these have taken on more importance in this year's edition. As in the past, weather conditions, animal-disease outbreaks, the macroeconomic environment and domestic policies are all factors that will continue to affect agricultural market outcomes. The question for the forthcoming period is how these key factors and uncertainties will change over time and to what extent they will change the market outlook. Some of these uncertainties are discussed in detail in a separate section in this report.

On the supply side, weather-related production shocks have always been the single most important factor for agricultural production and recent bad weather spells in several important producing regions have been responsible for much of the supply shortages on commodity crop markets. Is the recent spell of bad weather merely an episodic event, or does it foreshadow more systematic changes linked to global warming and more variable weather patterns around the world? In the presence of high prices and the related increased food security concerns, what is the scope for further productivity gains, technological advances and breakthroughs in production and harvesting or for bringing new areas into cultivation? In developing countries, what is the potential for the expected plateau of higher average prices to be transmitted to domestic markets, reinvigorating agricultural industries and improving their competitive position in local and international markets? What will be the timing of the availability of second generation biofuel production technologies? Coupled with unforeseen changes in crude oil prices, how will this affect the production of biofuels and agricultural commodity markets?

The uncertainties on the demand side seem to be lesser as steady year-on-year income driven consumption growth remains a basic feature of many commodity markets. Nevertheless, macroeconomic conditions are playing a crucial role for future market developments and a slowdown in economic growth as compared to that assumed in the *Outlook* would moderate demand, international trade and agricultural commodity prices. In addition, exchange rate developments could have an important influence on the markets as a change in domestic currencies *vis-à-vis* the US dollar would affect comparative advantages and domestic market responses given price changes on international markets. A particular uncertainty on the demand side of agricultural markets is the growing presence and investments of non-commercial interests, such as financial funds, in futures trading on commodity markets. To what extent is the growing demand for financial derivatives affecting demand, risk management strategies and spot market prices for crops? And how will this further evolve in the future.

Policy interventions can also create uncertainty in commodity markets. Changes in biofuel policies, either to raise or to lower domestic targets or to review current policy incentives downwards, could be of major importance for agricultural markets given that biofuel production is one of the important factors lending strength to these markets over the medium term. In more general terms, there will be changes to domestic policies in key producing and trading countries such as new farm legislation in the United States, any changes that may results from the "health check" of the EU CAP or an eventual outcome to the current round of the Doha multilateral trade negotiations. Such and other changes have not been anticipated in this *Outlook* and would affect market outcomes. Finally, high international commodity prices have recently lead governments in several countries to introduce measures to restrict exports. While such policies may in the short term provide some relief to domestic consumers, at the expense of some further belt tightening by their neighbours, they impose a burden on domestic producers, dampen the supply response in these countries, and aggravate the global commodity market situation.

The policy issues

The key feature of this year's *Outlook* is the record-high level of many agricultural commodity prices. These are partly due to short-term factors such as drought in major cereal-producing areas and speculative activity. Once the influence of these transitory factors is removed or changes, prices will fall from current highs. However, there are factors at play that will keep prices well above average levels over the past decade. These include the steady growth in demand linked to population and income growth as well as changing diets in emerging economies, in particular China and India. But there are also factors that are uncertain into the future: energy prices, the diversion of land and crops for bioenergy, and climate change.

High prices are always good for some and bad for others. They are good for producers of farm produce, including in many cases for the people they employ, even though high prices of cereals, for example, mean higher costs for producers of cereal-based animal products. High prices are not only beneficial for some farmers in OECD countries, but may also be good news for commercial producers in developing countries. Insofar as those higher prices more than offset higher energy and other input costs in these countries, higher farm incomes can have important multiplier effects and lead to higher income levels in rural areas. For farm households producing mainly for their own consumption or for local markets that are insulated from price fluctuations on national and international

markets, the impacts will be mitigated. But for the poorer segments of the population, and in particular for those in the net food importing developing countries, the impacts will be strongly negative as an even higher share of their limited income will be required for food consumption.

What are appropriate policy responses?

According to an old adage, the best remedy for high prices is high prices. High prices stimulate supply and dampen demand on agricultural markets, the balance will change and prices will come down. But the *Outlook* also shows that prices are likely to continue to average around substantially higher levels than in the past, possibly with larger variations around that higher average.

The *Outlook* for lower prices in the foreseeable future with the possibility of a turnaround being more rapid than is currently foreseen calls for caution in taking any precipitous policy action. However, the fact that certain groups in the population and certain countries suffer from current high prices and may continue to be worse off in a context of sustained higher price levels in the future provides a policy challenge.

In the short term, humanitarian aid for the populations in countries most severely affected is urgently required. Before recent price increases, although there had been improvements, hundreds of millions of people were going hungry because they could not afford food. With higher prices, the numbers of people suffering from extreme hunger has increased even further and the first UN Millennium Development Goal has become an even greater challenge. As suggested recently by the World Bank, aid in the form of cash or vouchers is more appropriate in many cases than commodity shipments, provided supplies can be procured. Such aid may also be more effective than short term measures, such as export taxes or embargoes, that restrain exports in order to ensure domestic market supplies.

In the medium term, there is a real need to foster growth and development in poor countries and to assist in developing their agricultural supply base. In some of the poorest countries, investment in agriculture, including in agricultural research, extension and education, which has been lagging in recent years, is often the best way to cut poverty and stimulate economic activity. Expected high farm prices may provide an incentive for this. In other situations, investment in agriculture may be helpful, but there is also a need to diversify the structure of the economy. In general, investments in improving the overall environment in which agriculture operates may be most appropriate. These include improving governance and administrative systems, macroeconomic policy, infrastructure, technology, education, health, and defining and enforcing property rights.

Agricultural trade policies require further reform. Trade restricting policies – whether they restrict exports or imports – have undesirable and often unintended impacts, especially in the medium and long term. On the import side, "protecting" domestic producers of agricultural commodities by providing high price support and border protection – including the increasing resort to non-tariff barriers – restricts growth opportunities for producers abroad and imposes a burden on domestic consumers. Export taxes and embargoes may in the short term provide some relief to domestic consumers – including to the wealthier ones who may not need these measures – but they impose an even larger burden on domestic producers and limit their supply response, as well as contribute to global commodity market uncertainty.

It is also necessary to examine more closely the causes and impacts of the recent price increases. On the supply side, the link between production and yield shortfalls, climate change and water availability warrants further analysis, both in terms of trends, variability and risk. Investments in R&D, technology transfer and extension services, particularly in less developed economies, could do much to increase productivity and output and there may be a role for governments to foster this, especially where there are wider public benefits. In addition, the future development of genetically modified organisms (GMOs) also offers potential that could be further exploited, both to improve productivity and to enhance the attributes of crops destined for either food or non-food uses.

The largely policy driven nature of the rapid increase in the supply and demand for biofuels is one of the reasons for current and future higher prices. OECD/IEA analysis to date[2] suggests that the energy security, environmental, and economic benefits of biofuels production based on agricultural commodity feed stocks are at best modest, and sometimes even negative, and are unlikely to be delivered by current policies alone. Alternative approaches may be considered that offer potentially greater benefits with less of the unintended market impact, such as policies that encourage reduced energy demand and greenhouse-gas (GHG) emissions, provide for freer trade in biofuels, and accelerate introduction of "second-generation" production technologies that do not rely upon current commodity feed stocks.

Notes

1. For a detailed analysis of the market impacts of biofuel policies, see OECD/IEA Economic Assessment of Biofuel Support Policies (forthcoming).

2. For further details, see OECD/IEA Economic Assessment of Biofuel Support Policies (forthcoming).

Chapter 2

Are High Prices here to Stay?

Introduction

World prices of maize, wheat and oilseed crops all nearly doubled in nominal terms between the 2005 and 2007 marketing years (Figure 2.1). Those prices continued rising into early 2008, competing with oil-price hikes in capturing media and policy attention. These developments have led to a fuller awareness and a justifiably heightened concern about food security and hunger, especially for developing countries where food availability at affordable prices is precarious. The analysis in this chapter does not attempt a comprehensive explanation of all of the factors responsible for the recent run up in prices. Rather the focus of the discussion is predominantly on the contribution – qualitative or quantitative – of various factors in determining price developments over the medium term.

Figure 2.1. **Food commodity prices, 1971-2007 with projections to 2017**
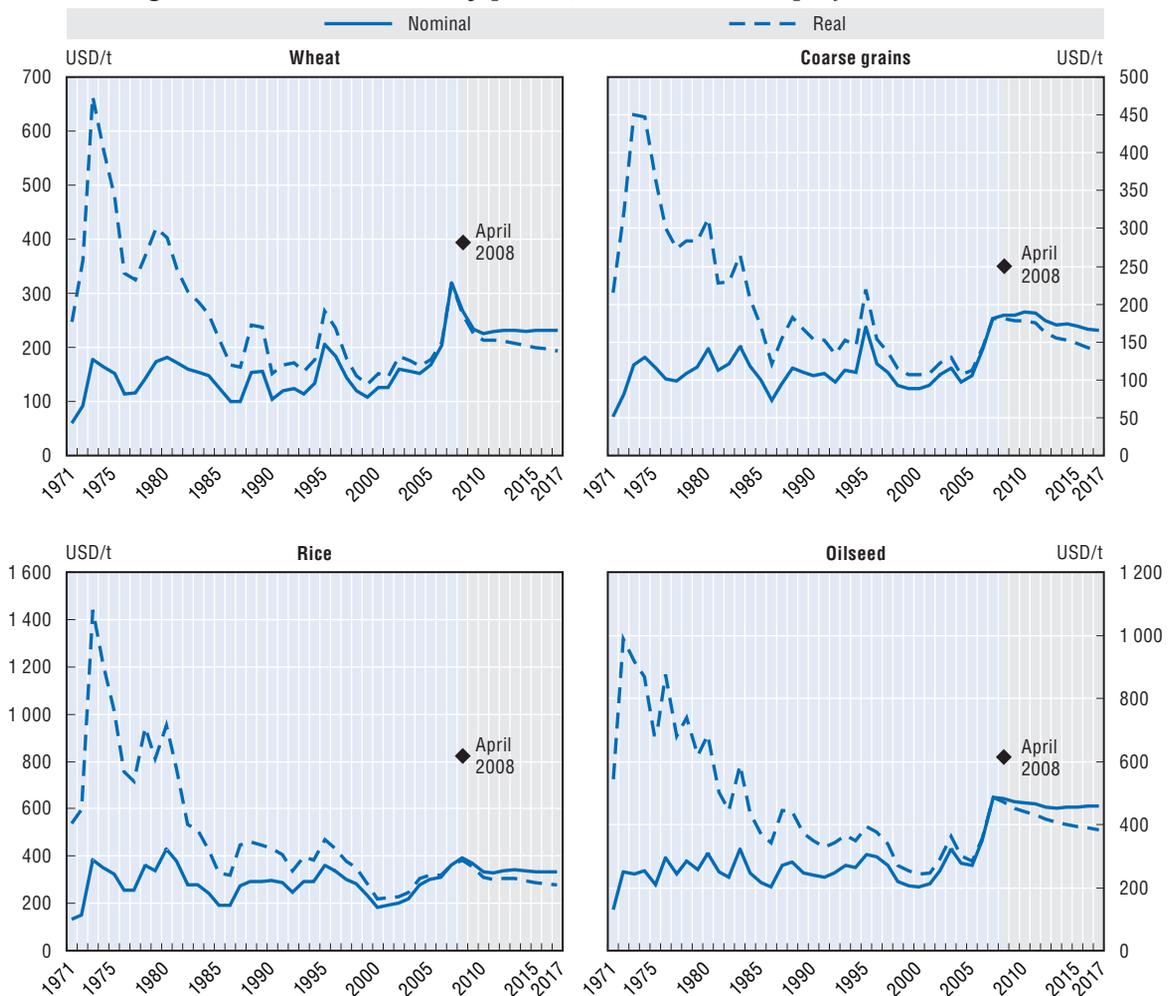
Note: Real prices deflated by USA GDP deflator; 2007 = 1 (April 2008: montlhy price quotation).
Source: OECD and FAO Secretariats.

Meat and poultry prices have also seen increases during this period but only very modest ones. There have been substantial increases in prices of dairy products in 2007 although the pressure on the international dairy market has already abated somewhat. As the international debate has focused recently on the implications of increases in crop markets, the primary focus of this chapter is on prices for cereals and oilseeds.

Agricultural commodity price increases have been a significant, but not the only, factor driving up the cost of food. High oil prices and the resulting higher costs of food processing, transportation and distribution have driven food costs higher still. Food price inflation is generally running well ahead of general price inflation but especially so in many developing countries (Box 2.1). Higher food costs are of course more painful for

---

Box 2.1. **Measuring the impact of rising commodity prices on food prices**

Agricultural commodity price increases are making headlines and there is much debate and concern about what these extraordinary price increases mean for food prices, particularly in developing countries. Policy makers have become extremely concerned by recent price developments because of the implications for consumers' ability to meet their most basic of needs, food. This is a critical issue for developing countries where large portions of the population have income levels that are low or at subsistence levels. But increasing prices reduces the purchasing power of incomes also in relatively high-income countries, where it will be the low-income groups that are particularly affected. In general, households with low incomes are more heavily penalized when the price of necessities rise because these absorb a larger share of their income.

The increase in food prices from a government perspective is however not generally measured by the change in one or two commodities or in one or two cities, but by a fixed basket of foods consumed in urban areas of the entire country; this measure is known as the food price index. Changes in the food price index are important because of their contribution to overall inflation rates, that is, the change in the Consumer Price Index (CPI).[a] The impact of food prices on this indicator varies across countries according to the share of income which consumers allocate to food and the rate of increase of food prices.

How important are commodity price increases for food prices?

The direct links between current commodity prices and retail food prices are often difficult to make without an analysis of the food production and distribution structure as well as the relative costs of inputs. For importing countries, the link between international commodity prices in local currency depends on a number of factors, including exchange rates, transportation costs and border policies, as well as the structure of the food distribution system. The local price of wheat for a consumer in such countries is not simply the international price in USD at say US Gulf Ports, but the Gulf Port price of wheat times the exchange rate plus the cost of transportation and insurance to the point of delivery in addition to any import duties imposed by the country. So in this case, recent domestic price increases not only reflect the higher price of wheat but also increased freight (transportation and insurance) costs, which have risen by 250% since early 2006, and are now at record high levels.[b] Nevertheless, price increases in domestic currency terms may be less than the increase in the dollar price of wheat in countries where the US dollar has depreciated significantly *vis-à-vis* their currency.

Box 2.1. **Measuring the impact of rising commodity prices on food prices** (cont.)

Trade policy measures such as import tariffs also add to the price of imported commodities. These costs can be easily modified by governments so as to limit price increases, for instance, if governments adopt import tariffs which decrease automatically if the price of the imported commodity rises beyond a certain level, as in the case of rice for Bangladesh, or even be suspended if the world price rises beyond a threshold level, such as in Indonesia. These mechanisms function to moderate price increases once goods reach the border. In the face of rising domestic prices of key commodities, exporting countries may put in place export taxes or bans. India and Vietnam recently banned rice exports when prices reached what were deemed to be unacceptable levels in domestic markets.

Once commodities reach the domestic market, the issue of price transmission through the supply chain to retail markets predominates. The link between commodity prices and retail food prices is a hotly debated issue, and depends on many factors that vary by country. In general, farm gate prices of agricultural commodities in many developed countries account on average for 25 to 35% of the final retail price. While this is not negligible, the share is often much less and varies across fresh and processed foods. The higher the degree of processing, the lower will be the share of the raw commodity in the final price at retail. This means that food prices reflect not only commodity price changes but also those of other inputs, in particular wages, energy, transport and storage. It also means that depending on the circumstances, retail food prices can change by more or by less than what would be determined by the change in commodity prices if these factors do not change to the same degree.

In developing countries the share of processed goods in the food basket is generally small, thus the increases in commodity prices are likely to be more directly transmitted through to retail prices. This fact, coupled with a larger share of income devoted to food expenditures, implies that the rise in agricultural commodity prices has a significant impact on developing country consumers. Both of these elements will determine the extent of the contribution of food price changes to the overall CPI or inflation.

How important is the food component in the CPI?

The weight of the food component in the CPI varies significantly across countries, reflecting the structure of household expenditures. The food price component ranges from less than 10% in the United States to over 30% in Turkey and Poland, but for the majority of OECD countries food expenditure shares range between 13% and 20%. In developing countries the share of food expenditure in the budget is much higher; for instance, it is 28% in China, 33% in India, and absorbs more than half of total household expenditures in countries such as Kenya at 51%, Haiti at 52%, Malawi at 58% and Bangladesh at 62%.

These observations confirm Engel's Law, which displays an inverse relationship between food expenditure shares and income (Figure 2.2). The implication is that for countries where food expenditure accounts for an important share of income, high food prices will have a negative impact on the purchasing power of incomes. In these countries, rising food prices mean an erosion of the capacity to meet basic needs, and this is likely to become a potential source of political tensions and even violence. Low-income households are those that will be most affected by an increases in food prices. As the share of income they spend on food is relatively high, they have little remaining income left to reallocate expenditure from other goods to meet food needs. They may simply be forced to consume less food and other basic necessities as a result of higher food prices.

