

## Part II

# WORLD FOOD AND AGRICULTURE IN REVIEW

A FOCUS ON PRODUCTIVITY



## Part II

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## A focus on productivity

The current world food and agricultural situation is characterized by continued high and volatile international food prices and the persistence of hunger and malnutrition in many parts of the world. This is generating growing concerns about the long-term sustainability of agricultural and food systems. These problems lie at the heart of recent discussions by the G20 Ministers of Agriculture and the United Nations Conference on Sustainable Development (Rio+20 Summit), both held in June 2012, which emphasized the need for sustainable growth in agricultural productivity to help eradicate hunger and ensure more efficient use of natural resources.

This part of the report examines price trends on international and domestic food markets and reviews recent developments in agricultural production, consumption and trade with a special focus on the supply response to higher food prices. It concludes by discussing the constraints to future output

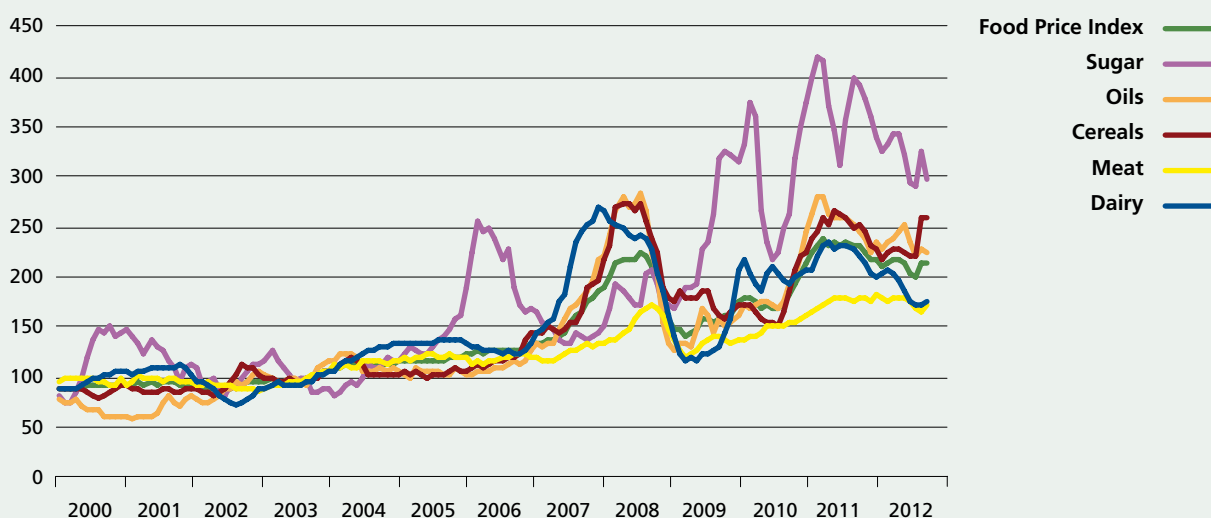
growth and the need for efforts to boost productivity growth in agriculture.

### HIGH REAL FOOD PRICES

After declining in real terms throughout the 1980s and 1990s, international food prices began rising in 2002 in an apparent reversal of this long-term trend (Figure 6B on page 16). By 2011, the FAO Food Price Index reached more than double its level during 2000–02 (Figure 28). Perhaps more significant is the fact that real prices have remained above their previous low for more than ten consecutive years. This is the longest sustained cyclical rise in real prices experienced in the last 50 years. While international food prices have come down slightly from their 2011 peak, they still remain well above historical averages and cereal prices increased again in mid-2012.

FIGURE 28  
FAO Food Price Index and indices of constituent commodities

Index (2002–04 = 100)



Note: The price indices are monthly observations plotted from January 2000 through August 2012. They reflect actual prices, not adjusted for inflation.  
Source: FAO.

