

### 3. Fostering farmers' investment in agriculture

Most investment in agriculture is made on the half a billion farms located around the world.<sup>9</sup> On-farm agricultural investment decisions are based on the potential profitability and risks compared with other investment opportunities and the individual constraints they face. In any country, the relative returns, risks and constraints associated with agricultural investment are affected by the overall investment climate, policies specific to agriculture and the provision of public goods that are essential for agriculture. Governments of countries that are dependent on agriculture for a large share of employment and GDP have a responsibility to provide an investment climate that is conducive to investment in the sector. Ensuring that agriculture is not penalized relative to other sectors is a basic element of this. Along with the need to foster investment in agriculture, governments have a responsibility to ensure that such investment is environmentally sustainable.

This chapter reviews the issues involved in creating a climate that fosters sustainable investment by farmers. It first looks at the role of the overall investment climate in promoting agricultural investment. It then discusses more specifically the role of economic incentives to invest in agriculture and how they are shaped by policies in agriculture and other sectors. It also discusses the crucial role of agro-industries in transmitting price incentives to farmers and briefly considers the enabling conditions for investment in these industries. The chapter concludes with a discussion of how to ensure that environmental costs and benefits are appropriately included in incentives to invest in agriculture in order to promote sustainability and socially beneficial outcomes.

#### Creating a favourable climate for investment in agriculture

Considerable attention has been focused on what constitutes a proper climate for private investment. Less has been given to how important these factors are for investment in agriculture. The *World Development Report 2005* argued that the general investment climate is central to growth and poverty reduction:

*The investment climate reflects the many location-specific factors that shape the opportunities and incentives for firms to invest productively, create jobs, and expand. A good investment climate is not just about generating profits for firms – if that were the goal, the focus could be limited to minimizing costs and risks. A good investment climate improves outcomes for society as a whole.*

(World Bank, 2004, p. 2).

According to the World Bank, the roles of government in providing a good general investment climate include:

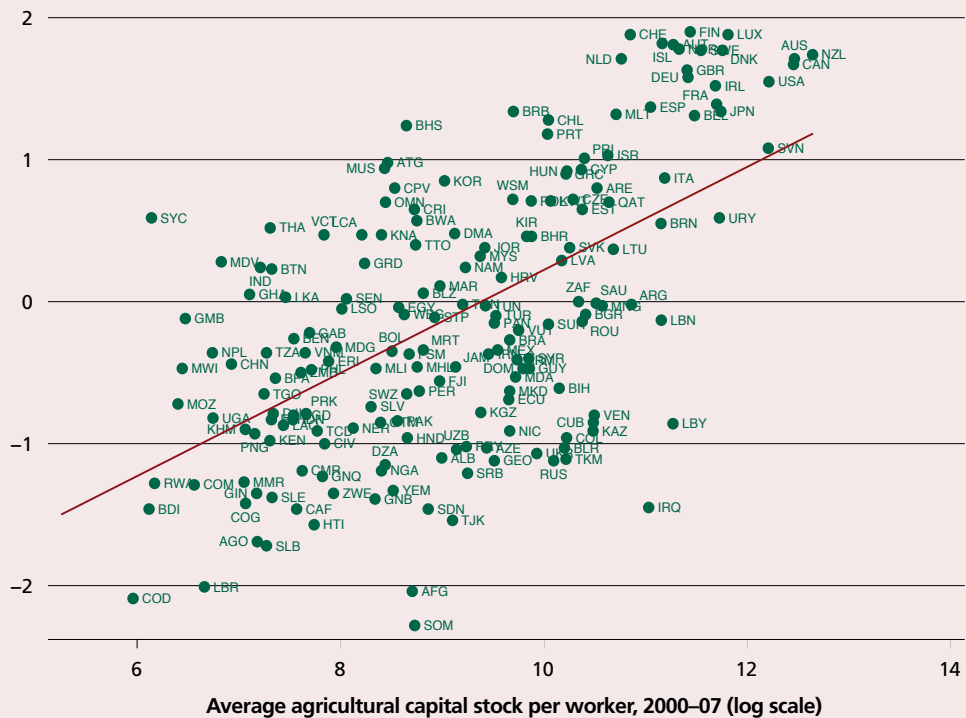
- ensuring stability and security, including rights to land and other property, contract enforcement and crime reduction;
- improving regulation and taxation, both domestically and at the border;
- providing infrastructure and financial market institutions; and
- facilitating labour markets by fostering a skilled workforce, crafting flexible and fair labour regulation and helping workers cope with change.

Each of these elements is complex and location-specific. Several indicators have been developed by the World Bank and other international organizations and research institutions to assess the business and investment climate in different countries.

<sup>9</sup> Nagayets (2005) estimated the total number of farms in the world to approximately 525 million.

**FIGURE 16**  
**Worldwide Governance Indicator for Rule of Law and agricultural capital stock per worker, by country**

**Worldwide Governance Indicator for Rule of Law, 2000**



Note: The Worldwide Governance Indicator for Rule of Law ranges from -2 to 2 with smaller values indicating poorer rule of law.

Source: Authors' compilation using World Bank, 2011c and FAO, 2012a. See Annex table A2.

Some indicators provide an assessment of overall governance in a country, including dimensions such as democracy, rule of law, absence of conflicts, and corruption. Others deal more specifically with factors that affect the ease of doing business in a country.

Despite the economic importance of agriculture in most low- and middle-income countries, insufficient attention has been given to assessing the extent to which these elements of a good investment climate are relevant for agriculture. Analysis of the relationship between these indicators and agricultural capital stock undertaken for this report suggests that they are indeed highly relevant.