Box 2.1. **Measuring the impact of rising commodity prices on food prices** (*cont.*)

Figure 2.2. **Food expenditure shares and per capita income**
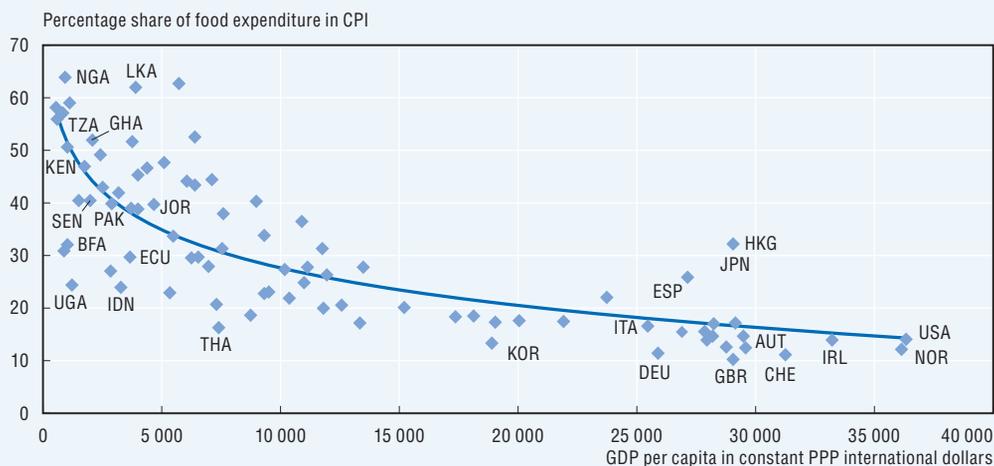
Source: FAO Secretariat (HLC/08/INF/1: Soaring food prices: Facts, perspectives, impacts and actions required. April 2008).

How fast have consumer food prices been rising?

For most countries consumer food price inflation has recently exceeded overall inflation rates (see Table 2.1 for selected countries), and food price inflation in developing countries has exceeded that in OECD countries. For most developing countries this is likely due to the rise in agricultural commodity prices. Since a larger share of foods consumed in developing countries is unprocessed, the commodity portion of food has a larger weight in retail prices. Furthermore, food price inflation in developing countries has exceeded that in developed OECD countries.

Since the food price component is an aggregate measure, it can hide price variations for specific products. It is difficult to summarize the products that have increased most rapidly over the past year, as this depends largely on country situations. Using data for February 2008 compared to February 2007, milk product prices have generally risen sharply, as shown by those for butter with price increases of 50% in Poland, 40% in France, 36% in Spain, 32% in the Czech Republic, about 36% in Jordan and some 12% in Malaysia. Eggs prices have also risen sharply, by 34% in the US, 30% in the UK and the Czech Republic and 10% in Spain. Vegetable oil prices rose 18% in India and 47% in Botswana in the past year. Meat prices rose sharply in some countries such as China, where the increase was 45% but this was largely due to disease issues in their pork sector. The increase in prices for cereals and bakery products was much more moderate; prices rose by 5.7% in the US, 6.9% in the UK and 3% in France and Korea, and about 6% in both China and India.

What is the effect of food price increases on overall inflation?

It is clear from Table 2.1 that consumer food prices are contributing to the overall rate of inflation in most countries. For developed countries, where food price inflation is moderate and the share of food in the total consumer basket is small, the contribution of food price inflation to overall inflation is correspondingly moderate. In most countries it contributed less than 1 percentage point to the overall CPI increase over the year from February 2007 to February 2008. But as would be expected, the impact of food price inflation on overall inflation in developing countries is much larger. As shown in Table 2.1 it contributes 6.5 percentage points of the total inflation of 8.7% in China, 7.6 points of the total inflation of 10.6% in Pakistan, 9.2 points of the total of 10.3% in Bangladesh, 12.4 points out of total inflation of 15.4% in Kenya, and 1.9 points out of total inflation of 4.6% in India.

Box 2.1. **Measuring the impact of rising commodity prices on food prices** (*cont.*)

Table 2.1. **Food price contribution to consumer price inflation (selected countries)**

	Total CPI % change[1]	Food price inflation[1]	Expenditure share of food	Food contribution to total change in CPI[3]
Developing		- % -		
Guatemala	8.04	11.6	38.9	4.5
Sri Lanka[2]	19.37	25.6	62	15.9
Botswana	7.7	18.3	21.8	4.0
India[2]	4.6	5.8	33.4	1.9
Indonesia	6.8	11.4	26.7	3.0
Pakistan[2]	10.6	18.2	41.5	7.6
South Africa	8.6	13.6	21	2.9
Jordan	5.4	9.1	39.7	3.6
Peru	4	6.4	29.6	1.9
Senegal	5.8	10.9	40.3	4.4
Egypt	9.5	13.5	41.5	5.6
Haiti	9.9	11.8	50.3	5.9
Kenya	15.4	24.6	50.5	12.4
Bangladesh	10.3	14.2	64.5	9.2
China	8.7	23.3	27.8	6.5
Developed				
USA	4.0	5.1	9.8	0.5
France	2.8	5.0	16.3	0.8
Germany	2.8	7.4	10.4	0.8
UK	2.5	5.6	11.8	0.7
Japan	1.0	1.4	19.0	0.3
Greece	4.4	6.6	17.8	1.2
Spain	4.4	7.1	21.9	1.6
Switzerland	2.4	2.2	11.0	0.2
Poland	4.3	7.1	30.4	2.2
Sweden	3.1	5.9	13.4	0.8

1. Percentage change February 2007 to February 2008.
2. Includes beverages and tobacco.
3. Contribution is column 2 x 3/100.
Source: OECD Secretariat. For OECD member countries, April 2008. FAO Secretariat for non-OECD countries.

The main conclusion is that for developing countries food price inflation makes an important contribution to overall inflation. For the urban poor the situation is particularly distressing since low incomes, often not much above USD 2 a day, combine with rising food costs and no access to land resources to produce at least part of their food supplies. The *Outlook*, with its projected sustained higher level of prices, implies an important decline in the purchasing power and welfare of millions of people across the globe.

a) In most OECD countries core inflation, which excludes food and energy prices because of their high variability, is the guiding indicator for policymaking in monetary and fiscal policies.
b) The International Grains Commission freight cost index rose from 4 125 at the start of 2006, to 10 347 in March 2008.

consumers in poorer segments of the population, in particular those in food-importing developing countries, where the food bill constitutes a dominant share of total consumer expenditures.

The causes of the price spike are complex and are attributable to a combination of mutually reinforcing factors at play in international agricultural markets. The list includes: droughts in key grain-producing regions; sharply increased biofuel demand for food commodities; rising oil prices and a continuing devaluation of the US dollar, the currency in which indicator prices for the commodities of interest are typically quoted.[1] Critically, these supply and demand developments occurred after there had already been a run-down in stocks, which under more normal circumstances could have dampened price movements. Finally, the turmoil in commodity markets has occurred against the backdrop of a severe world financial crisis that is widely believed to have sparked a substantial increase in speculative interest in agricultural futures markets (Box 2.2).

Box 2.2. **Prices in cash and derivative markets**[a]

Derivative-markets prices in the US, such as options and futures for wheat, soybeans and maize, are widely quoted as indicative prices and are the focus of much commercial activity. Long-time participants have been surprised at recent increases and daily changes – some daily changes in prices in 2008 have been greater than levels of prices a few years ago. New market participants are seen to bring vast amounts of money and some observers question if they contribute to both the direction and variability of prices in these markets.

A key concern now is the participation of new agents that are perceived to be motivated by risk-diversification to the exclusion of serious assessment of price levels. Institutional investors are known to be hedging other risk in their portfolios typically by taking long positions (a commitment to buy) on near-by contracts, as opposed to short positions (commitments to sell). Data relating to the activities of non-commercial traders in the US derivatives markets provides some information about institutional investors' trading patterns and scale.[b] Total open interest in maize, for example, has increased from 0.66 million contracts in February 2005 to 1.45 million February 2008 during which period non-commercial traders' share in opening interest in long positions increased from 17% to 43%. For wheat, contacts increased from 0.22 million to 0.45 million over this period and the non-commercial traders' share of opening long interest rose from 28% to 42%. The pattern for soybeans is similar whereas sugar contract volumes increased over this period but non-commercial traders' share in open long sugar positions remained at about a third. Monthly trading volumes have increased during this period by 85% for maize, 125% for wheat and 56% for soybeans, and by threefold for sugar. Supplemental data from this source confirm that institutional investors tend to take one-sided (long or buying) positions, and that these entities, along with other non-traditional participants such as banks, account for a growing share of the market.

Analysis of the role of institutional investors should not be reduced to the level of caricature. But a sound strategy for one firm may not be so wisely pursued by all. The aggregate effect of all their activities may be upward pressure on derivative market prices in the short term. The jury is still out on the longer term impacts on price levels. But increased price volatility seems a plausible result given the volume of these non-commercial investments and given the fact that they may move in and out off commodity trading as alternative profit opportunities dictate.

> ### Box 2.2. **Prices in cash and derivative markets**[a] (cont.)
>
> Ideally, derivative markets help pool information at low costs to help discover prices and provide a venue for trading risk. The surge of new moneys invested into commodity markets by non-traditional sources is seen by some observers to test the institutional designs of derivative markets and of the link between them and cash markets.
>
> a) The material of this box is based on a contribution by Frank Rose, formerly Senior Vice-President, CBOT, now Assistant Professor, Lewis University.
> b) Commitments of Traders Report, Commodity Futures Trading Commission.

The projections contained in this *Outlook* are based on implicit assumptions concerning which of the contributory factors are temporary and which are permanent. Further analysis examines how variations in these assumptions affect the robustness of the view that higher prices, though not as high as today's levels, are here to stay.

Recent food commodity price hikes in an historical context

The commodity price spikes witnessed in the last couple of years, and particularly most recently, are exceptional when viewed from the perspective of the last decade or so but not so much so when seen in a longer historical context. Figure 2.1 shows the evolution of annual average world prices of wheat, coarse grains, rice and oilseeds from 1970 to 2007, with projections from 2008 to 2017. Monthly average prices for April 2008 are also included to indicate most recent developments.[2]

For each commodity there are two lines, one tracing dollar-denominated nominal prices and one tracing that same series adjusted for inflation (labelled "real" prices). Nominal price trends are convenient indicators of short-run price developments but to be economically meaningful, longer-run price trends need to be looked at in inflation adjusted terms. The first thing to notice from these four graphs is that a high degree of price volatility is characteristic of world food commodity markets, even when one looks at annual averages. Prices are typically sensitive to short run shocks to either supply and demand because of, *e.g.*, delays between production decisions and output and the resulting slow adjustment of quantities demanded to price changes. Volatility on international markets is further enhanced by policy interventions that shift price risk away from producers or even outside of the country entirely.

The second thing to notice from the data plotted in Figure 2.1 is that the recent price spike is neither the only, nor even the most important, one to occur in the last 30-plus years. In inflation adjusted terms, today's prices fall well short of peaks achieved in the early 1970s, and neither current maize nor wheat prices are averaging much above levels achieved as recently as the mid-1990s.

Of course, having weathered previous food commodity price storms does not negate the need for or the urgency of policy action to deal with this one. However, deciding which policy actions are most appropriate requires an understanding of the various forces driving recent price moves and knowing which of those various forces may be assumed to be temporary and which are likely to be permanent features of future commodity markets.

Crop and vegetable oil price changes: What happened and what happens next?

What happened...

Wheat and coarse grains

Between the 2005 and 2007 marketing years, world planted area of wheat and coarse grains (maize, barley, sorghum, oats,) was basically flat, although regional changes were at times quite large (Table 2.2). Within the OECD region, a sharp decrease in EU area planted to these grains was offset by an increase in plantings in the US. The lower area planted to wheat and coarse grains in the EU defies the increasing world prices, even if less pronounced in euro, but may be consistent with domestic market incentives caused by policy changes. An analysis of the relative impacts of policy reform and other factors on recent changes in EU wheat and coarse grains areas goes beyond the scope of this report.

Table 2.2. **Supply of wheat and coarse grains**

	2005 level	2007 level	Change 2005 to 2007		2017 level	Change 2005 to 2017	
			Absolute	Per cent		Absolute	Per cent
Prices, USD/t (Nominal)							
Wheat[a]	168	319	150	89	231	62	37
Maize[b]	106	181	75	71	165	59	56
Area harvested, m ha							
World	525	531	6	1	539	14	3
OECD	177	177	0	0	177	−1	0
Australia and Canada	36	35	−1	−2	37	1	3
European Union	62	57	−6	−9	58	−4	−7
United States	55	61	5	10	58	3	5
Non-member economies	348	354	6	2	362	14	4
Brazil	16	16	0	−2	17	0	1
China	52	52	0	1	48	−4	−7
India	52	56	4	8	60	8	15
Indonesia	4	3	0	−2	4	0	1
South Africa	4	4	−1	−13	4	0	−10
Yield, t/ha							
World	3.1	3.1	0.1	2	3.5	0.5	15
OECD	4.5	4.5	0.1	1	5.3	0.8	17
Australia and Canada	2.5	2.0	−0.5	−21	2.6	0.1	3
European Union	4.4	4.5	0.1	2	5.4	1.0	22
United States	6.5	6.7	0.3	4	7.7	1.3	20
Non-member economies	2.4	2.4	0.1	3	2.7	0.3	14
Brazil	2.7	3.5	0.8	31	3.8	1.1	42
China	4.7	4.9	0.2	4	5.7	1.0	21
India	1.9	1.9	0.0	0	2.0	0.1	4
Indonesia	3.6	3.6	0.1	1	3.8	0.3	8
South Africa	3.3	2.6	−0.7	−22	3.2	−0.1	−2
Production, mt							
World	1 615	1 661	46	3	1 906	291	18
OECD	792	801	9	1	928	135	17
Australia and Canada	90	70	−20	−22	95	5	6
European Union	277	256	−21	−8	313	36	13
United States	356	407	51	14	446	90	25
Non-member economies	823	860	37	5	978	155	19
Brazil	43	56	12	29	62	19	44
China	245	257	11	5	276	31	13
India	102	110	8	8	122	20	19
Indonesia	13	12	0	−1	14	1	9
South Africa	14	10	−5	−32	12	−2	−12

a) No. 2 hard red winter wheat, ordinary protein, USA f.o.b. Gulf Ports (June/May).
b) No. 2 yellow corn, USA, f.o.b, Gulf ports.
Source: OECD and FAO Secretariats.

The impact of weather shocks in this period is clear: yields of two major exporting countries, Australia and Canada, fell by about a fifth in aggregate. In the case of Canada, the shock may to some extent be a reduction from atypically good yields in 2004 and 2005, but in Australia the poor crop represents one of several poor yield outcomes in recent years (Figure 2.3). The trend yield in Australia was assumed in this figure, rather than estimated. If estimated over this interval, the trend yield in Australia would be negative due to the persistent drought. To reduce the inconsistency as compared to longer historical patterns and the *Outlook* assumptions, a trend growth rate of 0% over this interval is assumed for these calculations. The graph shows that yields overall were at or below trend in many countries. In contrast, there was a recovery from poor yields experienced in 2005 in some places, such as in Brazil.

Figure 2.3. **Deviations from trend of wheat and coarse grain yields**
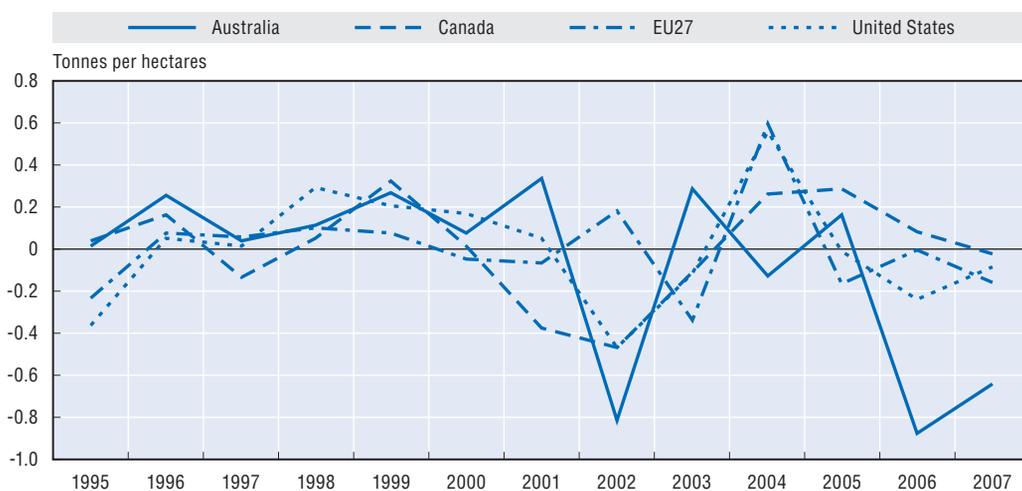
Note: Yield trends are estimated over these years to be 0.7% for the EU (27), 1.0% for Canada, and 2.6% for the US, and assumed to be 0% for Australia.

Source: OECD and FAO Secretariats.