Among the commodities that make up the FAO Food Price Index, prices for sugar, oils and cereals showed the sharpest increases in 2010 and early 2011. The volatility of sugar prices has been even more pronounced than that of the other commodities in the index. Meat prices have risen least and have shown less marked fluctuations. Dairy prices have been below the FPI average since late 2010 and have fallen markedly in recent months. International commodity prices are projected in the *OECD-FAO Agricultural Outlook 2012–2021* to remain on a higher plateau for the next decade (OECD-FAO, 2012).

Consumer food prices have risen more rapidly than overall consumer prices since 2000 in all but six of the 166 countries for which data are available (Figure 29). Food price inflation exceeded overall consumer price inflation by up to 10 percentage points in 73 countries, up to 20 percentage points in 55 countries and more than 30 percentage points in 12 countries. Selected country examples illustrate that food price inflation has been particularly severe in countries such as China, Rwanda and Thailand (Figure 30).

The shift towards higher and more volatile agricultural commodity prices can be explained by many factors including, *inter alia*, population growth and higher per capita

incomes, urban migration and associated changing diets in developing countries, weather-related production shocks, trade policy shocks and rising demand for biofuel feedstocks (OECD-FAO, 2012). The role of speculative trading as a factor underlying price volatility has also been debated. These factors, combined with tighter natural resource constraints, raise questions regarding the capacity of global agriculture to keep pace with growth in demand. How has global production responded to price trends, and how may it evolve in the future? Which countries have responded most to greater incentives provided by higher commodity prices? How has consumption been affected? Are new trading patterns emerging?

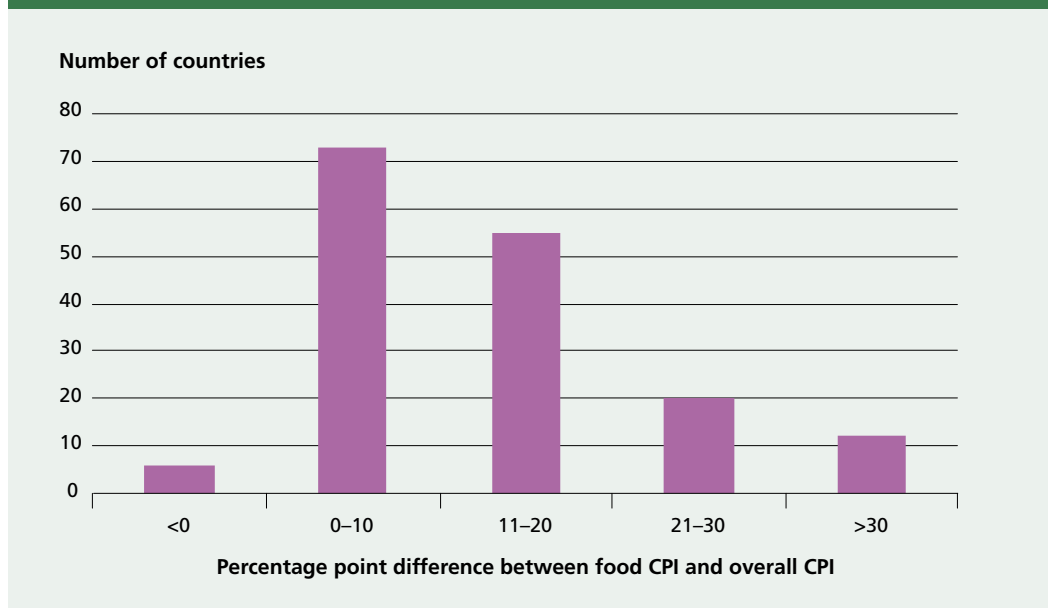
## TRENDS IN AGRICULTURAL PRODUCTION, CONSUMPTION AND TRADE

### Agricultural production responses

Global agricultural production growth declined somewhat from the 1960s through the 1980s before resuming higher rates of growth in recent years (Table 14). This