**Governance and agricultural investment**  
 A commonly used indicator of the governance in a country, the Worldwide Governance

Indicator for Rule of Law,<sup>10</sup> is closely correlated with agricultural capital stock per worker (Figure 16). Comparable patterns also emerge for other governance indicators, such as the Corruption Perception Index<sup>11</sup> compiled by Transparency International and the Political Risk Index<sup>12</sup> of the Political Risk Services

<sup>10</sup> The Worldwide Governance Indicator for Rule of Law measures overall crime rates and the extent to which agents believe in and follow laws, especially those pertaining to contract enforcement, property rights and the court systems.

<sup>11</sup> The Corruption Perception Index measures public-sector corruption in the country and covers, *inter alia*, the embezzlement of public funds, bribery of officials and the effectiveness of anti-corruption measures.

<sup>12</sup> The Political Risk Index measures government stability, socio-economic conditions, risk associated with investments, internal and external conflicts, corruption, degree of influence of military and religion in politics, law and order, ethnic tensions, democratic accountability and quality of bureaucracy.

**TABLE 9**  
**Business environment rankings and on farm investment in low- and middle-income countries**

"DOING BUSINESS" RANKING	AGRICULTURAL CAPITAL STOCK PER WORKER, 2007	ANNUAL CHANGE IN AGRICULTURAL CAPITAL STOCK PER WORKER, 1995–2007
	<i>(Constant 2005 US\$)</i>	<i>(Percentage)</i>
Top ten (best business environment)	19 000	2.4
Bottom ten (worst business environment)	5 600	0.3

Source: Authors' compilation based on World Bank, 2011d and FAO, 2012a. See Annex table A2.

Group. While these relationships only show correlations, they strongly suggest that the same elements of good governance that are needed for overall investment in an economy are equally needed for agriculture. Further evidence presented in Chapter 5 supports the conclusion that arbitrary, corrupt and unstable governments are not conducive to agricultural investment.

### The investment climate and agricultural investment

Beyond governance, other factors may directly facilitate or impede the operations of economic agents or investors in a country, such as access to transport, finance and electricity. These factors are difficult to quantify, and data are scarce, but interesting patterns emerge from World Bank indicators describing the urban business climate, including rankings of the Ease of Doing Business,<sup>13</sup> based on interviews with experts on private-sector activities in the various countries. The rankings show a clear relationship with the level and growth of agricultural capital stock per worker (Table 9). Looking only at the low- and middle-income countries, the ten countries where it is easiest to do business had more than three times the agricultural capital per worker in 2007 as the ten most challenging countries (US\$19 000 versus US\$5 600). Moreover, the rate of growth in agricultural capital stock per worker since 2000 was eight times faster in the most favourable countries compared with the least favourable. Again, while these are only correlations,

they strongly suggest that the factors that facilitate general business investment are likewise important for agriculture.

### Rural Investment Climate Assessments

The rankings discussed above are derived from urban settings, but efforts are under way to compile indicators for the rural investment climate.<sup>14</sup> The Rural Investment Climate Assessments by the World Bank – conducted for a small number of countries – examine small and medium off-farm enterprises located in rural areas. These assessments do not include primary agriculture, but a favourable investment climate for small enterprises in rural areas would be expected to have beneficial impacts on agriculture also, not least because of the importance of agro-processing and marketing enterprises in influencing incentives for agricultural investment.

The Rural Investment Climate Assessments found that the constraints faced by rural enterprises differ from those faced by large urban firms and vary by location; thus the priorities for governments and donors interested in addressing these constraints must be context-specific. For example, Table 10 shows the top five constraints cited by large firms in urban areas versus those identified by small and medium enterprises in rural areas (and the share of firms citing them as such) in Nicaragua, Sri Lanka and the United Republic of Tanzania. Transport appears more problematic for rural enterprises than urban ones in Sri Lanka and the United Republic of Tanzania, and lack of demand or marketing constraints pose more difficulties in rural areas than in urban areas in all three countries.

<sup>13</sup> The Ease of Doing Business rankings measure how easy it is to open and close a business, deal with construction permits, register property, obtain credit, pay taxes and trade across borders as well as how effectively investments are protected and contracts enforced.

<sup>14</sup> Agribusiness indicators are being developed by the World Bank's Agriculture Department, and the Bill and Melinda Gates Foundation is developing indicators of Doing Business in Agriculture.

**TABLE 10**  
**Top five greatest constraints to business activities identified by urban versus rural firms in selected countries**

SRI LANKA			
Factor	Percentage of urban firms	Factor	Percentage of rural firms
Electricity	42	Transport	30
Policy uncertainty	35	Finance (cost of)	28
Macroeconomic instability	28	Finance (access)	28
Finance (cost of)	27	Demand	27
Labour regulation	25	Electricity	26

UNITED REPUBLIC OF TANZANIA			
Factor	Percentage of urban firms	Factor	Percentage of rural firms
Tax rate	73	Finance	61
Electricity	59	Utilities (electricity)	49
Finance (cost of)	58	Transport	30
Tax administration	56	Marketing	29
Corruption	51	Governance	27

NICARAGUA			
Factor	Percentage of urban firms	Factor	Percentage of rural firms
Corruption	65	Political uncertainty	53
Finance (cost of)	58	Electricity	41
Economic/regulatory uncertainty	56	Corruption	39
Finance (access)	54	Finance (access)	38
Finance (availability)	49	Lack of demand	30

Note: Firms surveyed in urban areas were large-scale whereas those in rural areas were small and medium off-farm enterprises.