On the demand side, use of food grains to be processed into biofuels stands out as an important component of demand growth between marketing years 2005 and 2007 (Table 2.3). Wheat and coarse grain use overall increased by about 80 Mt, or 5%. Within this aggregate, biofuel use doubled, rising by 47 Mt, thus accounting for over half the increase in world grain use. The US biofuel use of grains alone explains the vast majority of this change, up by 41 Mt even after adjusting for distillers grains co-produced with ethanol and added to feed use. But these data also show that an attribution of all the grain price increases to ethanol would be incorrect.

Despite a doubling of some grain prices and broad increases overall, global food and feed use per capita were sustained, implying that the generally strong economic performance of the last two years has been manifested in outward shifts of demand that – in combination with relatively inelastic demand in the short term – has offset the impact of higher prices on quantities demanded. In non-OECD countries, food use of grains was 3% higher in 2007 than in 2005, and feed use was 2% higher indicating that the expansion in livestock consumption and production in these countries, discussed in previous editions of the *OECD-FAO Outlook*, has continued. Excluding biofuels, the total of other uses of wheat and coarse grains – non-food and non-feed uses such as for industrial processes – was flat between 2005 and 2007.

Table 2.3. **Demand for wheat and coarse grains**[a]

	2005 level	2007 level	Change 2005 to 2007		2017 level	Change 2005 to 2017	
			absolute	percent		absolute	percent
Prices, USD/t (Nominal)							
Wheat[b]	168	319	150	89	231	62	37
Maize[c]	106	181	75	71	165	59	56
Food, mt							
World	642	662	21	3	725	83	13
OECD	166	175	9	6	178	12	8
Australia and Canada	7	7	1	9	8	1	17
European Union	86	85	−1	−1	87	1	1
United States	31	34	3	10	34	3	10
Non-Member Economies	476	487	11	2	547	70	15
Brazil	16	16	0	−2	19	2	15
China	105	104	−1	−1	100	−5	−5
India	89	92	3	4	102	13	15
Indonesia	10	11	0	4	12	2	15
South Africa	7	8	0	1	8	0	4
Feed use (include ethanol co-products for USA), mt							
World	749	761	12	2	840	91	12
OECD	430	431	1	0	454	23	5
Australia and Canada	31	31	0	0	31	0	0
European Union	167	165	−2	−1	169	2	1
United States	176	179	3	2	198	22	12
Non-Member Economies	318	329	11	3	386	68	21
Brazil	31	32	0	1	38	7	22
China	107	110	4	3	130	23	21
India	8	9	1	11	14	5	67
Indonesia	4	5	0	5	5	1	20
South Africa	4	4	0	−10	4	0	−8
Other uses, mt							
World	232	279	47	20	365	133	57
OECD	121	163	43	35	238	118	97
Australia and Canada	5	8	2	44	15	9	175
European Union	17	19	2	12	39	23	136
United States	78	115	37	48	162	84	107
Non-Member Economies	111	116	5	4	127	16	14
Brazil	5	5	0	1	7	2	41
China	35	38	3	9	46	12	34
India	8	9	0	4	9	0	4
Indonesia	3	3	0	0	3	0	0
South Africa	1	1	0	−36	1	0	−16
of which, biofuel (ex. feed co-product)							
World	46	93	47	103	172	126	275
European Union	1	6	4	323	24	22	1 720
United States	41	81	41	100	131	91	222
Total use, mt							
World	1,622	1,702	80	5	1,930	307	19
OECD	717	770	53	7	870	153	21
Non-Member Economies	906	932	27	3	1,059	154	17
World ending stocks, mt	427	359	−68	−16	399	−28	−7

a) Historical data on the use of cereals for biofuels are estimates and subject to revision.
b) No.2 hard red winter wheat, ordinary protein, USA f.o.b. Gulf Ports (June/May).
c) No.2 yellow corn, USA, f.o.b, Gulf Ports.
Source: OECD and FAO Secretariats.

Oilseeds

The vegetable oil markets have experienced a broadly similar pattern of demand growth between the 2005 and 2007 marketing years, but without much of a shock to supply (Table 2.4).The area planted to oilseeds has decreased globally, whereas oilseed yields grew faster than was the case for grains. The reduction in oilseed plantings is explained by reallocation of area in the US, and decreases in Brazil and China. The poor oilseed yields of Australia and Canada do not offset better performance elsewhere. World vegetable oil production, which includes palm oil as well as oils crushed from oilseeds, grew 7% over this two year period.

Table 2.4. **Supply of oilseed and vegetable oil**

	2005 level	2007 level	Change 2005 to 2007		2017 level	Change 2005 to 2017	
			Absolute	Per cent		Absolute	Per cent
Prices, USD/t (Nominal)							
Oilseeds[a]	269	486	217	81	457	188	70
Vegetable oil[b]	556	1 015	459	82	1 055	499	90
Area harvested (oilseeds[c]), m ha							
World	145	142	−3	−2	164	19	13
OECD	48	46	−2	−4	50	3	5
Australia and Canada	7	8	1	10	10	2	27
European Union	9	10	1	13	11	2	28
United States	31	27	−4	−12	28	−2	−7
Non-member economies	97	96	−1	−1	113	16	16
Brazil	23	21	−3	−11	28	5	20
China	18	16	−2	−9	18	0	0
India	16	17	0	2	18	2	12
Indonesia	1	1	0	−19	0	0	−26
South Africa	1	1	0	−11	1	0	44
Yield (oilseeds), tons/ha							
World	2.0	2.1	0.0	1	2.3	0.3	15
OECD	2.6	2.4	−0.2	−8	2.8	0.2	6
Australia and Canada	1.9	1.5	−0.4	−20	1.8	−0.1	−6
European Union	2.6	2.4	−0.2	−7	3.1	0.6	22
United States	2.8	2.7	−0.1	−5	3.0	0.2	6
Non-member economies	1.8	1.9	0.2	9	2.2	0.4	22
Brazil	2.2	2.8	0.6	26	2.9	0.7	31
China	1.8	1.7	0.0	−3	1.9	0.2	11
India	1.0	1.0	0.0	1	1.1	0.1	15
Indonesia	1.3	1.3	0.0	1	1.5	0.2	15
South Africa	1.3	1.3	−0.1	−5	1.4	0.1	4
Production, vegetable oil, mt							
World	99	106	7	7	143	45	45
OECD	26	27	1	4	33	7	25
Australia and Canada	2	2	0	−3	3	1	72
European Union	11	12	1	8	14	3	27
United States	10	10	0	3	12	2	19
Non-member economies	73	79	6	8	111	38	52
Brazil	6	6	0	−1	7	2	28
China	11	11	0	3	17	6	51
India	4	4	0	1	5	1	29
Indonesia	16	19	3	18	28	12	74
South Africa	0	0	0	−13	0	0	46

a) Wheighted average oilseed price, European port.
b) Wheighted average price of oilseed oils and palm oil, European port.
c) Defined as rapeseed(canola), soyabeans and sunflower.
Source: OECD and FAO Secretariats.

World vegetable oil use increased faster between marketing years 2005 and 2007 than production (Table 2.5). Of the demand increase, biofuel use of oils accounted for over half. Excluding biofuel use, other uses rose by over 4% during these two years, or at roughly the rate of population growth. In the face of strong prices, this increase indicates a shift in demand for traditional uses that offsets the price effect, compounding the strong growth in use as biofuel feedstock.

Table 2.5. **Demand for vegetable oil**[a]

	2005 level	2007 level	Change 2005 to 2007		2017 level	Change 2005 to 2017	
			Absolute	Per cent		Absolute	Per cent
Prices, USD/t (Nominal)							
Oilseeds[a]	269	486	217	81	457	188	70
Vegetable oil[b]	556	1 015	459	82	1 055	499	90
Use, vegetable oil, mt							
World	96	105	8.8	9.2	143	47.5	49.5
OECD	34	37	3.1	9.2	50	16.3	48.2
Australia and Canada	1	1	0.0	0.8	2	1.0	85.8
European Union	17	19	1.9	11.4	29	12.3	72.5
United States	10	11	1.3	13.1	12	2.5	25.2
Non-member economies	62	68	5.7	9.2	93	31.1	50.2
Brazil	3	3	0.0	−0.3	6	2.6	78.3
China	17	20	2.3	13.3	25	7.7	43.9
India	9	9	0.2	2.2	11	2.4	27.6
Indonesia	4	5	0.9	22.6	8	3.9	100.4
South Africa	1	1	0.1	11.7	1	0.3	32.8
of which, biofuel							
World	4	9	4.9	113.9	21	16.9	388.0
European Union	3	6	2.3	68.8	12	9.0	266.8
United States	1	2	1.2	162.3	2	0.9	121.8
World ending stocks, mt	9	8	−1.1	−11.9	9	0.2	2.6

a) Historical data on the use of cereals for biofuels are estimates and subject to revision.
b) Wheighted average oilseed price, European port.
c) Wheighted average price of oilseed oils and palm oil, European port.
Source: OECD and FAO Secretariats.

What happens next…

Permanent and temporary factors in future prices and price volatility

Given how global supply and demand changed between 2005 and 2007, it may appear as if nothing much dramatic has happened that could possibly trigger the big price increases actually observed. Yet, there has effectively been a gap between growth rates of demand and supply wide enough to cause prices to rise significantly on markets where neither supply nor demand (can) respond elastically and swiftly to price changes – at least not in the short term. In the market for cereals (wheat and coarse grains), production has grown by 46 Mt (3%), between 2005 and 2007, while total use increased by nearly double that amount, *i.e.* 80 Mt (5%), over the same period. In the market for vegetable oil, the gap between production and use growth was also about two percentage points. Had stocks been easily available they might have helped to bridge these gaps. But that was not the case, as shown below.

Outlook data permit an assessment of the permanent and temporary nature of the various contributing factors to recent price increases. Those of a short-term nature do not

affect future prices as in the *Outlook* they are not assumed to recur. But the permanent factors are expected to influence the level and trends of future prices.

Recent *negative yield shocks* in key agricultural commodity-producing regions have contributed to the price increase. This particular phenomenon can be viewed as *temporary* in the *Outlook*, barring underlying climate change or water constraints that lead to permanent reductions in yield.

Macroeconomic conditions have favoured higher world prices. Good economic growth increased purchasing power in most countries during the recent past, leading to strong demand growth for most agricultural commodities. Moreover, a weak USD typically leads to higher USD-denominated prices of traded goods, as they will not be as expensive when priced in other currencies – although prices of most commodities in most currencies are more expensive than two years ago. This factor is assumed to be *permanent* in the *Outlook*. These are not new factors, however, and, certainly GDP growth in developing countries has been a feature of commodity markets for many years. These factors should be considered to *slow the decline in real prices* in the future, not to lift average prices to permanently higher levels.

The *oil price*, and energy prices more generally, are important contributing factors to the recent increase in agricultural commodity prices. While the effects of higher oil prices on biofuel demand may be the focus of discussion, traditional effects of energy prices, namely on costs of commodity production and on costs of transportation, processing, distribution and marketing intermediate and final products, are also important. In any case, the *Outlook* assumptions reflect the widely held belief that the oil price increases are *permanent* and that further gradual increases are likely. Higher oil prices result in a structural increase in agricultural production costs and contribute to lifting future prices to higher average levels.

Available data suggest that somewhat more than half of the increase in the quantity of demand for grains and vegetable oils between 2005 and 2007 was due to *biofuels*. Based on *Outlook* assumptions of further modest increases in the price of oil, continuation of policies that support for biofuel production and use and no dramatic technology change, feedstock demand for biofuel production appears to represent a *permanent* factor. While biofuel use of grains and vegetable oils is anticipated to represent a falling share of the overall increase in demand for these food commodities, it is nevertheless a new source of demand which is seen as one of the factors *lifting prices to higher average* levels in the future.

Stocks of wheat, coarse grains and vegetable oil have fallen to low levels relative to use (Figure 2.4), reducing the buffer against shocks in supply and demand. This has been one reason for the recent run-up in prices. During the 10-year outlook period stocks are projected to remain low, implying that tight markets are a *permanent* factor in the *Outlook*. This should not lead to permanently higher prices but certainly provides the background for more price *volatility* in the future.

There has recently also been a surge of new moneys invested into *futures commodity markets* from non-traditional sources. The long-term aggregate effect of these activities on the level of derivative market prices and related prices in cash markets is still very uncertain. Adjustment in market procedures and participants' behaviour argue that any effect on price *levels* will prove *temporary* relative to the 10-year *Outlook*. As these funds are very large, however, and can and will move rapidly in and out of commodity markets as profit opportunities dictate, this development may well be a new and *permanent* element in future price *volatility* (Box 2.2).

Figure 2.4. **Stocks-to-use ratios of maize and wheat**
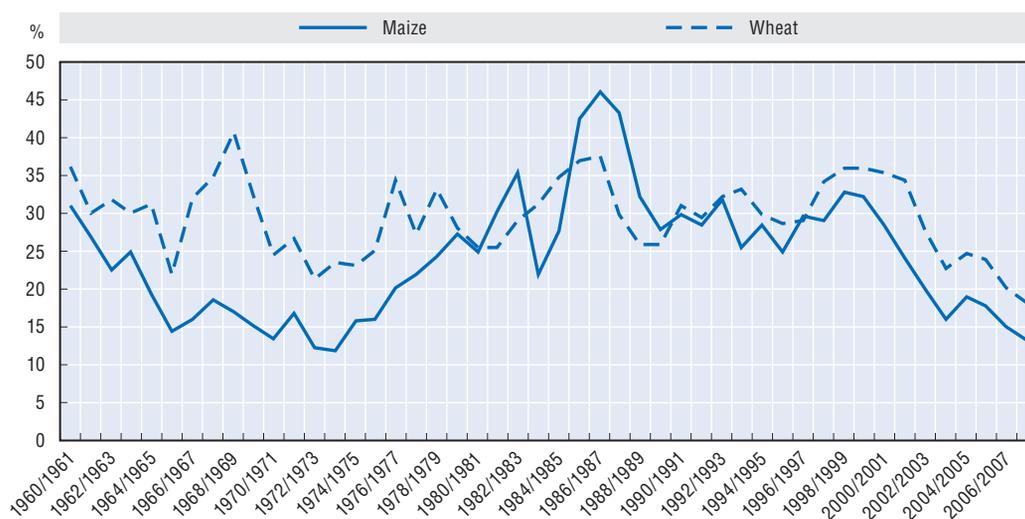
A more general point concerning price volatility relates to the "thinness" of markets, or the share of imports and exports relative to the volume of global consumption and production (Table 2.6). For coarse grains, the share of imports in consumption and exports in production is on the order of 10-12%. For rice the share is even lower whereas for wheat, these ratios are higher, but still less than 20%. In contrast, the share of vegetable oil production that is exported and the share of consumption that is imported are about 44%.

Table 2.6. **World coarse grain, wheat and vegetable oil market indicator ratios**

	Ratio	2005	2007	2017	Growth rate (2005-2007)	Growth rate (2005-2017)
Coarse grain	*Export/Production*	11.1%	11.7%	10.4%	4.6%	−6.3%
	Import/Consumption	10.4%	11.2%	10.5%	8.6%	1.1%
Wheat	*Export/Production*	17.8%	17.4%	18.3%	−2.4%	3.0%
	Import/Consumption	17.5%	17.9%	18.3%	2.1%	4.9%
Vegetable oil	*Export/Production*	44.8%	44.1%	44.0%	−1.4%	−1.7%
	Import/Consumption	44.0%	43.7%	44.1%	−0.5%	0.2%

Thin markets reflect barriers to trade – of a natural (*e.g.* transport costs) or policy (*e.g.* import tariffs) nature – that prevent agents from seeing world price signals. Thus prices must change more to accommodate an external shock to traded quantities, all else being equal, when markets are thinner. The assumptions on which the *Outlook* is based, however, do not include a change in natural or policy determined trade barriers. Thus, while such market characteristics are a *permanent* feature in the *Outlook*, there is no assumed change in the degree of market thinness and the impact on price *volatility* over time.

The *nature and composition of demand*, on the other hand, are factors that may increase the future variability in world prices. As discussed, industrial demand for grains and oilseeds – such as for the production of biofuels – constitutes a growing share of total use. This demand is generally considered less responsive to prices than traditional food and

feed demand. In addition, food demand elasticities may be further reduced by rising incomes and more sophisticated food supply chains. Such changes are *permanent* elements in the *Outlook* that may lead to greater *volatility* in future world prices (Box 2.3).

Box 2.3. **How income growth affects commodity demand**

Income growth has been strong and widespread in recent years, despite a slowdown of the US economy and some cases of poor economic performance. The consequence is higher per capita income in many countries, including many non-OECD countries. Previous *Outlook* reports emphasized that rising incomes are associated with greater demand for food and a shift in the composition of food demand towards livestock products, namely meats and dairy goods as well as fruits and vegetables, and away from staple crops. But they may also have other implications: less elastic demand, and new links from energy prices to commodity and food markets.

Income growth tends to be simultaneous with urbanization. Many countries with the greatest growth rate are also experiencing migration from rural areas to cities. As people move away from rural centres of food production and as they rely more on the infrastructure of countries and cities to deliver foods to their area, the marketing chain between commodity production and food consumption adapts. These changes may lead to longer transportation, refrigeration, and other activities whose costs vary with energy prices, as well as wages and other costs that may themselves be affected indirectly by energy prices. In short, food prices increasingly depend on oil and energy prices independently of commodity prices as income rises.