FIGURE 29

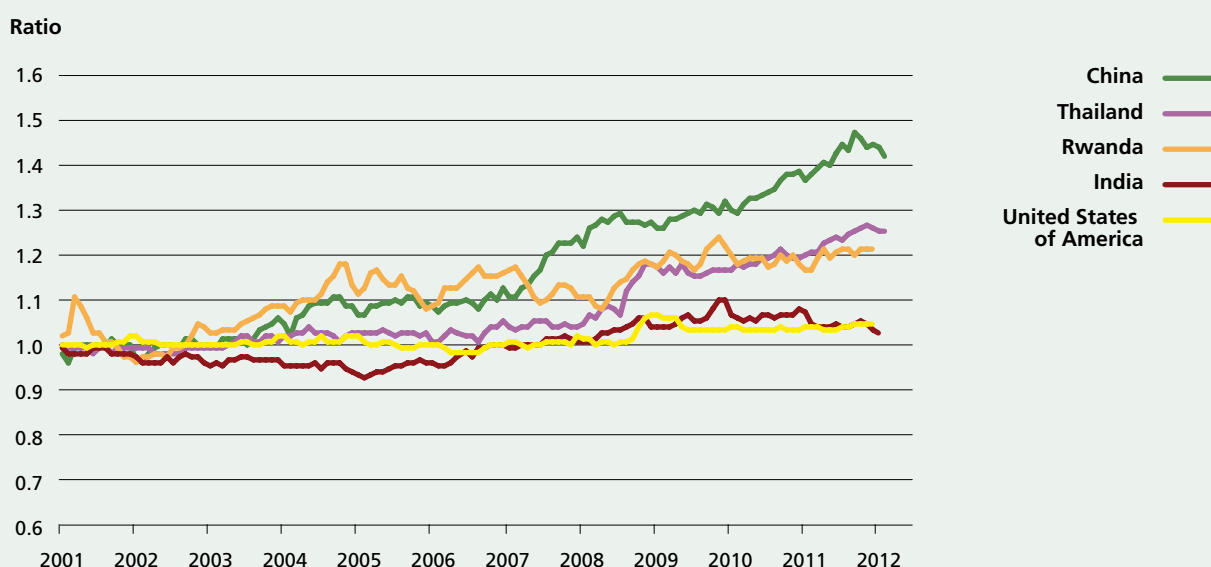
Average difference between food prices and overall consumer prices, 2000–11



Note: CPI = Consumer Price Index.

Source: FAO, 2012a.

**FIGURE 30**  
Consumer food prices relative to all prices, selected countries



Note: The data on monthly CPI are shown for the period January 2001 through February 2012 for China and Thailand, January 2012 for India and December 2011 for Rwanda and the United States of America.

Source: FAO.

**TABLE 14**  
Average annual growth in agricultural production

	1961–1970	1971–1980	1981–1990	1991–2000	2001–2010
(Percentage)					
<b>All agriculture</b>					
Total production	2.7	2.4	2.3	2.5	2.6
Per capita production	0.7	0.6	0.6	1.0	1.4
<b>Crops</b>					
Total production	2.7	2.4	2.3	2.5	2.6
Per capita production	0.9	0.4	0.3	1.1	1.5
<b>Livestock</b>					
Total production	2.9	2.5	2.4	2.2	2.2
Per capita production	0.9	0.6	0.7	0.7	1.0

Note: Annual average change in index of net agricultural production. Net production is gross production of crops and livestock net of feed and seed evaluated at 2004-06 constant international reference prices.

Source: FAO.

pattern broadly reflects the long-term price trends discussed above, with the acceleration of production growth in the most recent decade being at least partially attributable to higher price incentives. Total production growth for crops largely mirrors that for all agriculture, whereas total production growth

for livestock has not increased in the most recent period, perhaps because prices for livestock products have not risen as much as for crops.

In per capita terms, growth in agricultural production declined very slightly in the latter decades of the last century before

accelerating significantly since 2000. The decline and subsequent recovery of per capita production was more pronounced for crops than for all agriculture.