Source: World Bank, 2006b.

Some factors, including the provision of public services such as electricity and concerns about corruption, political instability and governance, are key constraints cited by investors in both rural and urban settings.

### An enabling environment for agricultural value chains

Agricultural value chains include many enterprises that provide goods and services to farmers, such as input supplies, storage and processing facilities and marketing services. They provide a crucial link between farmers and markets, upstream and downstream, and are essential for the effective transmission of investment incentives from markets to farmers (da Silva *et al.*, 2009).

As most developing countries become increasingly urbanized, so the distance

between farmers and consumers is becoming greater. The role of agro-industries is becoming ever more prominent in mediating demand for food to primary producers. The development of these sectors can significantly improve the returns to agricultural production and incentives for investment by farmers. Such development extends beyond large-scale enterprises to, especially, small and medium-sized enterprises, which may link better with smallholders (de Janvry, 2009).

An enabling environment for agro-industry development can encourage the entry of small- and medium-sized enterprises into the market and foster their competitiveness. The overall investment climate, as well as the specific rural investment climate discussed above, is critical for such development. Christy *et al.* (2009) examined in more detail the key

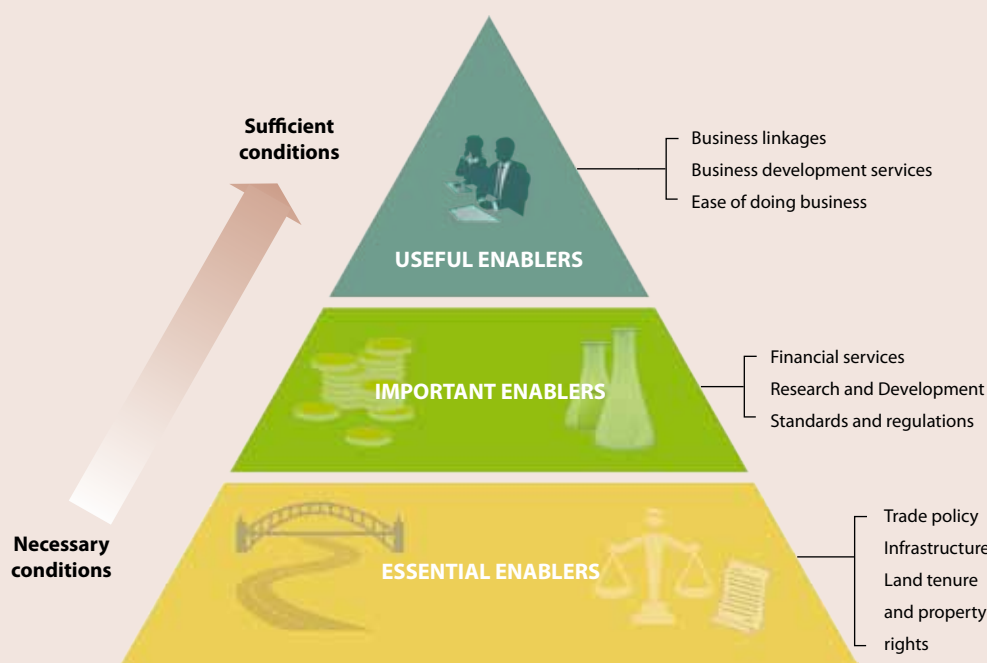
**BOX 9**

**An enabling environment for agro-industries**

Creating a favourable policy environment for agro-industry can provide a significant contribution to generating investment in primary agriculture. Christy *et al.* (2009) argue the case for a specialized method of describing the competitive environment for agribusiness firms. They

examine necessary state actions required to create an enabling environment for competitive agro-industries and propose a hierarchy of essential, important and useful “enablers” that influence agro-industry competitiveness. The pyramid below shows a hierarchy of these enabling needs.

**Hierarchy of enabling needs for agro-industry competitiveness**



Source: Christy *et al.*, 2009.

components of an enabling environment for competitive agro-industries (Box 9).

**A policy framework for agricultural investment**

Having recognized the importance of an enabling environment for agricultural investment, the OECD and the New Partnership for Africa’s Development (NEPAD) have developed a draft policy framework for promoting investment in the sector (Box 10). It underlines the complexity and diversity of the issues involved in ensuring an appropriate environment for agricultural investment and the extent to which the necessary policies and institutions

to a large extent transcend agriculture. They emphasize many of the well-known elements of good governance for investment identified above.

**Government policies and incentives to invest in agriculture<sup>15</sup>**

Government policies and market interventions can have a profound impact on the investment climate for agriculture and, specifically, on the

<sup>15</sup> This section draws on a background paper prepared by Kym Anderson (University of Adelaide) for the *State of Food and Agriculture 2012*.

## BOX 10

**The NEPAD-OECD draft Policy Framework for Investment in Agriculture**

The draft *Policy Framework for Investment in Agriculture* was prepared within the framework of the NEPAD-OECD Africa Investment Initiative and presented at the 5th NEPAD-OECD Ministerial Conference, held on 26–27 April 2011. It is intended as a flexible tool for governments to evaluate and design policies for agricultural investment in Africa. It recognizes that sustainable growth in agriculture relies on policies that go beyond agriculture itself and provides a checklist of questions for governments for improving the quality of a country's environment for agricultural investment. A summary of the issues addressed is as follows:

- **Investment policy.** Transparency of laws and regulations, property rights to land and other assets, protection of intellectual property and contract enforcement.
- **Investment promotion and facilitation.** Institutions and measures for promoting investment in agriculture, technology transfer to local farmers and public-private sector dialogue.
- **Human resource and skills development.** Human resource development, training of local farmers and local research and development capacity.
- **Trade policy.** Customs and administrative procedures, assessment of impact of trade policies, export promotion and financing, regional trade agreements.
- **Environment.** Policies for natural resource management and cleaner

technologies, integration of R&D and environmental policies, energy needs and mitigation of extreme weather.