The share of commodity price in food price may also decrease as the marketing chain lengthens. In the US, the commodity cost component of the total food bill has fallen from about one-third in the 1960s to about one-fifth since the mid-1990s.[a] As the share of commodity costs in the food bill falls, the expected proportional change in food prices for a given percentage change in commodity costs decrease: a doubling of commodity prices will have a greater effect on final food consumers if commodity costs initially already accounted for almost all of the food costs, whereas a similar doubling of commodity prices would have a smaller proportional effect for food consumers if the commodity costs were only a small fraction of the total food bill. Thus, as income increases and market chains extend, the responsiveness of demand to farm-level prices may decrease.

Economics of demand indicate that consumers tend to care less about prices of goods that represent a small share of their budget. As incomes expand and the share of budgets spent on a necessity like food fall, consumers are expected to be somewhat less sensitive to price changes, and a shock to supply of a given size will require a greater price signal to compel consumers to adjust their purchases. Higher incomes that tend to reduce demand elasticity may lead to greater variability in world prices.

This has certain implications. Greater income and purchasing power leading to less sensitivity to prices means that fewer people are pushed into starvation by rising prices. But people who have not enjoyed anything like the average income growth rate will face more variability in prices, including higher peaks, without the additional purchasing power, and these groups will be worse off than before. Thus, higher food prices strain budgets of the poor, even if food is still purchased.

a) US Economic Research Service (www.ers.usda.gov/data/FarmToConsumer/marketingbill.htm).

Wheat and coarse grains

The inventory of short-term and permanent factors and how these may affect future prices helps to disentangle what may happen next in cereals and oilseed markets. Looking ahead to marketing year 2017, the end of the *Outlook* period, wheat and maize prices are expected to remain higher than in 2005, but not as high as in 2007. Area is not expected to be a main source of new production, although some increase is expected. There is likely to be a geographic reorientation of sorts, as the US focuses on grains and the EU on oilseeds and the total area planted to wheat and coarse grains in the EU decreases. On a world scale wheat and coarse grain area is expected to increase some, but certainly not dramatically despite the higher level of prices as compared to 2005. Yields are expected to grow along historical trend patterns, but this assumption obscures two important caveats discussed below: weather-related yield shocks will certainly occur, and the effect of higher prices on yields is unclear.

Demand for these grains to be used as feedstocks in biofuel production is not expected to continue to expand at the rate of the last two years.[3] However, cereal use for biofuel production is projected nearly to double from 2007 to 2017, though its share of the overall increase in quantities of wheat and coarse grains used is expected to fall from about 60% to just over 40%. The US is likely to continue to be the centre of grain-based ethanol production, assuming no new technologies displace current practices, but use in the EU is likely to expand, too. The larger part of the growth in use is explained by rising food and feed demand particularly in non-OECD countries, where both categories rise by 15% on average or more whereas OECD food and feed uses increase at a lower rate. The assumed continuation of strong economic growth of recent years underlies these shifts in grain demand.

Oilseeds

The baseline previews a strong vegetable oil price even as by 2017 oilseed prices (and oilseed meal prices) are expected to retreat from recent levels. The higher prices of 2007 bring about a supply response that results in more land allocated to this sector and good yield growth. Area planted to oilseeds is expected to increase over the period, with some growth in the OECD area, apart from the US, and strong growth should be seen in non-OECD countries. A large share of this growth is expected to take place in Brazil and Argentina, but oilseed area will expand in Ukraine and Russia, too. During the projection period, yield grows on average at the historical trend rate. Palm-oil production is expected to grow quickly, increasing by two-fifths between 2007 and 2017.

Biofuel use of vegetable oils accounts for more than a third of the growth in vegetable oil use from 2005 to 2017. This is very strong growth in percentage terms, as world biofuel use increases more than five-fold from the very small base in 2005. But the growth in other uses amounts to an increase of about 33% over this period as well. These consumption increases worldwide take place at a nearly constant real world price, and while growth rates vary widely, they are indicative of strengthening demand. Income growth drives much of this expansion of demand, with non-OECD countries increasing their consumption of vegetable oils by half in 2017 relative to 2005.

Uncertainties

The foregoing paragraphs provided a discussion of the baseline results for cereals and oilseeds prices over the *Outlook* period. Based on the projected developments in supply and demand for these commodities, prices are expected to remain strong, albeit not as high as what they currently are. But these outcomes reflect the assumptions underlying the projections, and whether or not these assumptions become reality is uncertain. Some of these uncertainties are first discussed qualitatively in the following paragraphs. The next section shows what the quantitative impact of some of these factors may be.

Commodity market *volatility* will continue, and the direction of changes is uncertain. The fact that prices currently are at historic peak levels does not mean that swings in the other direction should be excluded. In the short term, low stocks-to-use ratios may lead to greater price movements for a given shock, either up or down. Higher income in most of the world may lead not only to greater demand and a change in the composition of demand, but also to lower responsiveness of demand to price changes. Thin markets with few stocks and increasingly inelastic components of total demand experience greater price volatility.

There will be shocks to *yields* and to *macroeconomic conditions, including oil prices*, that increase or decrease world prices. Crop harvests fail. Recent history abounds with predictions of constant strong economic growth of a country into the future that have been wide off the mark and a reduction in income leads to lower demand. Widespread expectations of climate change lead to predictions of declining yields, and diminishing water supplies lead to predictions of abandoned areas. Systemic and massive shocks are often assumed to be negative. But there are also "risks" in the opposite direction. Good weather can lead to exceptional yields, additional investments and technological breakthroughs may improve yields more than expected, and economic growth can beat predictions.

Policy response to the price situation is also an unknown. In response to concerns about domestic prices, will more countries use *trade policies or domestic market interventions* in order to reduce the increases in their domestic prices? If countries insulate their domestic market from world prices through beggar-thy-neighbour policies, then world prices will rise even further before the remaining countries that are paying or receiving these prices adjust quantities of demand and supply so that markets balance. There is also some uncertainty regarding future *agricultural policies*. For instance, there is the potential for another world trade agreement and there are scheduled policy decisions, such as the US farm bill that is pending at the time of writing or the 'health check' of the CAP to be undertaken by the EU. *Environmental policy* continues to be a source of uncertainty. Producers in many key exporting countries meet standards that are intended to encourage sustainable practices. Environmental policies introduced to address potential climate change, *e.g.*, carbon taxes or credits, could lead to rapid changes in the profitability of farmland use and practices.

Biofuel policies are also a source of uncertainty. By the time of this publication, the representation of key biofuel policies in some countries is already out of date in this *Outlook*. An array of new US mandates and the potential consequences of an EU Directive promoting larger quantities of biofuel use are not included. These or other policies to promote biofuel production and use, whether through mandate or subsidy, will lead to greater purchases of feedstocks for biofuel production. Alternatively, of course, if policies

to support biofuel use and production are deferred, waived, or overwritten with lesser efforts, then feedstock purchases will decline, reducing average prices in the future below the projections in this report.

Feedstock purchases may differ radically from current and projected patterns if *new biofuel production technologies* become viable, through whatever combination of commercial profit and subsidy. New processes that generate biofuels from feedstocks that do not directly compete with existing commercial crops, or are even co-products of such crops, could lead to a departure from the *Outlook*, possibly a fairly radical one. But such a possibility is explored elsewhere by the OECD, as it raises complicated questions that defy cursory analysis.

A key question is the *long-run capacity of supply*. One argument reiterates messages of climate change and water overuse, suggests that yields are peaking, and sees little scope for further supplies. Another argument emphasizes the potential of human innovation to continue or even quicken yield trends, particularly when motivated by a high price, and the unrealized potential of countries that are still in stages of development that are associated with low productivity. The *Outlook* is not the place to look for answers to these arguments. Neither is it a place to look for unconditional support for either case. Here, historical trends in technology growth are assumed to continue into the medium-term future.

More generally, *high prices are their own worst enemy*. Price increases lead to supply and demand responses, which lead to lower prices. A high price spurs producers to find new means of raising output, and encourages consumers to choose alternatives or to use goods more effectively. It may take time to introduce extreme changes, such as new processes of making a good, using a good for intermediate processing, introducing substitute goods or adjusting lifestyles. The scale and delay of such responses to high prices are uncertain, but that agents will respond in ways that work against sustained price increases is certain.

How important are the *Outlook* assumptions in determining future prices?

After having argued qualitatively the impacts of a number of factors with uncertain outcomes on the level and variability of prices, the discussion below tries to quantify some of these effects. The recent spikes in food commodity prices surprised most economic forecasters, reminding us of the inherent vulnerability of projections to unanticipated developments. The baseline assumptions of normal weather and stable economic performance are necessary, but the future will not follow that smooth path. Negative and positive yield shocks are a permanent feature of agricultural commodity markets. So, too, are macroeconomic shocks that reduce or raise income, alter exchange rates, and induce or limit inflation. Similarly there is growing discussion over whether governments will continue to subsidise the conversion of food commodities to biofuel production with the same enthusiasm as during recent years.

To give some idea of the sensitivity of the baseline to alternative assumptions regarding these factors, the economic model underlying those projections was used to perform sensitivity analysis. Two kinds of simulations were performed. In one, five versions of the baseline were simply reproduced, progressively replacing original assumptions about key determining variables with plausible alternative values. In the second, a stochastic simulation was undertaken wherein the assumptions of normal weather and a stable macroeconomic environment are replaced by a range of plausible yield values and macroeconomic variables.

Scenario results

The five key assumptions that were examined are: 1) biofuel use of grains and oilseeds, 2) petroleum prices, 3) income growth in major developing economies: China, India, Brazil, Indonesia and South Africa (labelled EE5 countries in Figure 2.5), 4) the exchange rate of the USD relative to the currencies of all other countries, and 5) crop yields. Figure 2.5 shows results for the first set of simulation experiments. To simplify the presentation, all the shocks chosen for these experiments were implemented such that they move prices below those projected in the baseline. Obviously, the opposite would have been possible as well. To further aid exposition, the focus here is just on the price outcomes for the terminal year of the baseline projection period, 2017.

In interpreting these findings it should be noted that, taken one by one, these alternative assumptions might seem equally realistic as those made for the baseline. Of course, the likelihood that they would all come together in the way that is assumed here is low. But, indeed, recent years have seen just such a coincidence of developments in all these factors, all pushing prices in the same, upward, direction. While those developments cannot explain the entire run-up in food commodity prices that has occurred since 2005, they surely help to explain much of it.

It is noteworthy that even seemingly modest changes in assumptions can lead to significant differences in projected prices. For coarse grains and vegetable oil, the price outlook would be most affected if biofuels production were to remain constant at 2007 levels. Changes in demand for these commodities as feedstocks for biofuel production are a source of uncertainty, no matter whether the cause is an oil price change, a change in biofuel support policies or a new technological development that lead processors to buy different feedstocks. Holding biofuels production constant at its 2007 level takes around 12% off the 2017 projected prices for coarse grains and around 15% off the projected price of vegetable oil.

Figure 2.5. **Sensitivity of projected world prices to changes in five key assumptions, percentage difference from baseline values, 2017**

Legend:
- Scenario 1 : Biofuel production constant at 2007 level
- Scenario 2 : Scenario 1 and Oil price constant at 2007 level (72$)
- Scenario 3 : Scenario 2 and Lower income growth in EE5 countries (half annual growth rate)
- Scenario 4 : Scenario 3 and Progressive appreciation of the USD exchange rates to reach 10% higher rates in 2017
- Scenario 5 : Scenario 4 and yields for wheat, oilseeds and coarse grains 5 % higher than over the projection period

Source: OECD and FAO Secretariats.

The second scenario shows that wheat, coarse grains and vegetable oil price projections are all shown to be highly sensitive to petroleum-price assumptions. This sheds light on the important role that the recent sharp escalation in crude oil prices is playing in driving up food commodity costs. This single external factor not only is a crucially important feature of the macroeconomic context but also directly affects the energy costs of agricultural production, transportation, and food processing. Many countries tend to have better economic growth if the oil price is low, but others benefit from a high oil price. Under the constant oil price assumption, the prices of maize and vegetable oil are about 10% lower and the wheat price falls 7% in 2017 when compared with the baseline projection.

GDP growth in developing countries is a source of recent increases in demand that many observers take to be a permanent feature of the medium-term future. Trend-line extrapolations of 8-10% GDP growth in a country that are extended into the indefinite future beg the question: when will this growth stop? The sensitivity of prices to increases in GDP is tested with respect to the hypothetical case where the rate of growth in GDP is reduced to half the rate assumed in the *Outlook*. This scenario gives wheat and coarse grains prices that are only modestly (1 to 2%) below the baseline. For vegetable oils, reflecting presumably a much higher income elasticity of the demand and a greater influence of EE5 countries in world trade, the simulated price difference is over 10%.

These results may be less surprising than they seem on first sight. First, while EE5 countries are rapid growth markets for wheat and coarse grains, they are still relatively small players in world trade. This is not the case for vegetable oils, where China and India are very large importers and where lower GDP growth has a substantial world price effect. Second, this scenario does not take account of any second-round effects that lower income growth in EE5 countries may have on economic growth elsewhere. So there may be some downward bias to the outcomes presented here.

A fourth scenario was defined to simulate the results of a stronger US dollar. Thus, USD exchange rates were progressively appreciated to reach rates in 2017 some 10% higher than was assumed for the baseline. A stronger US dollar raises prices in domestic currency terms in exporting countries, providing greater incentives to increase supplies. At the same time, a stronger US dollar reduces the import demand in importing countries. The combination of greater export supply and weaker import demand puts additional downward pressure on world prices. By 2017, wheat, coarse grain and vegetable oil prices are all some 5% below the corresponding baseline projection.

The scenario under which cereals and oilseeds yields are assumed to be 5% higher leads to projected wheat and maize prices for 2017 that are 6 and 8% lower respectively than the corresponding baseline value, but make little difference for projected vegetable oil prices. Yield trends are a source of great uncertainty. Some observers see constraints to agricultural productivity owing to vanishing water resources and even greater potential constraints to agricultural production as a consequence of global warming. Global warming is argued to lead directly to greater incidence of negative yield shocks and sustained negative pressure on production in heat stressed climatic zones. But yields may actually increase in regions with moderate climates so the net effect on world production is uncertain. Furthermore, it could lead to the introduction of policies such as carbon trading that may also tend to reduce agricultural output by raising land and energy costs.

Other observers note that sustained high prices lead to surges in investment and foresee that recent events will spur greater technology growth. The more optimistic view even looks to another Green Revolution that raises yields in some of the poorest regions of the world, much as the previous one raised yields in parts of South and Southeast Asia and Latin America. Such optimists reply to concerns about greater weather variability by noting the consequent incentive to develop technologies and to turn to commodities that are less susceptible.

Stochastic results

Stochastic analysis, in which ranges of key input variables are used instead of fixed values, provides a more balanced and comprehensive look at the underlying uncertainty of the projections.[4] The choices of alternative values for them were based on historically observed patterns in the data. The result is that for each year of the baseline a statistical distribution of price projections is produced for every commodity, rather than one single price projection.

The essence of the findings from this exercise is captured by looking only at the simulated distribution of price outcomes obtained for 2008 and 2017. Figure 2.6 summarizes results for those two projection years in terms of the median, and the values of the 10th and 90th percentiles of the distributions of the price projections for wheat, coarse grains and vegetable oil prices.

The median values of these distributions are nearly identical to the deterministic values projected for the baseline. The 10th percentile is an indicator of the lower end of the range; the 90th percentile indicates the upper end. These should not be read as representing low and high extremes, but rather as indicating plausible alternative futures based on past variation in key variables driving commodity prices.

Figure 2.6. **Stochastic crop prices in 2008 and 2017 in nominal terms**
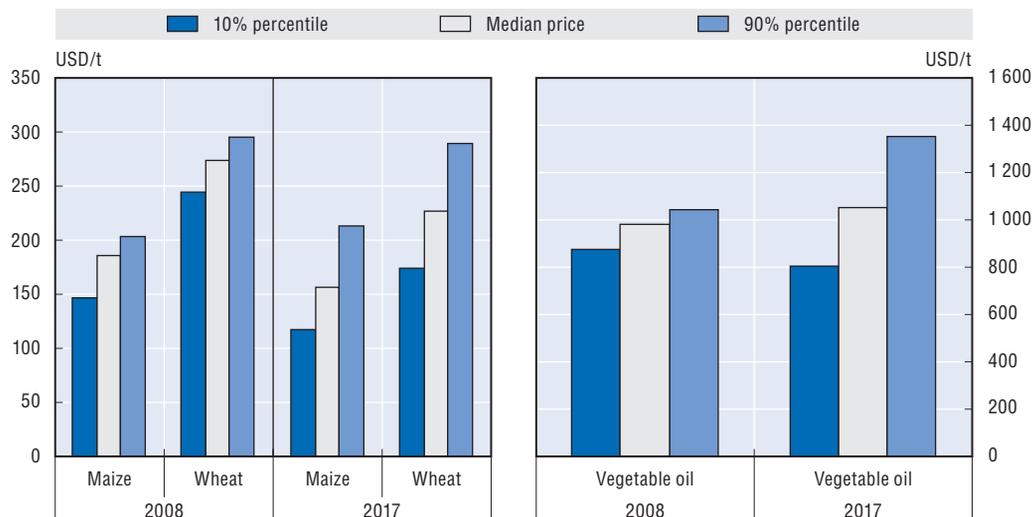
Source: OECD and FAO Secretariats.