The production responses by the different regions over the last decade have been very diverse (Figure 31). In Latin America, agricultural production increased by more than 50 percent from 2000 to 2012, with Brazil expanding production by more than 70 percent. Sub-Saharan Africa saw agricultural production growth of more than 40 percent. Eastern Europe and Central Asia expanded production by almost 40 percent, and the region is emerging as a key global supplier. In North America and Western Europe, on the other hand, agricultural output has increased only by about 20 percent and 6 percent, respectively, since 2000. Indeed, the OECD countries as a group increased output by only 14 percent over the period, while the BRIC countries (Brazil, Russian Federation, India and China) increased it by 39 percent, the least-developed countries by 54 percent and the remaining developing countries by 45 percent.

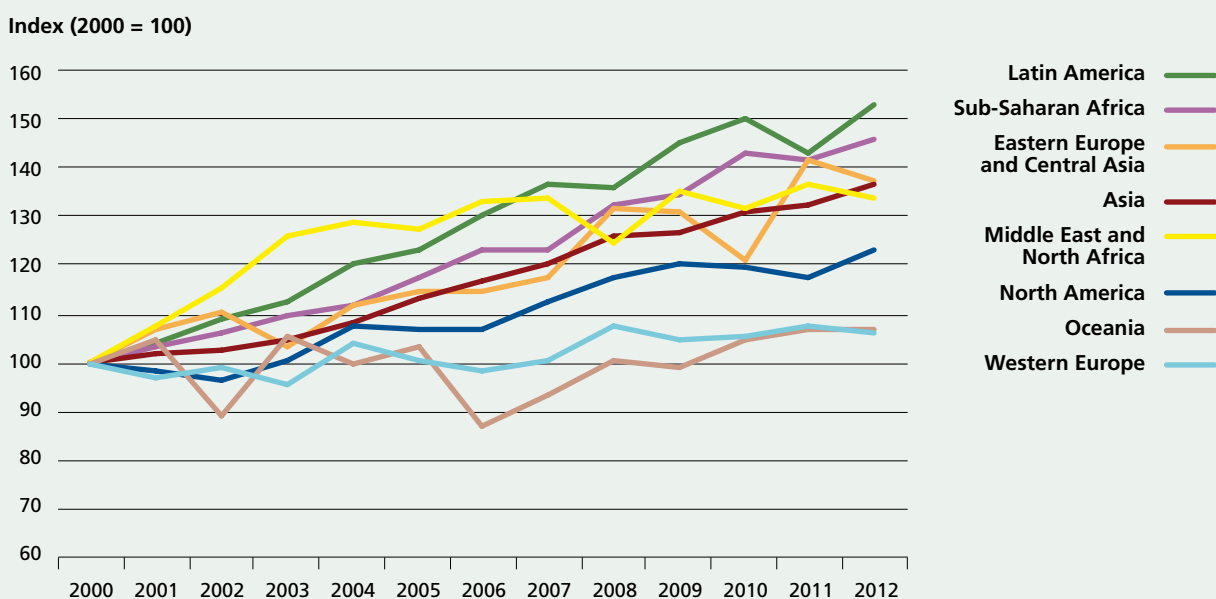
### Food consumption

Despite higher prices, rapid income growth has supported robust increases in per capita food consumption in most emerging and developing countries (Figure 32). Eastern Europe and Central Asia experienced the strongest growth in per capita food consumption since 2000 at 24 percent, followed by Asia at almost 20 percent. In sub-Saharan Africa, per capita consumption grew quickly from 2000 to 2005, but higher prices in the latter part of the decade appear to have limited further growth, and per capita consumption in the region was only 11 percent higher in 2012 than in 2000. Not surprisingly, per capita consumption of food has been stagnant in Western Europe and declining in North America, given the already high consumption levels.