- **Responsible business conduct.** Labour standards in agriculture, enforcement of human rights, environmental protection, labour relations and financial accountability.
- **Infrastructure development.** Coherent infrastructure, rural development and agricultural policies, transparent funding procedures, information and communications technology for farming, incentives to private investment in secondary roads, water resource management and storage facilities.
- **Financial sector development.** Regulatory framework for agricultural finance, banking sector competition, functioning capital markets, instruments for risk mitigation, access to credit by local farmers and small and medium enterprises, guarantee and insurance mechanisms to support smallholders accessing credit and business development services for local farmers.
- **Taxation.** Tax policies supporting agricultural investment, appropriate tax burden on agribusiness, transparent and efficient tax policy and administration, coordination of central and local tax administration and funding of local public goods.

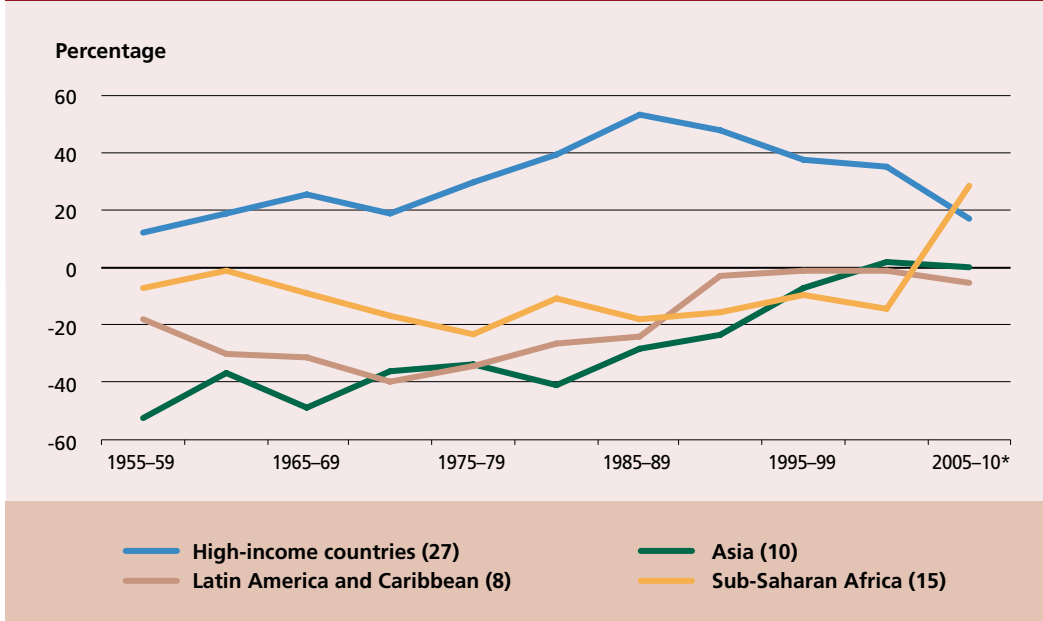
Source: OECD, 2011.

economic incentives to invest in the sector. Some of these are specific to agriculture, but others relate to other sectors or are economy-wide (Schiff and Valdés, 2002). The main sector-specific policies affecting incentives in agriculture include tariffs, input and credit subsidies, price controls, quantitative trade restrictions, government expenditures and taxes. There may also be indirect effects on agriculture deriving from other policies, such as protection of other

sectors (e.g. industrial protection), exchange and interest rates, fiscal and monetary policies. Such policies may significantly affect the incentives to invest in agriculture relative to other sectors.

In the mid-twentieth century, many developing countries implemented policies aimed at promoting industrial development. These policies created a bias against agriculture and disincentives for investment and production. In many developed

**FIGURE 17**  
Relative rate of assistance to agriculture, by region, 1955–2010



Notes: \* For the majority of countries the most recent point in the figure is the weighted average annual rate (based on agricultural production) for the years 2005–10; otherwise it is the value for the most recent observations. For all other periods the values are five-year weighted annual averages. The number of countries included in each group is shown in parentheses.

Source: Authors' calculations using data from Anderson and Nelgen, 2012.

countries, on the other hand, governments wanted to protect the agriculture sector, which was declining in relative economic size but remained socially and politically powerful. These broad trends severely curtailed agriculture in developing countries relative to other sectors at home and relative to developed-country agriculture on world markets. These policy-induced “distortions” of agricultural incentives in developing countries and their associated costs for 18 countries were documented by Krueger, Schiff and Valdés (1988; 1991).

#### Policy trends and incentives to invest

Over time, policy reforms have changed the levels of protection and taxation of agriculture in many countries and have realigned investment incentives, improving them in developing countries and reducing them in developed countries. These broad trends are presented in recent work by the World Bank on more than 70 countries in developing and developed regions over the past five decades (Anderson and Valenzuela, 2008; Anderson 2009; Anderson and Nelgen, 2012).