For the projected maize price in 2008, the 10th percentile is USD 146 per tonne and the 90th percentile is USD 204. The corresponding values for wheat price are USD 244 per tonne and USD 296. In both cases, the 10th and 90th percentile are farther apart in the 2017

results than in 2008, reflecting the compounding effects of uncertainty in early years, particularly as regards underlying trends. In both cases, the distribution shifts downward. The 10th percentile falls to USD 117 per tonne for maize and USD 174 per tonne for wheat, whereas the 90th percentile changes little.

The lower level of the distribution in 2017 reflects the underlying assumptions of the *Outlook*. The potential for deviations from those assumptions to result in either much lower or constant grain prices relative to current values based on the historical variations represented here reflects the degree of uncertainty that is known and readily modelled. The distribution of vegetable oil prices in 2017 indicates that in that case, too, assumptions of these projections and historical variations that are most readily measured imply the potential for prices to be either one-fifth lower or two-fifths higher than the price projected for 2008 in the *Outlook*.

The bottom line

In this chapter, a number of temporary and permanent factors have been identified which help to understand how future commodity prices are expected to evolve. On the basis of the analysis, the response of this report to the question "Will prices remain as high as they are today?" is "Very unlikely". While prices can be expected to fall from current highs, and to resume a gradual decline, they are expected to do so from a higher level than what is seen historically.

To summarise, the main factors that have contributed to the current spike and will help to determine developments in the future can be summed up as follows:

● Demand has grown faster than supply because of, among other reasons, growth in biofuels production.

● Supply would normally have grown more, but unfavourable weather conditions in some important producing countries reduced production and export supplies to world markets. Future supply response will be dampened by high oil prices.

● The sensitivity of demand to price changes appears to be falling for various reasons. Thus, a shock to supply of a given size will require a greater price change to bring about the demand adjustment required to balance the market.

● At the same time, global stocks have declined to record-low levels over the last decade, such that any variations in quantities produced and demanded cannot be buffered and hence have a proportionally much greater effect on market prices.

● The sharp increase of financial fund activity in futures commodity markets may have further contributed to the short term price hike, but the extent to which this has been the case is uncertain.

● Border measures that have been taken by many countries in an effort to increase domestic market supplies have reduced supplies on world markets, further magnifying the price increases.

These developments have combined to lift prices to very high levels. But an element of uncertainty about future developments appears to have had a strong impact as well, particularly recently, as both governments and investors are acting in ways that sometimes contribute to further price increases and future price volatility. Without these additional influences, prices would most likely not have been as high as what they are in reality.

With respect to future price trends over the *Outlook*, scenario results have shown the relative impact on prices of different assumptions with respect to macroeconomic developments, exchange rates, oil prices, biofuel production and yield trends. When taken together, these changed assumptions could lead to cereal and vegetable oil prices that are some 25 to 40% lower than baseline values in 2017.

While these scenarios were implemented in a manner to reduce prices to demonstrate their relative contribution, they may also occur in a different configuration that would lead to prices being stronger than projected in the baseline. However, the stochastic analysis that was carried out for this *Outlook* assessment suggests that at least for cereals, the downside risk for prices in the future seems to be increasing.

Notes

1. Dollar-denominated prices have risen substantially, but the generally weakening dollar over this period means that the price increases elsewhere have often been less pronounced than headline prices might lead one to believe. With the exception of few countries, domestic and import crop price increases have been substantial but somewhat less dramatic than in USD terms. Moreover, many countries, in both the OECD and non-OECD region intervene in agricultural markets with policies such as tariffs, leading to even lower transmission of changes in the prices of traded goods to domestic markets.

2. Price projections for 2008 in the *Outlook* baseline clearly do not, and could not possibly, match the recent extreme price hike. The baseline, generated to provide an impression of possible medium to longer-term market developments, necessarily has to abstract from some of the short-term factors inherent in commodity markets. These can result in monthly price variations that are much larger than those that can be observed from annual averages which are used in the *Outlook*.

3. Note that the EISA in the United States and proposals for new mandates in the EU have not been taken into account in this analysis.

4. Stochastic simulation techniques and output have been elaborated in previous Outlook reports. The annual projected values of yields and macroeconomic variables (including the petroleum price) are not assumed to be single numbers in the projection period, as for the baseline. Rather, random perturbations in yield levels, trends, and in macroeconomic variables are drawn from historically determined distributions, respecting to the greatest extent possible correlation among errors and relationships among macroeconomic variables. Several hundred such randomly determined values are fed into the model which is solved for each set. The output represents a wide range of yield values and macroeconomic settings that may be relevant during the Outlook period. As an example, for the oil price in 2008, the 10th percentile is USD 73 per tonne and the 90th percentile is USD 140. Details on how the partial stochastic analysis has been performed are given in the Methodology section of the full Outlook report.

ANNEX A

Statistical Tables

Table A.1. **Economic assumptions**

Calendar year[a]		Average 2002-06	2007 est.	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
REAL GDP[b]													
Australia	%	3.2	4.3	3.5	3.0	3.2	3.2	3.1	3.0	2.8	2.8	2.8	2.8
Canada	%	2.7	2.6	2.4	2.7	2.7	2.2	2.1	2.2	2.1	2.1	2.1	2.1
EU15	%	1.6	2.6	1.9	2.0	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8
Japan	%	1.7	1.9	1.6	1.8	1.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Korea	%	4.8	4.9	5.2	5.1	4.7	4.2	4.0	3.9	3.9	3.9	3.9	3.9
Mexico	%	2.8	3.0	3.6	4.3	4.2	4.0	4.0	4.0	4.0	4.0	4.0	4.0
New Zealand	%	3.5	3.4	1.9	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Norway	%	2.4	3.4	3.6	2.4	1.7	1.7	2.0	2.1	2.0	2.0	2.0	2.0
Switzerland	%	1.7	2.7	2.0	2.0	1.7	1.4	1.4	1.4	1.5	1.5	1.5	1.5
Turkey	%	7.2	5.1	5.4	5.7	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
United States	%	2.7	2.2	2.0	2.2	2.7	2.6	2.4	2.4	2.4	2.4	2.4	2.4
Argentina	%	4.9	7.8	5.7	4.7	3.4	3.2	3.1	3.0	2.9	2.9	2.9	2.8
Brazil	%	2.8	4.8	4.5	4.5	3.9	3.6	3.6	3.6	3.5	3.5	3.4	3.5
China	%	10.1	11.3	10.8	10.5	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
India	%	7.7	7.7	7.2	6.9	6.7	6.4	6.1	5.9	5.6	5.3	5.3	5.3
Russia	%	6.5	7.5	6.5	6.0	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
South Africa	%	4.4	5.0	5.1	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
OECD [c, d]	%	2.3	2.5	2.2	2.3	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.2
PCE DEFLATOR[b]													
Australia	%	2.1	2.5	2.9	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Canada	%	2.7	1.6	1.4	1.7	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EU15	%	2.1	1.9	2.4	2.1	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Japan	%	−0.8	−0.5	0.1	0.3	0.5	0.6	0.9	1.0	1.1	1.1	1.1	1.1
Korea	%	2.9	2.4	2.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Mexico	%	5.1	3.7	3.7	3.4	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
New Zealand	%	1.6	1.6	2.2	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Norway	%	1.6	0.5	2.5	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Switzerland	%	0.9	0.9	1.5	1.4	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Turkey	%	17.4	8.5	6.5	4.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
United States	%	2.4	2.5	2.4	1.7	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Argentina	%	12.7	8.6	11.1	11.3	4.7	4.8	4.7	4.6	4.6	4.6	4.5	4.5
Brazil	%	7.7	4.0	4.1	4.2	3.7	4.4	4.4	4.4	4.4	4.4	4.4	4.4
China	%	1.8	4.6	3.9	3.0	2.6	2.8	2.9	3.1	3.1	3.0	2.9	3.0
India	%	4.1	6.2	5.5	4.5	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
Russia	%	6.5	10.4	8.9	7.6	5.5	5.2	4.9	4.7	4.4	4.2	4.0	3.8
South Africa	%	4.4	5.9	5.7	5.2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
OECD[c, d]	%	2.4	2.2	2.4	2.0	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3

For notes, see end of the table.

Source: OECD and FAO Secretariats.

Table A.1. **Economic assumptions** (cont.)

Calendar year[a]		2007 est. (million)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
POPULATION												
Australia	%	20.6	1.04	1.00	0.97	0.97	0.97	0.96	0.95	0.94	0.93	0.92
Canada	%	32.6	0.92	0.90	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.80
EU27	%	491.7	0.22	0.18	0.16	0.14	0.13	0.11	0.09	0.08	0.07	0.05
Japan	%	127.8	0.01	−0.02	−0.05	−0.09	−0.12	−0.15	−0.18	−0.21	−0.24	−0.28
Korea	%	48.3	0.36	0.34	0.31	0.28	0.24	0.21	0.18	0.15	0.13	0.09
Mexico	%	102.9	1.13	1.19	1.18	1.12	1.06	1.01	0.96	0.93	0.90	0.88
New Zealand	%	4.1	0.94	0.86	0.83	0.82	0.82	0.81	0.78	0.77	0.77	0.72
Norway	%	4.7	0.62	0.62	0.61	0.61	0.63	0.60	0.60	0.59	0.61	0.59
Switzerland	%	7.5	0.39	0.37	0.37	0.36	0.37	0.34	0.34	0.35	0.34	0.35
Turkey	%	73.9	1.29	1.27	1.24	1.21	1.18	1.14	1.11	1.08	1.04	1.01
United States	%	299.4	0.99	0.97	0.96	0.94	0.93	0.91	0.89	0.88	0.86	0.85
Argentina	%	39.1	0.90	0.89	0.88	0.96	0.94	0.93	0.92	0.90	0.88	0.88
Brazil	%	188.6	1.14	1.12	1.10	1.29	1.25	1.22	1.18	1.14	1.11	1.07
China	%	1 324.1	0.63	0.62	0.62	0.64	0.67	0.69	0.69	0.68	0.66	0.63
India	%	1 151.8	1.50	1.47	1.44	1.41	1.38	1.35	1.32	1.28	1.25	1.22
Russia	%	142.5	−0.53	−0.53	−0.54	−0.46	−0.47	−0.47	−0.49	−0.50	−0.52	−0.53
South Africa	%	48.3	0.61	0.53	0.47	0.44	0.42	0.40	0.39	0.39	0.39	0.39
OECD[c]	%	1 213.5	0.57	0.55	0.53	0.51	0.49	0.47	0.45	0.44	0.42	0.40
World	%	6 607.1	1.19	1.18	1.16	1.6	1.5	1.14	1.13	1.11	1.09	1.07

Calendar year[a]		Average 2002-06	2007 est.	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
EXCHANGE RATE													
Australia	AUD/USD	1.47	1.19	1.20	1.21	1.23	1.24	1.25	1.27	1.28	1.29	1.31	1.32
Canada	CAD/USD	1.32	1.07	1.07	1.07	1.08	1.08	1.09	1.09	1.10	1.11	1.11	1.12
European Union	EUR/USD	0.87	0.73	0.73	0.73	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Japan	JPY/USD	115.0	117.4	114.7	112.8	111.2	109.6	108.3	107.0	105.9	104.8	103.6	102.5
Korea	'000 KRW/USD	1.11	0.93	0.92	0.91	0.92	0.92	0.93	0.94	0.94	0.95	0.96	0.97
Mexico	MXN/USD	10.70	10.95	11.15	11.30	11.45	11.57	11.70	11.82	11.94	12.07	12.19	12.32
New Zealand	NZD/USD	1.67	1.36	1.39	1.39	1.40	1.40	1.41	1.41	1.42	1.42	1.43	1.43
Argentina	ARS/USD	3.02	3.10	3.30	3.40	3.45	3.52	3.61	3.68	3.75	3.83	3.91	3.99
Brazil	BRL/USD	2.66	1.90	1.90	2.00	2.04	2.09	2.13	2.18	2.22	2.27	2.32	2.37
China	CNY/USD	8.20	7.57	7.20	6.84	6.53	6.43	6.35	6.30	6.26	6.23	6.20	6.18
India	INR/USD	45.74	41.50	40.00	39.50	41.78	44.19	46.75	49.45	52.30	55.33	58.52	61.90
Russia	RUR/USD	29.3	26.4	26.1	26.1	27.2	28.1	28.7	28.7	29.5	30.1	30.7	31.3
South Africa	ZAR/USD	7.54	7.22	7.17	7.33	7.72	8.14	8.58	9.05	9.54	10.06	10.60	11.18
WORLD OIL PRICE													
Brent crude oil price	USD/barrel	42.30	72.30	90.00	90.00	91.10	92.80	94.60	96.40	98.20	100.10	102.00	104.00

a) For OECD member countries, historical data for population, real GDP, private consumption expenditure deflator and exchange rate were obtained from the *OECD Economic Outlook*, No. 82, December 2007. For non-member economies, historical macroeconomic data were obtained from the World Bank, November 2007. Assumptions for the projection period draw on the recent medium term macroeconomic projections of the OECD Economics Department, projections of the World Bank, responses to a questionnaire sent to member country agricultural experts and for population, projections from the United Nations World Population Prospects Database, 2006 Revision (medium variant). Data for the European Union are for the euro area aggregates.

b) Annual per cent change. The price index used is the private consumption expenditure deflator.

c) Excludes Iceland.

d) Annual weighted average real GDP and CPI growth rates in OECD countries are based on weights using 1995 GDP and purchasing power parities (PPPs).

est.: estimate.

Source: OECD and FAO Secretariats.

Table A.2. **World prices**[a]

		Average 02/03-06/07	07/08 est.	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18
WHEAT													
Price[b]	USD/t	167.8	318.6	267.0	233.6	225.9	229.7	231.0	231.2	230.2	230.9	231.6	230.6
COARSE GRAINS													
Price[c]	USD/t	113.2	181.3	185.3	185.0	189.0	188.4	178.5	173.0	173.2	170.9	166.6	164.6
RICE													
Price[d]	USD/t	262.3	361.0	390.6	367.9	330.7	326.7	337.2	340.3	335.6	333.8	332.5	334.5
OILSEEDS													
Price[e]	USD/t	293.4	485.8	481.9	470.6	468.3	464.2	455.8	452.4	453.2	455.6	457.6	457.2
OILSEED MEALS													
Price[f]	USD/t	219.5	365.7	348.2	331.5	328.4	321.6	308.4	302.6	303.4	304.0	305.8	307.0
VEGETABLE OILS													
Price[g]	USD/t	587.5	1 015.1	986.9	1 017.9	1 026.3	1 031.2	1 043.8	1 048.0	1 050.9	1 055.9	1 060.3	1 055.1
SUGAR													
Price, raw sugar[h]	USD/t	237.1	229.3	216.0	228.0	257.6	280.4	304.5	298.0	307.1	309.6	308.2	301.7
Price, refined sugar[i]	USD/t	291.2	289.1	268.1	280.8	317.8	351.8	374.5	371.3	384.9	385.0	383.4	379.1
BEEF AND VEAL													
Price, EU[j]	EUR/100 kg dw	256.5	276.0	275.3	279.2	281.2	282.9	285.9	288.8	295.0	300.4	303.2	305.9
Price, USA[k]	USD/100 kg dw	291.0	327.1	327.2	323.1	325.4	322.7	310.7	317.1	320.5	322.9	323.1	328.7
Price, Argentina[l]	USD/100 kg dw	120.7	151.7	143.3	142.3	138.6	138.1	136.2	138.1	143.1	144.5	147.9	147.5
PIG MEAT													
Price, EU[m]	EUR/100 kg dw	131.3	130.6	148.5	149.6	149.8	147.7	150.8	149.7	147.5	150.5	148.4	151.6
Price, USA[n]	USD/100 kg dw	137.3	143.5	143.5	156.0	172.3	176.9	164.6	169.8	167.5	163.2	160.8	158.8
Price, Brazil[o]	USD/100 kg dw	78.0	109.4	147.7	153.6	151.4	145.7	148.2	150.2	149.9	149.0	151.1	153.0
POULTRY MEAT													
Price, EU[p]	EUR/100 kg rtc	101.5	111.7	115.9	118.5	120.9	117.7	115.7	120.3	121.4	122.5	123.6	124.8
Price, USA[q]	USD/100 kg rtc	144.1	168.4	166.8	160.6	165.6	168.7	164.2	167.9	170.1	171.9	174.0	177.3
Price, Brazil[r]	USD/100 kg pw	95.1	143.8	156.0	137.7	137.4	140.1	140.3	143.4	146.2	148.1	149.7	152.8
SHEEP MEAT													
Price, New Zealand[s]	NZD/100 kg dw	379.0	318.8	313.2	344.6	365.8	379.9	386.1	392.4	398.8	405.3	420.1	435.6
BUTTER													
Price[t]	USD/100 kg	161.6	293.8	300.6	290.1	265.6	256.1	257.1	259.8	264.4	268.1	269.6	271.8
CHEESE													
Price[u]	USD/100 kg	234.6	402.2	418.9	393.9	359.6	349.9	350.4	351.7	354.1	355.6	357.3	358.0
SKIM MILK POWDER													
Price[v]	USD/100 kg	191.2	431.6	355.2	331.2	314.4	308.3	305.8	304.7	303.4	304.2	303.9	304.6
WHOLE MILK POWDER													
Price[w]	USD/100 kg	192.1	416.7	365.7	333.5	311.3	303.6	303.4	304.6	306.6	308.0	309.6	311.0
WHEY POWDER													
Wholesale price, USA[x]	USD/100 kg	54.1	133.8	92.1	87.9	93.3	96.1	100.9	102.4	104.2	108.9	111.0	114.3
CASEIN													
Price[y]	USD/100 kg	577.0	1 029.5	956.7	804.6	807.4	752.6	784.2	755.0	776.6	757.0	772.4	759.3

For notes, see end of the table.