### Expansion in global biofuel production

Biofuel production has expanded rapidly over the past 10–15 years, particularly in the United States of America, Brazil and the European Union (EU). Ethanol production in the United States of America and Brazil grew by 780 percent and 140 percent respectively over the

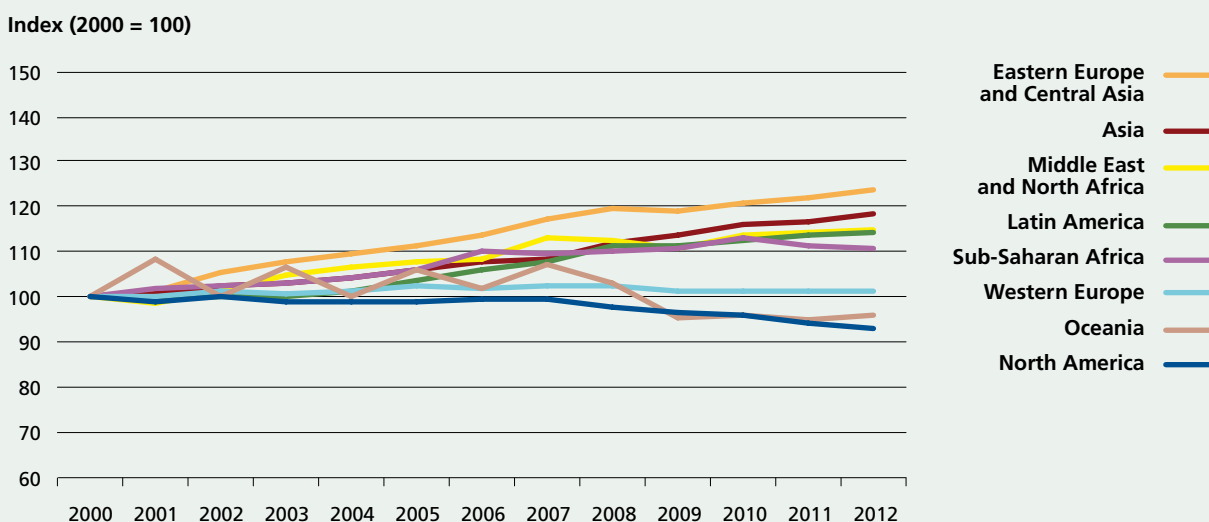
FIGURE 31  
Net production by region



Notes: Net production is gross production of crops and livestock net of feed and seed evaluated at 2004–06 constant international reference prices. Data for 2012 are projections; those for 2011 are provisional estimates.

Source: FAO.

FIGURE 32  
Per capita food consumption by region



Notes: Food consumption of crops and livestock evaluated at 2004–06 constant international reference prices. Data for 2012 are projections; those for 2011 are provisional estimates.

Source: FAO.

period 2000–12. By 2012, ethanol production absorbed over 50 percent of Brazil's sugar cane crop and 37 percent of the coarse grain crop in the United States of America. Biodiesel production absorbed almost 80 percent of the EU vegetable oil production. In other countries, such as Australia and Canada, growth in the biofuel sector has been strong, although less than in the primary producing countries. Growth of the biofuel sector has been driven largely by policies – such as mandates, blending credits or subsidies and various supportive trade policies – although higher petroleum prices have played a clear role in stimulating demand. The sector has proved the largest source of new demand for agricultural production in the past decade, and represents a new “market fundamental” that is affecting prices for all cereals (de Gorter and Just, 2010).

### Changes in global trade patterns

Global trade patterns have changed significantly since 2000 in ways that reflect the underlying trends in production and consumption (Figure 33). The growth of net trade (exports minus imports, in constant dollars) in Latin America has been the strongest of any region, as a result of its