An overall indicator of policy-induced price distortions to agriculture, the relative rate of assistance (RRA), measures the extent to which government policies affect farm prices *relative* to other sectors and provides an indication of the degree to which a country's overall policy regime is biased for or against agriculture. A positive RRA implies that agriculture is favoured or subsidized relative to other sectors, while a negative RRA indicates that agriculture is penalized or taxed (Anderson and Valenzuela, 2008). Analysis of average RRAs over time shows the dramatic differences in the policy stance towards agriculture between developed and developing regions. From the mid-1950s, agriculture was taxed heavily in many of the low- and middle-income countries of Asia, Latin America and sub-Saharan Africa, while the sector was increasingly protected in many of the high-income countries (Figure 17).<sup>16</sup>

<sup>16</sup> Australia and New Zealand are exceptional in that they had an anti-agricultural policy bias for most of the twentieth century because their manufacturing tariff protection exceeded agricultural supports. Both sectors' distortions were reduced in the final third of that century and are now close to zero. See Anderson, Lloyd and MacLaren (2007).



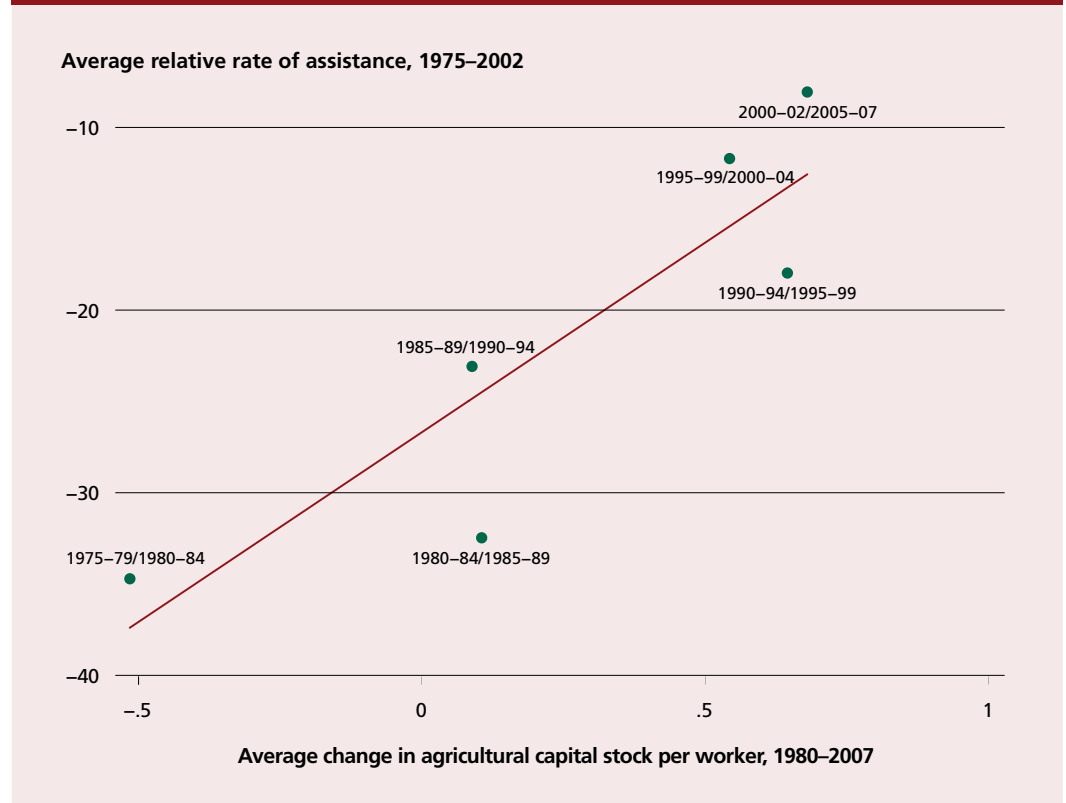
Beginning at different times, the low- and middle-income countries have gradually reduced the bias against agriculture and the high-income countries have reduced the degree of support (Figure 17). For the low- and middle-income countries, the movement of the average RRA towards zero, and even into the positive range in many countries, is due to a decline in both the taxation of agriculture and in the protection of other sectors. The extent and speed of change varies across regions.

These contrasting policy stances have had many negative implications, including a severe bias over many decades in the incentives to invest in agriculture. High relative RRAs to agriculture in many high-income countries provided strong incentives for agricultural investment, while heavy taxation of agriculture in many developing countries created severe disincentives.

This distorted the geographical pattern of agricultural investment and is partially responsible for the divergence in the levels of agricultural capital stock per worker reported in Chapter 2. Ultimately, this bias has been responsible for a relative shift in agricultural production from developing countries towards developed countries.

The impact of policy-induced distortions on levels of agricultural investment in low- and middle-income countries is illustrated by Figure 18. It plots the average RRA for successive five-year periods against the growth in agricultural capital stock per worker during the following five-year period. A time lag was chosen because it may take time for private investors to respond to a significant change in incentives. Observations are included for six different time periods. In the earliest time period the extreme bias against agriculture, reflected in an

**FIGURE 18**  
Relative rate of assistance and change in agricultural capital stock per worker in low- and middle-income countries



Notes: The indicators are shown for five-year averages. The average relative rate of assistance for each period is plotted against the average annual change in agricultural capital stock per worker in the subsequent five-year period.

Source: Authors' calculations using Anderson and Nelgen, 2012 and FAO, 2012a.



average RRA of around negative 35 percent in 1975–79, is associated with an average annual reduction in agricultural capital stock per worker of more than 0.5 percent in the period 1980–84. Over time, as the average RRA moved from strongly negative closer to neutral, the growth rate for capital stock per worker increased.