Source: OECD and FAO Secretariats.

Table A.2. **World prices**[a] (cont.)

		Average 02/03-06/07	07/08 est.	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18
ETHANOL													
Price[z]	USD/hl	31.4	42.0	53.0	55.6	54.0	53.7	53.6	52.9	52.8	52.7	52.0	51.3
BIODIESEL													
Price[aa]	USD/hl	83.8	94.7	98.6	105.2	105.8	103.4	104.2	104.8	105.3	106.3	106.3	105.5

a) This table is a compilation of price information presented in the detailed commodity tables further in this annex. Prices for crops are on marketing year basis and those for meat and dairy products on calendar year basis (*e.g.* 07/08 is calendar year 2007).
b) No. 2 hard red winter wheat, ordinary protein, USA f.o.b. Gulf Ports (June/May), less EEP payments where applicable.
c) No. 2 yellow corn, US f.o.b. Gulf Ports (September/August).
d) Milled, 100%, grade b, Nominal Price Quote, NPQ, f.o.b. Bangkok (August/July).
e) Weighted average oilseed price, European port.
f) Weighted average meal price, European port.
g) Weighted average price of oilseed oils and palm oil, European port.
h) Raw sugar world price, New York No. 11, f.o.b. stowed Caribbean port (including Brazil), bulk spot price.
i) Refined sugar price, London No. 5 , f.o.b. Europe, spot.
j) Producer price.
k) Choice steers, 1 100-1 300 lb lw, Nebraska – lw to dw conversion factor 0.63.
l) Buenos Aires wholesale price linier, young bulls.
m) Pig producer price
n) Barrows and gilts, No. 1-3, 230-250 lb lw, Iowa/South Minnesota – lw to dw conversion factor 0.74.
o) Producer price.
p) Weighted average farm gate live chickens, first choice, lw to rtc conversion of 0.75, EU15 starting in 1995.
q) Wholesale weighted average broiler price 12 cities.
r) Weighted average wholesale price of differents cuts.
s) Lamb schedule price, all grade average.
t) f.o.b. export price, butter, 82% butterfat, Oceania.
u) f.o.b. export price, cheddar cheese, 39% moisture, Oceania.
v) f.o.b. export price, non-fat dry milk, 1.25% butterfat, Oceania.
w) f.o.b. export price, WMP 26% butterfat, Oceania.
x) Edible dry whey, Wisconsin, plant.
y) Export price, New Zealand.
z) Brazil, Sao Paulo (ex-distillery).
aa) Central Europe FOB price net of biodiesel tariff.
est.: estimate.
Source: OECD and FAO Secretariats.

Table A.3. **World trade projections**

IMPORTS			Average 2002-06	2007 est.	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Wheat	World trade	kt	109 363	111 003	121 070	115 943	116 958	118 354	120 578	120 885	122 913	124 106	125 294	126 465
	OECD	kt	24 907	25 144	26 484	24 906	24 424	24 152	24 818	24 698	24 853	24 913	25 070	25 127
	Developing	kt	85 114	87 062	96 495	92 824	94 400	95 863	97 699	97 976	99 778	100 858	101 793	102 849
	Least Developed Countries	kt	10 445	10 590	13 271	11 822	11 853	12 292	12 710	12 809	13 009	13 173	13 369	13 605
Coarse grains	World trade	kt	105 924	119 616	111 697	111 197	111 423	112 858	114 921	116 832	119 567	122 072	125 101	126 943
	OECD	kt	49 923	59 088	49 298	50 523	50 116	49 694	49 646	50 033	50 097	50 593	51 179	51 448
	Developing	kt	73 297	76 900	79 529	78 276	78 858	80 639	83 000	84 940	87 352	90 165	92 497	94 151
	Least Developed Countries	kt	2 553	2 057	2 287	2 506	2 655	2 885	3 156	3 409	3 692	3 715	4 025	4 277
Rice	World trade	kt	29 641	31 245	30 844	31 901	32 486	33 422	34 414	35 167	36 090	36 791	37 485	38 082
	OECD	kt	4 242	4 436	4 463	4 510	4 793	4 812	4 861	4 954	5 116	5 252	5 421	5 475
	Developing	kt	25 171	26 568	26 014	27 091	27 371	28 225	29 152	29 829	30 655	31 273	31 874	32 440
	Least Developed Countries	kt	6 279	7 051	7 516	8 319	8 201	8 083	8 170	8 552	8 770	9 055	9 199	9 374
Oilseeds	World trade	kt	71 937	83 620	80 052	82 152	83 945	85 127	86 578	88 186	90 512	92 514	94 802	97 488
	OECD	kt	33 788	34 199	30 982	30 855	31 084	30 188	29 397	29 141	29 427	29 751	30 261	31 280
	Developing	kt	45 609	57 178	56 601	59 084	60 808	62 997	65 395	67 367	69 555	71 317	73 205	74 999
	Least Developed Countries	kt	238	270	261	264	277	295	310	323	337	352	368	383
Oilseed meals	World trade	kt	52 056	61 773	64 787	66 941	69 238	70 192	71 501	72 734	73 614	74 249	74 866	75 329
	OECD	kt	32 007	35 142	36 685	37 228	37 263	37 179	37 222	37 299	37 081	36 586	36 054	35 181
	Developing	kt	20 873	27 347	29 091	30 619	32 902	34 061	35 422	36 535	37 680	38 993	40 142	41 555
	Least Developed Countries	kt	271	408	444	494	510	535	567	604	626	642	659	678
Vegetable oils	World trade	kt	38 655	45 805	48 889	50 596	52 408	54 340	56 270	58 012	59 616	61 029	62 238	63 175
	OECD	kt	9 275	11 883	14 075	15 495	16 874	17 547	18 434	19 290	19 831	20 480	20 833	21 141
	Developing	kt	29 182	33 768	34 623	34 755	35 136	36 349	37 333	38 176	39 182	39 902	40 706	41 290
	Least Developed Countries	kt	3 316	3 875	4 001	4 118	4 264	4 413	4 563	4 721	4 883	5 049	5 213	5 390
Sugar	World trade	kt	46 908	44 096	48 656	50 624	51 560	51 916	52 588	53 901	54 780	56 260	57 842	59 657
	OECD	kt	11 261	10 130	10 911	11 764	12 120	12 481	12 631	12 845	13 023	13 239	13 495	13 768
	Developing	kt	30 732	30 589	33 960	35 257	36 108	36 484	37 220	38 500	39 438	41 002	42 633	44 405
	Least Developed Countries	kt	3 513	3 702	3 821	4 045	4 247	4 409	4 430	4 657	4 705	4 872	5 040	5 283
Beef[a]	World trade	kt	6 232	7 071	7 675	7 594	7 789	8 075	8 442	8 707	9 033	9 250	9 529	9 787
	OECD	kt	3 536	3 478	3 692	3 853	3 930	4 052	4 216	4 317	4 407	4 444	4 441	4 509
	Developing	kt	2 393	2 977	3 313	3 223	3 328	3 489	3 649	3 770	3 996	4 118	4 323	4 497
	Least Developed Countries	kt	102	135	219	188	201	214	232	249	263	277	294	305
Pigmeat[a]	World trade	kt	4 263	4 798	5 184	5 408	5 507	5 615	5 757	5 909	6 065	6 208	6 410	6 601
	OECD	kt	2 407	2 544	2 608	2 712	2 832	2 922	3 000	3 069	3 136	3 190	3 282	3 368
	Developing	kt	1 464	1 818	2 060	2 295	2 305	2 290	2 367	2 442	2 541	2 630	2 764	2 883
	Least Developed Countries	kt	44	57	70	71	82	95	101	112	121	132	139	153
Poultry	World trade	kt	7 635	8 568	8 827	9 277	9 682	9 778	9 977	10 258	10 409	10 544	10 831	11 102
	OECD	kt	2 021	2 150	2 326	2 205	2 416	2 277	2 336	2 427	2 442	2 387	2 391	2 377
	Developing	kt	4 248	4 906	5 131	5 537	5 835	5 968	6 150	6 393	6 509	6 652	6 949	7 238
	Least Developed Countries	kt	420	453	479	542	571	587	596	593	594	617	632	652
Butter	World trade	kt	738	735	745	761	778	800	817	835	856	875	897	916
	OECD	kt	144	144	138	137	138	139	138	137	136	134	133	133
	Developing	kt	436	458	443	457	471	482	490	500	512	522	534	544
	Least Developed Countries	kt	12	14	14	20	21	22	24	26	29	31	33	35
Cheese	World trade	kt	1 418	1 564	1 623	1 680	1 732	1 799	1 854	1 902	1 949	1 995	2 046	2 113
	OECD	kt	754	778	792	809	833	857	881	903	925	948	971	994
	Developing	kt	567	618	626	656	693	721	742	770	795	824	851	896
	Least Developed Countries	kt	17	20	14	24	31	28	29	34	35	37	37	40
Whole milk powder	World trade	kt	1 382	1 400	1 625	1 661	1 723	1 785	1 856	1 924	1 984	2 049	2 126	2 197
	OECD	kt	85	76	77	78	78	78	78	78	78	78	78	79
	Developing	kt	1 312	1 331	1 545	1 583	1 645	1 706	1 779	1 847	1 908	1 973	2 038	2 107
	Least Developed Countries	kt	124	139	153	164	176	187	197	208	220	232	245	259

For notes, see end of the table.
Source: OECD and FAO Secretariats.

Table A.3. **World trade projections** *(cont.)*

IMPORTS			Average 2002-06	2007 est.	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Skim milk powder	World trade	kt	1 220	1 207	1 192	1 217	1 236	1 270	1 319	1 367	1 418	1 463	1 510	1 549
	OECD	kt	211	210	213	216	209	212	216	219	220	224	227	230
	Developing	kt	1 081	1 052	1 038	1 064	1 092	1 125	1 172	1 219	1 266	1 311	1 357	1 395
	Least Developed Countries	kt	56	32	32	33	35	37	39	41	43	45	47	49

For notes, see end of the table.
Source: OECD and FAO Secretariats.

Table A.3. **world trade projections** (cont.)

EXPORTS			Average 2002-06	2007 est.	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Wheat	World trade	kt	109 363	111 003	121 070	115 943	116 958	118 354	120 578	120 885	122 913	124 106	125 294	126 465
	OECD	kt	71 994	64 315	81 900	75 891	75 752	76 396	77 232	75 394	75 600	74 946	74 731	74 776
	Developing	kt	19 101	18 735	19 856	18 486	18 860	18 866	19 895	20 738	21 288	21 799	22 419	22 663
	Least Developed Countries	kt	145	88	71	55	56	56	57	57	58	58	59	59
Coarse grains	World trade	kt	105 924	119 616	111 697	111 197	111 423	112 858	114 921	116 832	119 567	122 072	125 101	126 943
	OECD	kt	72 984	86 515	76 856	72 763	72 300	73 485	76 506	77 500	79 184	81 871	84 160	84 694
	Developing	kt	28 286	32 390	29 258	29 547	27 888	27 932	27 850	29 240	29 845	30 025	30 368	31 359
	Least Developed Countries	kt	2 007	3 547	3 591	3 656	4 119	4 035	3 739	3 712	3 628	3 152	3 059	3 084
Rice	World trade	kt	29 641	31 245	30 844	31 901	32 486	33 422	34 414	35 167	36 090	36 791	37 485	38 082
	OECD	kt	3 991	3 814	3 647	4 204	4 340	4 115	4 238	4 437	4 607	4 712	4 800	4 905
	Developing	kt	24 544	26 540	27 167	27 676	28 124	29 284	30 153	30 707	31 459	32 055	32 660	33 152
	Least Developed Countries	kt	537	1 652	1 825	1 336	1 432	1 768	2 188	2 023	2 210	2 255	2 439	2 213
Oilseeds	World trade	kt	71 937	83 620	80 052	82 152	83 945	85 127	86 578	88 186	90 512	92 514	94 802	97 488
	OECD	kt	35 321	35 086	35 024	32 612	32 586	31 097	29 875	29 789	30 089	30 347	30 356	30 479
	Developing	kt	33 134	41 996	42 741	46 122	47 386	49 826	52 277	53 959	55 708	57 372	59 433	61 682
	Least Developed Countries	kt	18	18	34	29	28	27	25	23	21	20	19	18
Oilseed meals	World trade	kt	52 056	61 773	64 787	66 941	69 238	70 192	71 501	72 734	73 614	74 249	74 866	75 329
	OECD	kt	8 795	10 656	9 842	11 348	12 375	12 660	13 174	13 343	13 302	13 090	12 931	12 567
	Developing	kt	45 705	50 494	52 415	52 999	54 120	54 784	55 716	56 601	57 504	58 335	59 039	59 833
	Least Developed Countries	kt	18	19	19	19	19	20	20	20	20	20	21	21
Vegetable oils	World trade	kt	38 655	45 805	48 889	50 596	52 408	54 340	56 270	58 012	59 616	61 029	62 238	63 175
	OECD	kt	2 579	2 631	2 308	2 459	2 696	2 897	3 220	3 459	3 607	3 642	3 735	3 718
	Developing	kt	35 859	42 512	44 085	45 549	46 984	48 545	50 008	51 352	52 702	53 928	54 921	55 741
	Least Developed Countries	kt	81	96	89	90	91	93	94	95	96	97	98	99
Sugar	World trade	kt	48 322	49 287	48 656	50 624	51 560	51 916	52 588	53 901	54 780	56 260	57 842	59 657
	OECD	kt	10 299	5 735	5 813	6 340	6 639	7 005	7 160	7 534	7 683	7 752	7 854	7 845
	Developing	kt	36 247	41 731	41 193	42 836	43 625	44 029	44 611	45 619	46 209	47 563	49 079	50 873
	Least Developed Countries	kt	566	688	708	810	847	851	861	877	912	934	969	1 011
Beef[a]	World trade	kt	6 232	7 071	7 675	7 594	7 789	8 075	8 442	8 707	9 033	9 250	9 529	9 787
	OECD	kt	3 427	3 291	3 300	3 212	3 216	3 298	3 436	3 508	3 607	3 631	3 644	3 714
	Developing	kt	3 286	4 136	4 284	4 452	4 657	4 899	5 189	5 394	5 634	5 848	6 167	6 384
	Least Developed Countries	kt	2	2	3	3	11	3	3	3	3	3	3	3
Pigmeat[a]	World trade	kt	4 263	4 798	5 184	5 408	5 507	5 615	5 757	5 909	6 065	6 208	6 410	6 601
	OECD	kt	3 468	3 854	3 979	4 160	4 247	4 273	4 312	4 402	4 486	4 551	4 684	4 789
	Developing	kt	1 225	1 380	1 461	1 575	1 601	1 680	1 779	1 843	1 918	2 000	2 075	2 154
	Least Developed Countries	kt	0	0	4	1	2	1	1	1	1	2	2	2
Poultry	World trade	kt	7 635	8 568	8 827	9 277	9 682	9 778	9 977	10 258	10 409	10 544	10 831	11 102
	OECD	kt	3 716	3 877	3 961	3 962	4 123	4 113	4 231	4 340	4 325	4 301	4 341	4 355
	Developing	kt	4 094	4 974	4 822	5 272	5 513	5 617	5 696	5 868	6 035	6 192	6 439	6 695
	Least Developed Countries	kt	7	11	10	10	10	10	11	11	12	12	13	13
Butter	World trade	kt	738	735	745	761	778	800	817	835	856	875	897	916
	OECD	kt	749	616	537	545	560	573	582	586	599	608	617	627
	Developing	kt	66	104	113	121	124	132	140	147	156	165	172	180
	Least Developed Countries	kt	1	1	3	1	1	1	1	1	1	1	1	1
Cheese	World trade	kt	1 418	1 564	1 623	1 680	1 732	1 799	1 854	1 902	1 949	1 995	2 046	2 113
	OECD	kt	1 194	1 232	1 213	1 245	1 267	1 288	1 302	1 311	1 308	1 311	1 313	1 320
	Developing	kt	176	234	289	281	296	315	345	376	413	450	486	527
	Least Developed Countries	kt	0	0	0	0	0	0	1	0	0	0	0	0
Whole milk powder	World trade	kt	1 382	1 400	1 625	1 661	1 723	1 785	1 856	1 924	1 984	2 049	2 126	2 197
	OECD	kt	1 231	1 140	1 043	1 056	1 093	1 107	1 134	1 154	1 166	1 184	1 200	1 219
	Developing	kt	442	449	545	571	597	644	690	736	783	830	879	929
	Least Developed Countries	kt	3	4	4	5	5	6	7	7	8	8	9	9

For notes, see end of the table.
Source: OECD and FAO Secretariats.