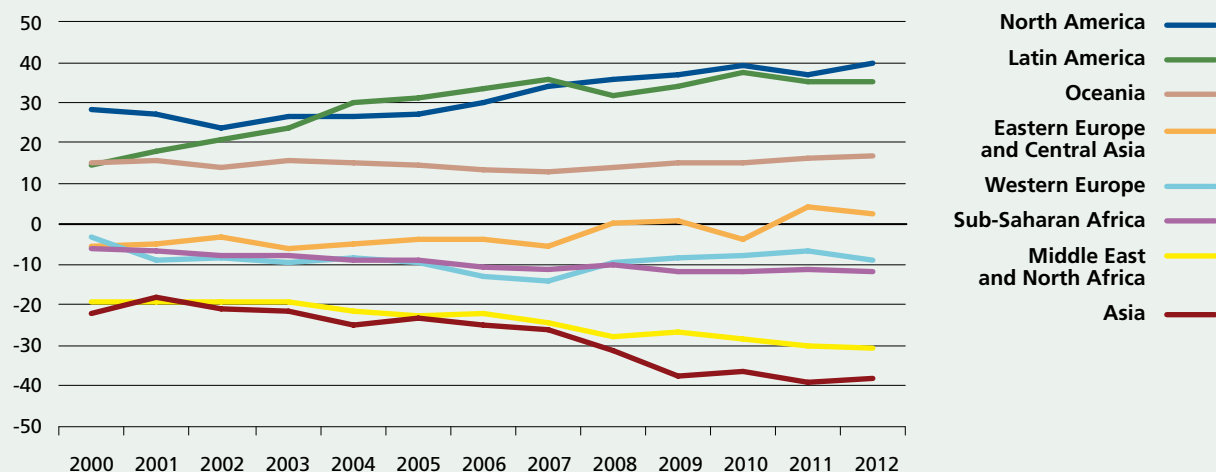
significant production growth and in spite of its sustained consumption growth. However, for products considered in this analysis, North America remains the largest net exporter, owing primarily to stagnant consumption in the region. Eastern Europe and Central Asia appears to be moving from a net-importing to a net-exporting region, while Western Europe's trade pattern remains stable as a net importer. Sub-Saharan Africa's net imports continue to grow gradually as high population growth outpaces that of domestic food supply. The Middle East and North Africa is becoming an important and rapidly growing net-importing region, as agricultural production is not keeping pace with demand. However, the most rapidly growing net importer is the rest of Asia, and in particular China.

### FUTURE PROSPECTS AND CHALLENGES

The major conclusion from this assessment is that global agriculture appears to be facing a demand-driven expansion supplied primarily by new and emerging exporters rather than traditional suppliers. However, higher input costs and the higher costs of

FIGURE 33  
Net exports of food by region

Billion constant US\$ (2004–06)



Notes: Net exports of crops and livestock evaluated at 2004–06 constant international reference prices. Data for 2012 are projections; those for 2011 are provisional estimates.

Source: FAO.

access from more remote areas have been driving food prices upwards in real terms. The question is whether production will keep pace with demand in the coming years, so as to either stabilize real prices or bring them down to historical trends, or whether prices will continue to rise under growing demand pressures.

As argued in the *OECD-FAO Agricultural Outlook 2012–21* (OECD-FAO, 2012), food prices are expected to remain on their higher plateau for the next decade. Furthermore, according to the *Outlook* (based largely on the views of national experts and commodity experts at OECD and FAO, as well as on assumptions of “normal” growing conditions, firm economic growth in developing regions and rising real energy prices), the average annual growth in global agricultural production through 2021 will slow to 1.7 percent, down from the 2.6 percent of the previous decade. Agriculture in many countries has grown at a pace that cannot be sustained. Rising input costs and potential supply constraints appear on the immediate horizon. These derive from the availability and quality of resource inputs and the prospects for sustainable productivity growth.

### Resource constraints

Globally, most of the best land is already being used in agriculture. Analysis of global agro-ecological zones data reveals that much of the additional arable land is in Latin America and sub-Saharan Africa but is in remote locations, far from population centres and agricultural infrastructure and cannot be brought into production without investments in infrastructure development. Where the potential to expand agricultural land use exists, there is also competition from urban growth, industrial development, environmental reserves and recreational uses, while other areas are not readily accessible or are of poorer quality (FAO, 2011h).