### Country-level policy distortions

The averages shown in Figure 18 hide considerable variation among RRAs within regions and income groups. Policy-induced price distortions remain significant in many countries, and low- and middle-income countries are still more likely to tax and high-income countries to subsidize agriculture (Figure 19). Some individual country examples are quite extreme. This suggests that efforts to increase agricultural investment in low- and middle-income countries are still being hindered by policy distortions at both extremes of the spectrum.

### Commodity-level incentives: focus on Africa

The overall level of protection or taxation of the agriculture sector is clearly important, but differences across commodities within a country also influence investment incentives. There can be considerable variation, with some commodities receiving protection and others being taxed. This may lead to inefficient patterns of investment and production within the country's agriculture sector.

Such differences across commodities may also have different impacts on different types of producers, with some farmers being advantaged over others. This may imply, for instance, different incentives to producers of cash or export crops versus food staples or to smallholders versus large-scale farmers. The impact on a specific commodity is often the result of the interaction of different policies and policy instruments; these can sometimes be inconsistent, with their individual impacts acting in opposite directions. As a result, the incentives for agricultural investment may be unclear to investors and not aligned with the goals of policy-makers.

An improved incentive framework for agriculture requires careful analysis of agricultural policies within a country in order

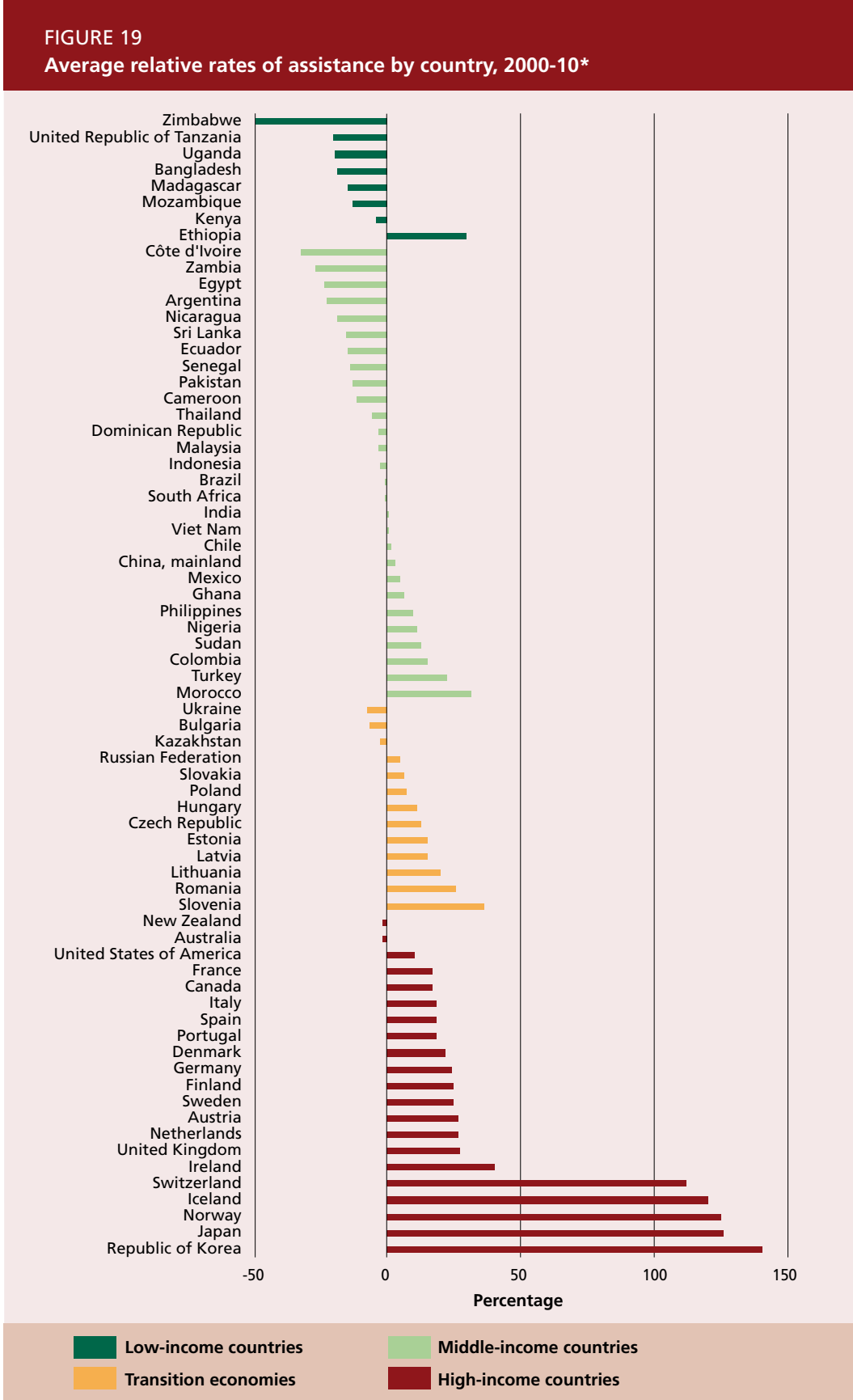
to improve the consistency and transparency of their impacts. The Monitoring African Food and Agricultural Policies (MAFAP) project aims to improve the evidence base for policy-making in ten African countries by providing a framework for analysing the impact of policies and market development gaps (Box 11).