Table A.3. **world trade projections** *(cont.)*

EXPORTS			Average 2002-06	2007 est.	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Skim milk powder	World trade	*kt*	1 220	1 207	1 192	1 217	1 236	1 270	1 319	1 367	1 418	1 463	1 510	1 549
	OECD	*kt*	951	907	881	851	848	860	880	898	930	968	1 015	1 053
	Developing	*kt*	121	108	140	171	191	202	212	222	231	245	257	269
	Least Developed Countries	*kt*	2	1	1	1	1	1	1	1	1	1	1	1
Biofuel[a]	Ethanol world trade	*mn l*	6 363	4 752	4 613	5 998	6 237	5 175	5 478	6 366	7 065	7 831	8 842	10 384
	Biodiesel world trade	*mn l*	563	1 554	1 790	2 360	2 491	2 296	2 104	2 011	1 999	2 034	2 115	2 187

a) Excludes trade of live animals.
b) Sum of all positive net trade positions.
est.: estimate.
Source: OECD and FAO Secretariats.

Table A.4. **World cereal projections**

Crop year[a]		Average 02/03-06/07	07/08 est.	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18
WHEAT													
OECD[b]													
Production	mt	250.8	234.2	283.3	272.8	271.6	276.8	280.7	281.1	283.5	285.7	287.9	290.5
Consumption	mt	205.4	205.7	212.6	218.9	222.0	225.6	228.7	231.8	234.3	236.4	239.0	241.3
Closing stocks	mt	54.6	39.3	54.6	57.4	55.6	54.6	54.2	52.9	51.4	50.7	49.9	49.4
Non-OECD													
Production	mt	345.7	368.2	375.8	372.9	376.0	376.9	381.9	386.5	388.3	392.3	394.7	398.9
Consumption	mt	406.5	415.8	422.9	423.4	428.3	429.5	432.8	436.0	438.7	441.9	444.8	448.1
Closing stocks	mt	128.1	115.7	124.1	124.6	123.6	123.3	124.9	126.1	126.4	126.9	126.5	126.9
WORLD[c]													
Production	mt	596.5	602.4	659.2	645.7	647.5	653.7	662.7	667.6	671.8	678.0	682.6	689.4
Consumption	mt	611.9	621.5	635.5	642.3	650.3	655.0	661.5	667.7	673.0	678.3	683.7	689.4
Closing stocks	mt	182.7	155.0	178.6	182.0	179.2	177.9	179.1	179.0	177.9	177.6	176.4	176.4
Price[d]	USD/t	167.8	318.6	267.0	233.6	225.9	229.7	231.0	231.2	230.2	230.9	231.6	230.6
COARSE GRAINS													
OECD[b]													
Production	mt	508.6	567.2	567.8	576.2	590.1	601.2	608.1	611.8	617.4	625.3	630.2	637.2
Consumption	mt	488.7	546.7	549.8	556.1	563.2	571.9	577.6	581.9	585.5	591.4	595.4	600.8
Closing stocks	mt	102.1	79.9	70.3	68.2	72.9	78.4	82.0	84.4	87.2	89.8	91.7	94.8
Non-OECD													
Production	mt	456.3	491.9	507.3	514.6	523.1	534.1	539.9	545.5	551.7	562.0	571.3	579.5
Consumption	mt	482.2	516.6	532.8	542.8	547.9	553.3	564.4	573.3	582.4	591.3	602.2	611.3
Closing stocks	mt	126.3	123.7	125.7	119.8	117.2	121.8	124.2	123.9	122.2	124.1	126.2	127.7
WORLD[c]													
Production	mt	964.9	1 059.1	1 075.0	1 090.8	1 113.3	1 135.2	1 148.0	1 157.4	1 169.0	1 187.3	1 201.5	1 216.7
Consumption	mt	970.9	1 063.4	1 082.6	1 098.9	1 111.1	1 125.1	1 142.0	1 155.3	1 168.0	1 182.7	1 197.6	1 212.1
Closing stocks	mt	228.3	203.6	196.1	188.0	190.1	200.3	206.2	208.3	209.3	213.9	217.8	222.4
Price[e]	USD/t	113.2	181.3	185.3	185.0	189.0	188.4	178.5	173.0	173.2	170.9	166.6	164.6
RICE													
OECD[b]													
Production	mt	22.2	21.0	21.9	22.3	22.3	21.9	21.8	21.9	21.9	21.9	21.8	21.7
Consumption	mt	22.8	23.0	22.6	22.6	22.6	22.6	22.5	22.5	22.5	22.4	22.4	22.4
Closing stocks	mt	6.8	5.3	5.4	5.3	5.4	5.4	5.3	5.2	5.1	5.1	5.0	5.0
Non-OECD													
Production	mt	387.5	410.8	416.9	424.2	426.4	429.0	434.0	437.6	442.2	446.9	450.4	453.2
Consumption	mt	399.2	416.5	415.1	418.1	426.2	431.8	434.4	437.0	441.4	445.9	449.7	452.8
Closing stocks	mt	85.7	73.6	74.5	80.3	80.1	76.6	75.6	75.7	76.0	76.5	76.6	76.4
WORLD[c]													
Production	mt	409.7	431.8	438.8	446.5	448.7	450.9	455.9	459.5	464.1	468.7	472.2	475.0
Consumption	mt	422.0	439.5	437.8	440.8	448.8	454.4	456.9	459.4	463.8	468.4	472.1	475.2
Closing stocks	mt	92.5	78.8	79.9	85.6	85.5	81.9	80.9	80.9	81.2	81.5	81.6	81.4
Price[f]	USD/t	262.3	361.0	390.6	367.9	330.7	326.7	337.2	340.3	335.6	333.8	332.5	334.5

a) Beginning crop marketing year.
b) Excludes Iceland but includes the 8 EU members that are not members of the OECD.
c) Source of historic data is USDA.
d) No. 2 hard red winter wheat, ordinary protein, USA f.o.b. Gulf Ports (June/May), less EEP payments where applicable.
e) No. 2 yellow corn, US f.o.b. Gulf Ports (September/August).
f) Milled, 100%, grade b, Nominal Price Quote, NPQ, f.o.b. Bangkok (August/July)
est.: estimate.
Source: OECD and FAO Secretariats.

Table A.5. **World oilseed projections**

		Average 02/03-06/07	07/08 est.	08/09	09/10	10/11	11/12	12/13	13/14	14/15	14/16	16/17	17/18
OILSEEDS (crop year[a])													
OECD[b]													
Production	mt	115.5	109.6	123.9	125.9	127.7	128.9	130.3	131.5	133.7	135.1	136.8	138.6
Consumption	mt	111.5	121.3	120.4	123.5	126.2	127.8	129.4	130.8	132.9	134.5	136.7	139.1
crush	mt	100.5	110.2	109.6	112.9	115.6	117.2	118.6	120.0	122.1	123.6	125.8	128.1
Closing stocks	mt	17.5	13.2	12.6	13.2	13.2	13.4	13.9	13.9	14.0	13.9	13.9	14.3
Non-OECD													
Production	mt	162.0	184.7	191.9	200.7	206.4	212.4	217.9	222.9	228.2	233.4	238.9	244.6
Consumption	mt	164.9	191.8	196.5	202.8	207.9	212.7	218.1	223.3	228.8	233.9	238.8	243.9
crush	mt	139.0	162.5	166.5	172.3	177.5	182.1	187.0	191.8	196.8	201.5	206.2	210.9
Closing stocks	mt	9.5	8.4	7.9	7.5	7.5	8.1	8.4	8.6	8.6	8.7	8.9	8.7
WORLD[c]													
Production	mt	277.5	294.3	315.8	326.5	334.2	341.3	348.2	354.4	361.8	368.5	375.7	383.2
Consumption	mt	276.4	313.1	316.9	326.3	334.1	340.6	347.4	354.1	361.8	368.4	375.5	383.0
crush	mt	239.5	272.7	276.1	285.2	293.1	299.3	305.6	311.8	318.9	325.1	331.9	339.0
Closing stocks	mt	27.0	21.6	20.5	20.7	20.7	21.5	22.3	22.5	22.6	22.7	22.8	23.0
Price[d]	USD/t	293.4	485.8	481.9	470.6	468.3	464.2	455.8	452.4	453.2	455.6	457.6	457.2
OILSEED MEALS (marketing year)													
OECD[b]													
Production	mt	73.0	79.2	78.9	81.2	83.1	84.2	85.2	86.2	87.6	88.7	90.1	91.6
Consumption	mt	96.2	103.8	105.8	107.1	108.0	108.7	109.3	110.2	111.4	112.2	113.2	114.2
Closing stocks	mt	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Non-OECD													
Production	mt	101.0	116.0	120.5	124.6	128.4	131.8	135.4	138.9	142.5	146.0	149.4	152.9
Consumption	mt	73.3	89.4	94.0	98.9	103.5	107.2	111.3	115.0	118.7	122.5	126.2	130.2
Closing stocks	mt	4.1	4.9	4.5	4.3	4.3	4.3	4.4	4.4	4.4	4.4	4.4	4.5
WORLD[c]													
Production	mt	174.0	195.2	199.4	205.8	211.5	216.0	220.6	225.1	230.2	234.6	239.5	244.5
Consumption	mt	169.5	193.1	199.8	206.0	211.5	215.9	220.6	225.1	230.2	234.6	239.5	244.4
Closing stocks	mt	6.3	7.1	6.6	6.4	6.3	6.4	6.5	6.4	6.4	6.5	6.5	6.5
Price[e]	USD/t	219.5	365.7	348.2	331.5	328.4	321.6	308.4	302.6	303.4	304.0	305.8	307.0
VEGETABLE OILS (marketing year)													
OECD[b]													
Production	mt	24.8	27.3	27.6	28.4	29.1	29.6	29.9	30.3	31.0	31.5	32.1	32.8
Consumption	mt	31.4	37.0	39.4	41.5	43.3	44.4	45.2	46.2	47.2	48.3	49.2	50.2
Closing stocks	mt	2.4	2.4	2.4	2.3	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.3
Non-OECD													
Production	mt	65.8	78.8	82.9	86.1	89.3	92.3	95.4	98.5	101.6	104.7	107.7	110.7
Consumption	mt	57.7	67.7	70.7	72.9	74.9	77.6	80.1	82.6	85.3	87.7	90.5	93.2
Closing stocks	mt	5.2	5.6	6.0	6.1	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0
WORLD[c]													
Production	mt	90.6	106.1	110.5	114.5	118.4	121.8	125.3	128.8	132.6	136.1	139.8	143.5
of which palm oil	mt	33.5	41.9	44.0	45.8	47.7	49.6	51.4	53.3	55.1	56.9	58.7	60.5
Consumption	mt	89.1	104.7	110.1	114.4	118.2	121.8	125.3	128.8	132.5	136.1	139.7	143.4
Closing stocks	mt	7.6	7.9	8.4	8.5	8.7	8.8	8.8	8.9	8.9	9.0	9.1	9.3
Oil price[f]	USD/t	587.5	1 015.1	986.9	1 017.9	1 026.3	1 031.2	1 043.8	1 048.0	1 050.9	1 055.9	1 060.3	1 055.1

a) Beginning crop marketing year.
b) Excludes Iceland but includes the 8 EU members that are not members of the OECD.
c) Source of historic data is USDA.
d) Weighted average oilseed price, European port.
e) Weighted average meal price, European port.
f) Weighted average price of oilseed oils and palm oil, European port.
est: estimation.
Source: OECD and FAO Secretariats.

Table A.6. **World meat projections**

Calendar year[a]		Average 2002-06	2007 est.	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
OECD[b]													
BEEF AND VEAL[c]													
Production	kt cwe	26 465	26 872	26 576	26 287	26 280	26 448	26 500	26 585	26 759	26 900	27 075	27 200
Consumption	kt cwe	26 771	27 081	26 967	26 910	26 986	27 198	27 268	27 389	27 551	27 691	27 860	28 028
Ending stocks	kt cwe	1 014	1 010	1 008	1 023	1 029	1 031	1 041	1 043	1 048	1 068	1 077	1 051
Per capita consumption	kg rwt	15.6	15.5	15.4	15.3	15.2	15.3	15.2	15.2	15.3	15.3	15.3	15.3
Price, Australia[d]	AUD/100 kg dw	295	282	312	302	296	289	276	288	300	308	319	333
Price, EU[e]	EUR/100 kg dw	257	276	275	279	281	283	286	289	295	300	303	306
Price, USA[f]	USD/100 kg dw	291	327	327	323	325	323	311	317	321	323	323	329
Price, Argentina[g]	USD/100 kg dw	121	152	143	142	139	138	136	138	143	144	148	147
PIG MEAT[h]													
Production	kt cwe	37 113	38 140	37 939	37 890	37 958	38 130	38 037	38 166	38 709	38 979	39 455	39 797
Consumption	kt cwe	35 842	36 661	36 396	36 253	36 381	36 590	36 523	36 693	37 170	37 434	37 876	38 194
Ending stocks	kt cwe	801	811	809	827	817	834	862	827	838	843	840	840
Per capita consumption	kg rwt	23.3	23.4	23.1	22.9	22.9	22.9	22.8	22.8	22.9	23.0	23.2	23.3
Price, EU[i]	EUR/100 kg dw	131	131	149	150	150	148	151	150	148	151	148	152
Price, USA[j]	USD/100 kg dw	137	143	143	156	172	177	165	170	167	163	161	159
POULTRY MEAT													
Production	kt rtc	36 287	37 785	38 632	39 055	39 403	39 682	39 980	40 532	40 865	41 283	41 781	42 380
Consumption	kt rtc	34 590	36 081	36 945	37 299	37 696	37 848	38 088	38 622	38 984	39 370	39 833	40 404
Ending stocks	kt rtc	1 128	1 081	1 125	1 124	1 124	1 122	1 120	1 118	1 116	1 115	1 113	1 111
Per capita consumption	kg rwt	25.4	26.0	26.5	26.6	26.8	26.7	26.8	27.0	27.2	27.3	27.5	27.8
Price, EU[k]	EUR/100 kg rtc	102	112	116	119	121	118	116	120	121	123	124	125
Price, USA[l]	USD/100 kg rtc	144	168	167	161	166	169	164	168	170	172	174	177
SHEEP MEAT													
Production	kt cwe	2 762	2 904	2 802	2 762	2 748	2 751	2 749	2 749	2 751	2 750	2 750	2 748
Consumption	kt cwe	2 417	2 482	2 465	2 404	2 392	2 381	2 366	2 360	2 356	2 349	2 345	2 340
Ending stocks	kt cwe	522	533	514	514	514	514	514	514	514	514	514	518
Per capita consumption	kg rwt	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.6
Price, Australia[m]	AUD/100 kg dw	346	323	327	328	332	337	341	345	349	353	357	361
Price, Australia[n]	AUD/100 kg dw	172	130	132	140	141	142	143	144	146	147	148	150
Price, New Zealand[o]	NZD/100 kg dw	379	319	313	345	366	380	386	392	399	405	420	436
TOTAL MEAT													
Per capita consumption	kg rwt	66.1	66.8	66.8	66.5	66.6	66.6	66.4	66.7	67.0	67.2	67.6	68.1
Non-OECD													
BEEF AND VEAL													
Production	kt cwe	36 955	40 534	41 342	42 663	44 160	45 481	46 430	47 439	48 704	49 972	51 096	52 201
Consumption	kt cwe	36 452	40 042	41 150	42 184	43 580	44 867	45 762	46 733	47 996	49 255	50 388	51 489
Per capita consumption	kg rwt	4.9	5.1	5.2	5.3	5.4	5.5	5.5	5.5	5.6	5.7	5.8	5.8
Ending stocks	kt cwe	66	60	60	58	58	58	58	58	58	58	58	58
PIG MEAT													
Production	kt cwe	63 172	64 936	66 541	69 180	71 326	72 774	74 903	77 234	79 132	81 016	83 129	85 452
Consumption	kt cwe	63 946	65 916	67 826	70 503	72 593	73 969	76 054	78 400	80 307	82 193	84 341	86 681
Per capita consumption	kg rwt	9.5	9.4	9.6	9.8	10.0	10.0	10.2	10.4	10.5	10.6	10.7	10.9
Ending stocks	kt cwe	48	51	51	51	51	51	51	51	51	51	51	51
POULTRY MEAT													
Production	kt rtc	43 596	47 908	49 715	51 650	52 940	53 937	55 625	57 314	58 959	60 403	61 938	63 327
Consumption	kt rtc	45 117	49 419	51 352	53 401	54 648	55 772	57 519	59 223	60 839	62 316	63 888	65 306
Per capita consumption	kg rwt	7.6	8.0	8.2	8.4	8.5	8.5	8.7	8.8	9.0	9.1	9.2	9.3
Ending stocks	kt rtc	222	158	157	162	161	161	163	166	169	169	169	169

For notes, see end of the table.
Source: OECD and FAO Secretariats.