A recent FAO report warns of “the creeping degradation of the land and water systems that provide for global food security and rural livelihoods” (FAO, 2011h). Approximately 25 percent of the world’s agricultural land area is highly degraded. These pressures have reached critical levels in some areas, and climate change is expected to worsen the situation (IPCC, 2012; Easterling *et al.*, 2007). There are also other serious resource constraints, especially concerning water. At present, agriculture accounts for over 70 percent of global



**TABLE 15**  
Total factor productivity growth in agriculture, selected regions and countries

	AVERAGE ANNUAL GROWTH RATE				
	1961–1970	1971–1980	1981–1990	1991–2000	2001–2009
<b>All developed countries</b>	0.99	1.64	1.36	2.23	2.44
<b>All developing countries</b>	0.69	0.93	1.12	2.22	2.21
North Africa	1.32	0.48	3.09	2.03	3.04
Sub-Saharan Africa	0.17	-0.05	0.76	0.99	0.51
Latin America and the Caribbean	0.84	1.21	0.99	2.30	2.74
Brazil	0.19	0.53	3.02	2.61	4.04
Asia	0.91	1.17	1.42	2.73	2.78
China	0.93	0.60	1.69	4.16	2.83
Transition countries	0.57	-0.11	0.58	0.78	2.28
Russian Federation	0.88	-1.35	0.85	1.42	4.29

Source: Fuglie, 2012.

water use, but the share of water available for agriculture is expected to decline to 40 percent by 2050 (OECD, 2012b). The availability of freshwater resources shows a similar picture to that of land: sufficient resources at the global level are unevenly distributed and an increasing number of countries, or parts of countries, are reaching critical levels of water scarcity. Many of the water-scarce countries in the Near East and North Africa and in South Asia also lack land resources. Due to their vulnerability, coastal areas, the Mediterranean basin, the Near East and North African countries and dry Central Asia appear as locations where investment in water management techniques should be considered a priority when promoting agricultural productivity growth.

### Prospects for productivity growth

Several studies point to slowing productivity growth in agriculture. For crops, for instance, some evidence suggests a slowdown in yield growth rates in recent decades. The 2008 *World Development Report* (World Bank, 2007) highlighted the decline in annual average yield growth rates for maize, wheat, rice and soybeans, both globally and for most country groupings, with the exception of Eastern Europe for wheat and soybeans. Alston, Beddow and Pardey (2010) reported similar results for developing and developed countries – in particular for cereal yields – in the majority of large producing countries.

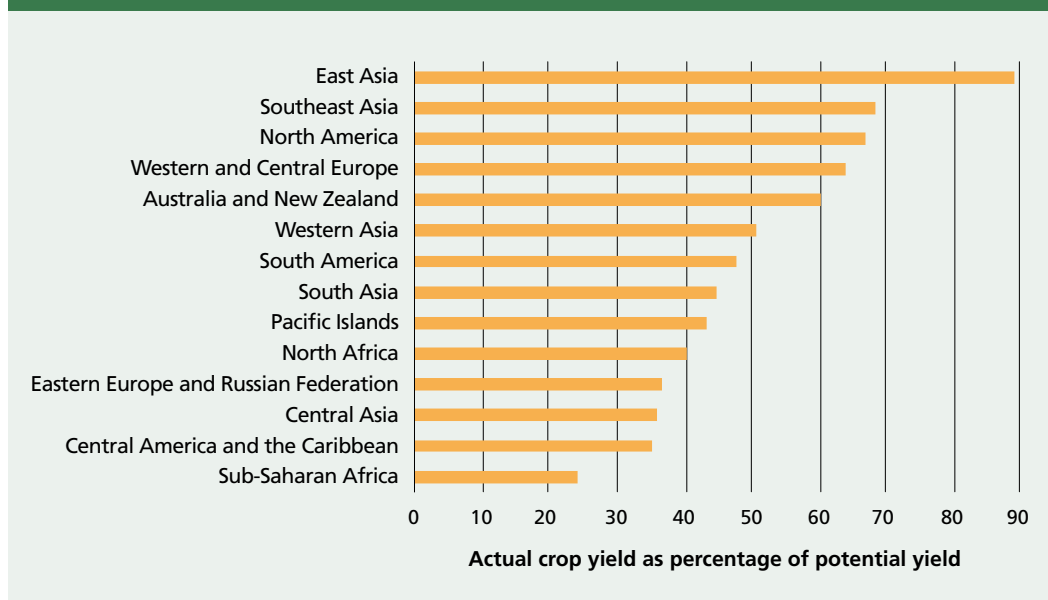
While certain measures of partial productivity growth, such as crop yields, may be slowing in some regions, total factor productivity (TFP)<sup>30</sup> growth does not appear to be slowing (Table 15). Indeed, estimates show recent annual growth in TFP in the 2.2–2.5 percent range in both developed and developing regions.