Preliminary results from MAFAP are available for several specific commodities. For example, Figure 20 shows trends in support to maize production during the period 2005–10 in the ten MAFAP countries grouped by subregion: Western Africa (Burkina Faso, Mali, Ghana, Nigeria), Eastern Africa (Ethiopia, Kenya, the United Republic of Tanzania, Uganda), and Southern Africa (Malawi, Mozambique). For the ten countries together, the policy stance was roughly neutral relative to international price levels between 2005 and 2007, with an average NRP of about zero. The average NRP to maize producers rose to 40 percent in 2008 before declining to around 20 percent in 2010.

However, this average trend masks differences in the trends among the various countries. Countries in Western Africa have provided higher levels of support to maize than those in Southern Africa, while countries in Eastern Africa have tended to tax maize production. Protection reached very high levels in 2008, particularly in Western Africa. This likely represents a policy response to the food price crisis, where governments put in place measures to support production, including through protective measures such as high tariffs and export bans in addition to productivity-enhancing measures such as input subsidies.

Figure 21 shows the percentage of maize production in the ten MAFAP countries that have received positive and negative protection respectively. Over the period 2005–10, the policies adopted have provided protection to an increasing share of maize production in the MAFAP countries (from 36 percent in 2005 to 66 percent in 2010).

The wide variation in levels of support and taxation for maize across the different countries and the sharp fluctuations from year to year suggest that considerable policy-induced distortion and uncertainty affects the incentives to invest in the sector.



\*Or most recent year.

Source: Authors' calculations using data from Anderson and Nelegan, 2012.

## BOX 11

**Monitoring African Food and Agricultural Policies (MAFAP)**

MAFAP is working with national partners in ten countries in Africa to support decision-makers by systematically monitoring and analysing food and agricultural policies in the participating countries. The MAFAP analysis shows how domestic policy interventions – and sometimes excessive market access costs – affect incentives to farmers and their investment decisions. These measures are captured in estimates of nominal rates of protection (NRP),<sup>1</sup> which permit comparison over time and across countries. This analysis is supplemented by an analysis of the level, composition and effectiveness of public expenditures to determine the extent to which they are supportive of agricultural growth and development.

The information produced will feed into national decision-making processes and mechanisms for policy dialogue at the pan-African and regional levels, as well as to donors and other stakeholders. Efforts are made to embed the MAFAP activities in the country-level processes of the Comprehensive Africa Agriculture Development Programme (CAADP)

so as to ensure that MAFAP results will be fully supportive of the overall CAADP endeavour towards agricultural development (see also Box 23 on page 87). MAFAP is also expected to become an element of the CAADP monitoring and evaluation framework and may provide useful benchmarks against which policy impacts can be analysed. The initiative is led by FAO in partnership with OECD and with major funding from the Bill and Melinda Gates Foundation.

<sup>1</sup> The NRP represents the increase or decrease in gross revenue from sales of a product relative to a situation of no policy intervention or excess market access costs. It excludes any possible increase in revenue resulting from direct budgetary transfers (such as input subsidies or taxes for example) and any other budgetary transfers not tied to production. Unlike the RRA discussed elsewhere in this report, the NRP does not consider the impact of policies protecting or taxing other sectors of the economy; it thus covers only that part of distortions to incentives that derive directly from policies affecting agricultural prices.

### Potential gains from reducing policy distortions

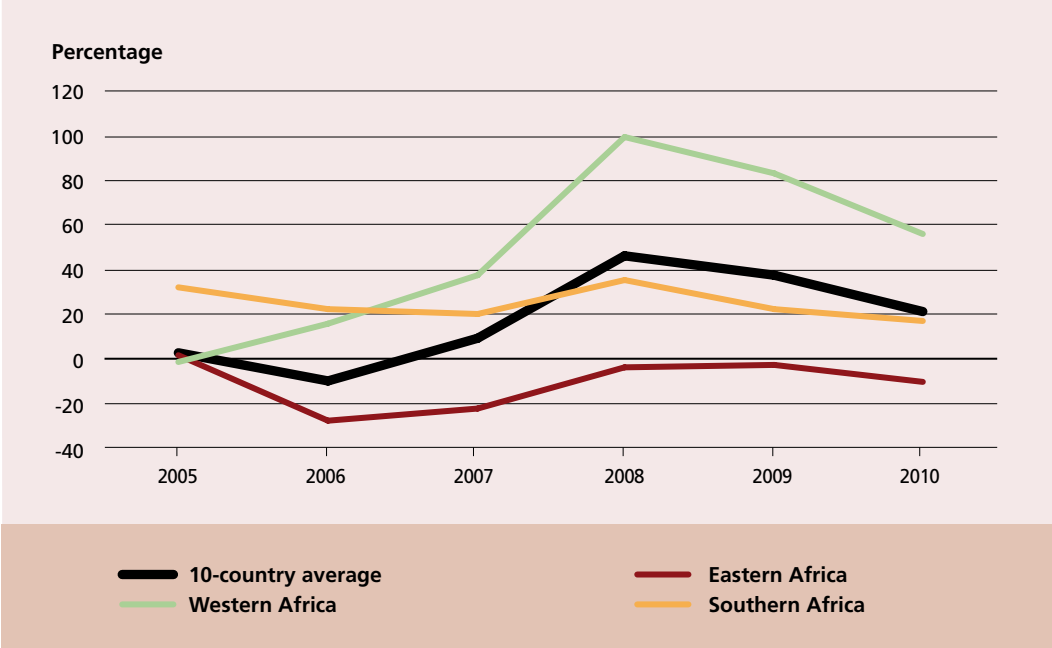
This section has shown that policies in many countries at all levels of development influence the incentives to invest in agriculture, creating disincentives in many low- and middle-income countries and subsidies in many high-income countries. While these distortions have been reduced on average, they are still significant in many countries. Reducing the remaining price-distorting policies would improve incentives to invest and lead to better resource allocation by directing investment towards the activities and industries for which each country has its strongest comparative advantage. In the case of countries that still discriminate against agriculture, it is likely that such reforms would boost investment in agriculture, especially in the highest-payoff areas and subsectors. Several studies have estimated the impact of distorted incentives to agriculture

on national and global economic welfare, economic growth and poverty.