Table A.6. **World meat projections** *(cont.)*

Calendar year[a]		Average 2002-06	2007 est.	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
SHEEP MEAT													
Production	*kt cwe*	10 935	10 828	11 022	11 319	11 575	11 831	12 084	12 329	12 583	12 839	13 100	13 358
Consumption	*kt cwe*	11 259	11 230	11 484	11 793	12 052	12 326	12 614	12 898	13 197	13 503	13 792	14 080
Per capita consumption	*kg rwt*	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0
Ending stocks	*kt cwe*	5	5	5	5	5	5	5	5	5	5	5	5
TOTAL MEAT													
Per capita consumption	*kg rwt*	23.8	24.3	24.7	25.3	25.7	25.9	26.3	26.6	27.0	27.3	27.7	28.0

a) Year ending 30 September fo New Zealand
b) Excludes Iceland but includes the 8 EU members that are not members of the OECD. Carcass weight to retail weight conversion factors of 0.7 for beef and veal, 0.78 for pig meat and 0.88 for sheep meat. Rtc to retail weight conversion factor 0.88 for poultry meat.
c) Do not balance due to statistical differences in New Zealand.
d) Weighted average price of cows 201-260 kg, steers 301-400 kg, yearling < 200 kg dw.
e) Producer price.
f) Choice steers, 1100-1300 lb lw, Nebraska - lw to dw conversion factor 0.63.
g) Buenos Aires wholesale price linier, young bulls.
h) Do not balance due to consumption in Canada which excludes non-food parts.
i) Pig producer price.
j) Barrows and gilts, No. 1-3, 230-250 lb lw, Iowa/South Minnesota – lw to dw conversion factor 0.74.
k) Weighted average farmgate live fowls, top quality, (lw to rtc conversion of 0.75), EU15 starting in 1995.
l) Wholesale weighted average broiler price 12 cities.
m) Saleyard price, lamb, 16-20 kg dw.
n) Saleyard price, wethers, < 22 kg dw.
o) Lamb schedule price, all grade average.
est.: estimate.
Source: OECD and FAO Secretariats.

Table A.7. **World dairy projections (butter and cheese)**

Calendar year[a]		Average 2002-06	2007 est.	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
BUTTER													
OECD[b]													
Production	kt pw	3 679	3 618	3 580	3 581	3 586	3 601	3 612	3 612	3 619	3 623	3 626	3 628
Consumption	kt pw	3 076	3 184	3 189	3 177	3 168	3 170	3 171	3 165	3 159	3 153	3 146	3 138
Stock changes	kt pw	4	−37	−8	−4	−3	−3	−2	−3	−3	−3	−4	−4
Non-OECD													
Production	kt pw	4 666	5 597	5 976	6 213	6 415	6 606	6 815	7 028	7 218	7 417	7 631	7 824
Consumption	kt pw	5 131	6 018	6 386	6 626	6 842	7 046	7 264	7 483	7 686	7 896	8 120	8 323
WORLD													
Production	kt pw	8 345	9 215	9 556	9 793	10 002	10 208	10 427	10 640	10 837	11 040	11 256	11 452
Consumption	kt pw	8 207	9 202	9 575	9 803	10 010	10 216	10 435	10 648	10 845	11 049	11 266	11 462
Stock changes	kt pw	−2	−43	−18	−9	−8	−7	−7	−7	−7	−8	−8	−9
Price[c]	USD/100 kg	162	294	301	290	266	256	257	260	264	268	270	272
CHEESE													
OECD[b]													
Production	kt pw	14 163	14 974	15 332	15 642	15 867	16 041	16 228	16 389	16 542	16 688	16 846	16 980
Consumption	kt pw	13 729	14 555	14 919	15 201	15 423	15 606	15 801	15 973	16 150	16 315	16 493	16 649
Stock changes	kt pw	−6	−34	−7	5	11	5	6	8	9	9	11	5
Non-OECD													
Production	kt pw	3 966	4 314	4 420	4 503	4 623	4 734	4 841	4 947	5 055	5 155	5 254	5 345
Consumption	kt pw	4 340	4 750	4 848	4 946	5 064	5 172	5 270	5 362	5 445	5 525	5 602	5 678
WORLD													
Production	kt pw	18 129	19 289	19 752	20 145	20 491	20 776	21 070	21 336	21 597	21 842	22 099	22 325
Consumption	kt pw	18 069	19 305	19 767	20 147	20 487	20 777	21 071	21 335	21 595	21 840	22 095	22 326
Stock changes	kt pw	−14	−53	−14	−2	4	−2	−1	1	2	2	4	−2
Price[d]	USD/100 kg	235	402	419	394	360	350	350	352	354	356	357	358

a) Year ending 30 June for Australia and 31 May for New Zealand in OECD aggregate.
b) Excludes Iceland but includes the 8 EU members that are not members of the OECD.
c) f.o.b. export price, butter, 82% butterfat, Oceania.
d) f.o.b. export price, cheddar cheese, 39% moisture, Oceania.
est.: estimate.
Source: OECD and FAO Secretariats.

Table A.8. **World dairy projections (powders and casein)**

Calendar year[a]		Average 2002-06	2007 est.	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
SKIM MILK POWDER													
OECD[b]													
Production	kt pw	2 695	2 524	2 581	2 566	2 576	2 598	2 625	2 644	2 679	2 718	2 767	2 808
Consumption	kt pw	1 970	1 789	1 850	1 874	1 892	1 903	1 921	1 930	1 941	1 950	1 962	1 970
Stock changes	kt pw	−70	−2	4	3	2	1	1	1	−1	0	0	0
Non-OECD													
Production	kt pw	729	678	781	834	863	893	931	972	998	1 012	1 019	1 025
Consumption	kt pw	1 478	1 450	1 447	1 468	1 500	1 540	1 593	1 650	1 707	1 755	1 805	1 846
WORLD													
Production	kt pw	3 424	3 201	3 362	3 400	3 440	3 491	3 556	3 617	3 677	3 730	3 786	3 833
Consumption	kt pw	3 376	3 238	3 297	3 342	3 392	3 443	3 514	3 580	3 648	3 705	3 766	3 817
Stock changes	kt pw	−70	−1	6	4	4	3	3	3	1	2	2	1
Price[c]	USD/100 kg	191	432	355	331	314	308	306	305	303	304	304	305
WHOLE MILK POWDER													
OECD[b]													
Production	kt pw	1 887	1 802	1 690	1 700	1 737	1 750	1 773	1 791	1 804	1 820	1 835	1 854
Consumption	kt pw	741	738	724	722	721	720	717	715	715	714	713	713
Non-OECD													
Production	kt pw	1 834	2 219	2 379	2 440	2 514	2 595	2 667	2 740	2 819	2 899	2 969	3 043
Consumption	kt pw	2 665	3 073	3 347	3 421	3 533	3 628	3 726	3 818	3 910	4 007	4 093	4 186
WORLD													
Production	kt pw	3 721	4 021	4 069	4 140	4 251	4 346	4 440	4 531	4 623	4 719	4 805	4 897
Consumption	kt pw	3 406	3 810	4 071	4 142	4 253	4 348	4 442	4 533	4 624	4 721	4 807	4 899
Price[d]	USD/100 kg	192	417	366	333	311	304	303	305	307	308	310	311
WHEY POWDER													
Non-OECD													
Wholesale price, USA[e]	USD/100 kg	54	134	92	88	93	96	101	102	104	109	111	114
CASEIN													
Price[f]	USD/100 kg	577	1 030	957	805	807	753	784	755	777	757	772	759

a) Year ending 30 June for Australia and 31 May for New Zealand in OECD aggregate.
b) Excludes Iceland but includes the 8 EU members that are not members of the OECD.
c) f.o.b. export price, non-fat dry milk, 1.25% butterfat, Oceania.
d) f.o.b. export price, WMP 26% butterfat, Oceania.
e) Edible dry whey, Wisconsin, plant.
f) Export price, New Zealand.
est.: estimate.
Source: OECD and FAO Secretariats.

Table A.9. **World sugar projections (in raw sugar equivalent)**

Crop year[a]		Average 02/03-06/07	07/08 est.	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18
OECD													
Production	kt rse	39,783	36 558	35 876	35 765	35 533	35 601	35 306	36 022	36 366	36 653	36 871	37 047
Consumption	kt rse	40,280	40 911	41 072	41 202	41 022	41 175	41 249	41 539	41 824	42 139	42 464	42 728
Closing stocks	kt rse	17,373	16 887	16 789	16 776	16 768	16 669	16 197	15 991	15 872	15 873	15 921	16 164
NON-OECD													
Production	kt rse	110,890	129 481	130 610	133 043	134 872	136 321	138 209	141 017	142 735	145 772	148 742	151 997
Consumption	kt rse	105,108	117 474	123 657	126 728	129 105	130 709	132 746	135 997	138 647	141 218	143 504	146 055
Closing stocks	kt rse	50,127	66 667	68 490	69 351	69 611	69 746	69 770	69 524	68 324	67 464	67 153	67 281
WORLD													
Production	kt rse	150,674	166 039	166 487	168 808	170 405	171 922	173 515	177 039	179 101	182 425	185 613	189 044
Consumption	kt rse	145,389	158 385	164 729	167 930	170 126	171 884	173 995	177 535	180 472	183 357	185 968	188 782
Closing stocks	kt rse	67,710	83 554	85 279	86 127	86 379	86 415	85 967	85 515	84 197	83 337	83 074	83 445
Price, raw sugar[b]	USD/t	237.1	229.3	216.0	228.0	257.6	280.4	304.5	298.0	307.1	309.6	308.2	301.7
Price, white sugar[c]	USD/t	291.2	289.1	268.1	280.8	317.8	351.8	374.5	371.3	384.9	385.0	383.4	379.1

a) Beginning crop marketing year.
b) Raw sugar world price, New York No. 11, f.o.b. stowed Caribbean port (including Brazil), bulk spot price, October/September.
c) Refined sugar price, London No. 5 , f.o.b. Europe, spot, October/September.
est: estimate.
Source: OECD and FAO Secretariats.

Table A.10. Biofuels projections: ethanol

	Production (mn l)				Domestic use (mn l)				Fuel use (mn l)				Share in gazoline type fuel use (%)					Net trade (mn l)			
													Energy shares				Volume shares 2017				
	Average 2005-07 est.	2008	2017	Growth[a] (%) 2008-17	Average 2005-07 est.	2008	2017	Growth[a] (%) 2008-17	Average 2005-07 est.	2008	2017	Growth[a] (%) 2008-17	Average 2005-07 est.	2008	2017	Growth[a] (%) 2008-17		Average 2005-07 est.	2008	2017	Growth[a] (%) 2008-17
North America																					
Canada	762	1 383	2 730	5.05	939	1 608	2 983	5.83	735	1 400	2 757	6.34	1.26	2.34	4.07[b]	4.98	5.96	–178	–224	–253	–24.50
United States	21 478	38 394	52 444	3.06	22 713	38 880	57 544	3.79	21 094	37 228	55 827	3.91	2.63	4.55	6.03	2.55	8.74	–1 235	–486	–5 100	0.00
Western Europe																					
EU27	2 049	4 402	11 883	10.53	2 127	7 297	14 707	7.37	2 127	4 748	11 962	9.58	1.00	2.19	4.88	8.22	7.11	–1 783	–2 895	–2 824	0.00
Oceania developed																					
Australia	63	156	1 004	12.52	63	156	1 004	12.52	63	156	1 004	12.52	0.22	0.54	3.30	11.82	4.84	0	0	0	0.00
Other developed																					
Japan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	–568	–825	–1 475	0.00
South Africa	410	369	683	6.32	99	134	527	8.32	0	0	367	32.98	0.00	0.00	1.87	–21.92	2.77	310	235	156	26.72
Sub-Saharian Africa																					
Ethiopia	33	38	74	8.27	33	34	39	1.32	0	1	6	13.36	0.00	0.34	0.67	5.01	1.00	4	4	35	28.25
Mozambique	21	24	28	2.00	22	23	28	2.46	0	1	5	22.20	0.00	0.34	1.86	17.89	2.75	–1	1	0	–1.39
Tanzania	26	29	43	4.28	30	35	51	4.07	0	5	18	14.96	0.00	1.01	2.54	10.07	3.75	–4	–6	–8	1.27
Latin America and Caribbean																					
Brazil	17 396	22 110	40 511	6.36	14 595	18 806	31 694	5.90	13 499	17 641	30 289	6.11	32.31	40.43	56.62	3.83	66.08	2 801	3 304	8 816	8.45
Columbia	272	497	796	5.58	303	472	506	0.79	268	435	460	0.65	3.34	5.21	4.99	–0.43	7.27	–31	25	290	28.67
Peru	16	22	40	5.29	11	14	19	3.77	0	2	2	0.37	0.00	0.16	0.19	2.33	0.29	5	8	21	7.25
Asia and Pacific																					
China	5 564	6 686	10 210	4.29	4 998	5 775	10 792	6.44	1 565	2 139	6 211	10.71	1.66	1.98	4.03	6.90	5.89	566	910	–583	–71.15
India	1 411	1 909	3 574	7.32	1 678	1 958	3 192	5.59	267	416	1 059	10.86	1.73	2.65	5.61	8.83	8.15	–267	–49	383	55.91
Indonesia	177	212	227	0.70	147	153	171	1.27	0	4	5	1.30	0.00	0.02	0.01	–2.69	0.02	30	59	56	–0.92
Malaysia	63	70	84	2.15	97	84	105	2.47	0	4	7	5.53	0.00	0.02	0.02	–0.78	0.03	–34	–14	–20	0.00
Philippines	62	105	126	1.98	109	147	170	1.58	17	50	50	0.00	0.24	0.70	0.53	–3.06	0.79	–47	–42	–44	0.00
Thailand	285	408	1 790	18.90	266	366	1 530	15.96	134	229	1 374	19.80	1.26	2.08	11.70	19.09	16.51	19	42	260	37.81
Turkey	55	77	81	0.39	103	119	128	0.85	43	58	63	0.94	0.62	0.87	1.15	3.17	1.70	–48	–42	–48	0.00
Vietnam	140	164	532	13.90	134	139	164	1.85	0	0	0	0.70	0.00	0.00	0.00	–10.52	0.00	6	25	368	28.01
TOTAL	50 284	77 054	126 860	5.12	50 991	76 200	125 355	5.11	39 811	64 517	111 467	5.58	3.78	5.46	7.63	3.30	10.98	–454	30	30	0.00

a) Least-squares growth rate.
b) Correspond to 5% of net-sale for on-road motor vehicles.
For notes, see end of the table.
est.: estimate, n.a.: Not available.
Source: OECD and FAO Secretariats.

Table A.11. **Biofuels projections: biodiesel**

	Production (mn l)				Domestic use (mn l)				Share in diesel type fuel use (%)					Net trade (mn l)			
									Energy shares				Volume shares 2017				
	Average 2005-07 est.	2008	2017	Growth[a] (%) 2008-17	Average 2005-07 est.	2008	2017	Growth[a] (%) 2008-17	Average 2005-07 est.	2008	2017	Growth[a] (%) 2008-17		Average 2005-07 est.	2008	2017	Growth[a] (%) 2008-17
North America																	
Canada	46	207	660	11.41	46	223	664	12.36	0.22	1.05	2.78	11.00	3.45	0	-15	-4	-5.66
United States	1 429	2 017	1 731	-2.22	852	1 476	1 638	1.67	0.28	0.47	0.46	0.31	0.58	577	541	93	-23.29
Western Europe																	
EU27	5 095	6 580	13 271	6.64	5 436	7 825	14 843	5.57	2.12	2.98	4.99	4.21	6.17	-341	-1 245	-1 572	0.00
Oceania developed																	
Australia	199	911	994	0.96	199	911	994	0.96	1.82	8.21	8.15	-0.08	0.00	0	0	0	0.00
Other developed																	
South Africa	0	0	0	-0.11	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	-0.11
Sub-Saharan Africa																	
Ethiopia	2	6	36	18.50	2	2	23	22.41	0.00	0.16	0.80	14.07	1.00	0	4	13	13.92
Mozambique	1	3	34	24.72	1	2	14	22.20	0.00	0.40	2.21	17.86	2.75	0	1	19	26.93
Tanzania	4	10	53	17.86	4	8	36	16.86	0.16	0.80	2.62	12.75	3.25	0	2	17	20.41
Latin America and Caribbean																	
Brazil	158	760	2 519	10.80	158	650	2 603	15.25	0.29	1.15	3.61	12.54	4.47	0	110	-84	-80.04
Columbia	10	218	388	6.09	0	159	229	4.02	0.00	4.04	5.29	2.99	6.52	0	59	160	9.76
Peru	0	0	0	-0.12	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	-0.12
Asia and Pacific																	
India	277	317	385	2.14	277	318	388	2.21	0.59	0.88	0.88	0.00	1.10	0	0	-3	0.00
Indonesia	241	753	2 984	15.45	47	129	2 169	32.30	0.28	0.66	7.88	28.52	9.66	168	624	815	1.84
Malaysia	148	443	1 137	10.15	0	43	143	13.16	0.40	0.43	0.80	6.87	1.00	148	400	994	9.80
Philippines	0	0	85	51.42	0	7	88	26.10	0.00	0.08	0.80	23.06	1.00	0	-7	-3	0.52
Thailand	0	48	75	2.30	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0	48	75	2.30
Turkey	0	0	0	-0.14	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	-0.14
Vietnam	0	0	5	30.43	0	2	3	4.67	0.00	0.02	0.02	-6.55	0.02	0	-2	1	9.81
TOTAL	7 610	12 274	24 357	6.66	7 023	11 753	23 836	6.86	0.93	1.50	2.59	5.03	3.21	552	521	521	0.00

a) Least-squares growth rate.
est.: estimate.
Source: OECD and FAO Secretariats.