One of the salient characteristics of both partial and total productivity measures is the large differences in absolute productivity among countries. While growth rates may be similar or higher, productivity in developing regions is often a fraction of that in developed regions. Many developing regions also have large gaps relative to their potential. In sub-Saharan Africa, for example, crop yields reached only about 27 percent of their economic potential in 2005 (Figure 34). Closing these yield gaps – by, *inter alia*, providing female farmers and other smallholders with equal access to productive resources – could have a significant impact on crop supply, both regionally and globally, and hence on market balances and commodity prices.

Simulation experiments with the Aglink-Cosimo model employed in the *OECD-FAO Agricultural Outlook* (OECD-FAO, 2012)

<sup>30</sup> Growth in TFP represents that part of production growth that cannot be attributed to increased use of inputs and factors of production but rather by other things such as technological progress, human capital development, improvements in physical infrastructure etc. See also Box 7, where TFP growth is defined and discussed in more detail.

FIGURE 34  
Ratio of crop yield to economic potential yield



Source: FAO, 2011h.

suggest that reducing cereal yield gaps in developing countries by just 10 percent would increase global cereal supply by about 1.3 percent, 1.8 percent and 2.6 percent for wheat, coarse grain and rice, respectively. Such production increases would lower international prices by 13, 14 and 27 percent, respectively, for each of these commodities. Closing the yield gaps could thus have a considerable impact on agricultural markets and prices.

Reducing food losses and waste is another way to increase food supplies. Global food losses and waste are estimated at roughly 30 percent for cereals; 40–50 percent for root crops, fruits and vegetables; 20 percent for oil seeds; and 30 percent for fish (FAO, 2011i). Food losses occur in both high- and low-income countries. In middle- and high-income countries, food is largely wasted at the consumption stage, whereas in low-income countries it is lost mostly during the early and middle stages of the food supply chain. Investing in more efficient systems that reduce losses or waste would also help to reduce greenhouse gas emissions – both directly, as wastage typically generates methane emissions during food disposal, and indirectly, through the need for fewer resources.

In 2012, at the request of the G20, a number of international organizations jointly prepared

a special report on *Sustainable agricultural productivity growth and bridging the gap for small family farms* (Bioversity et al., 2012). This is a clear illustration of the importance governments place on enhancing productivity growth, particularly of smallholder farms. The study assesses the challenges of increasing production and calls on governments to step up their efforts to improve sustainable productivity growth in agriculture by encouraging better agronomic practices, creating the right commercial environment and strengthening innovation systems.

## CONCLUSION

The persistence of high levels of undernourishment worldwide and recent trends in agricultural prices, production and consumption confirm the major challenges facing world agriculture over the coming decades, notably meeting increasing demand from a growing world population, contributing to eradicating hunger and malnutrition, and preserving the natural resources upon which agriculture and we all depend. If we are to meet these challenges we need to boost productivity growth in agriculture. Ensuring more and better investments in agriculture is a cornerstone in these efforts.