Anderson, Valenzuela and van der Mensbrugge (2009) provide a combined retrospective and prospective assessment in an economy-wide modelling exercise. They use the World Bank's global Linkage model (van der Mensbrugge, 2005) to quantify the impacts of past reforms (up to 2004) and of potential benefits from removing remaining distortions in 2004. Their results confirm the significant gains to agriculture especially in developing countries from removing distortions to price incentives.

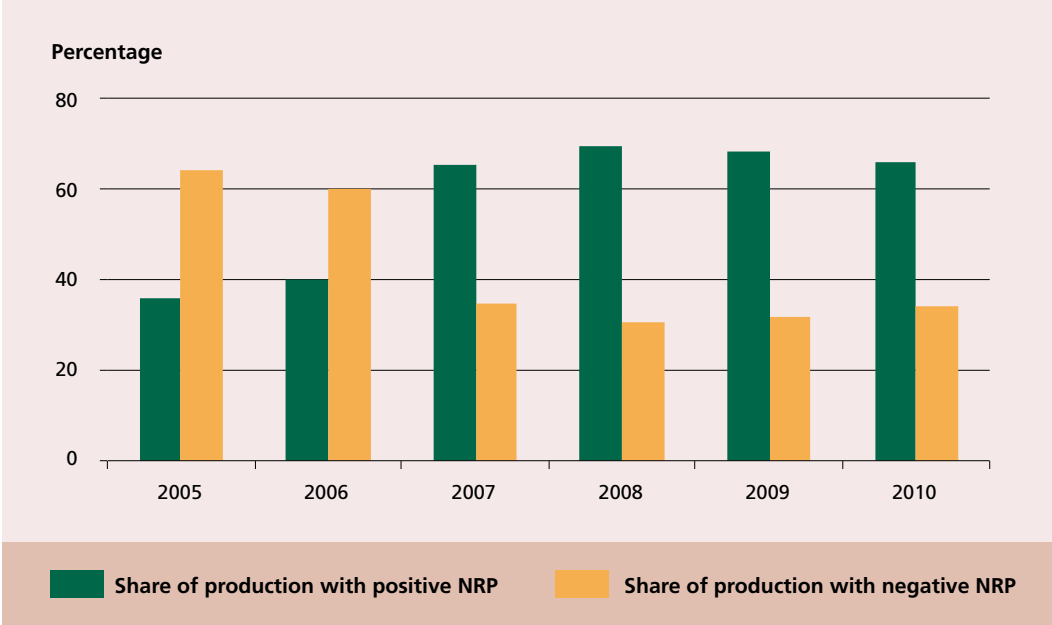
The dynamic effects of price distortions are analysed by Anderson and Brückner (2011), who examine econometrically the effect of moving the RRA towards zero on overall economic growth of sub-Saharan African countries. Given that most countries in the region currently tax agriculture, removing these price distortions would have

**FIGURE 20**  
Nominal rates of protection of maize in selected countries of sub-Saharan Africa, by subregion



Notes: The ten countries included are focus countries in the MAFAP project. The averages shown are weighted by volume of production in individual countries.  
Source: Short, Barreiro-Hurlé and Balié, 2012.

**FIGURE 21**  
Share of maize production with positive and negative nominal rate of protection in selected countries of sub-Saharan Africa



Notes: The ten countries included are focus countries in the MAFAP project. The averages shown are weighted by volume of production in individual countries. NRP = nominal rate of protection.  
Source: Short, Barreiro-Hurlé and Balié, 2012.

a significant positive effect on their overall economic growth rate. These results show that taxing agriculture relative to other sectors reduces national economic welfare at a point in time and reduces overall output growth over time. Such model-based results are confirmed by experience in China (Box 12).

### Including environmental costs and benefits in incentives to invest

Removing distortions is an essential element in improving the enabling environment for investment, but another element that will

gain importance over time is the need to incorporate natural capital in investment decisions more effectively. The value of natural capital is normally excluded from assessments of agricultural capital (Box 13) and from national accounting, and both private and public investment decisions in agriculture have only intermittently and inconsistently accounted for the value of natural resources. Expansion in agricultural production over the last decades has been achieved at the cost of significant environmental degradation. The Millennium Ecosystem Assessment's (2005) comprehensive review of global environmental resources, for example,

#### BOX 12

#### Agricultural growth in China: the role of policies, institutions and public investment

In 1978, agriculture in China accounted for about 28 percent of GDP and 74 percent of the economically active population. The sector was mired in low rates of productivity, and rural poverty rates stood at 76 percent in 1980 (World Bank, 2007a). However, institutional reforms, market liberalization and investment – above all in research and development – kick-started a remarkable growth in agricultural productivity and rural incomes that ultimately led to industrialization and a massive reduction in poverty.

Reforms starting in 1978 focused on creating market institutions and incentives. Prices of agricultural commodities were raised, followed by institutional reforms that led to the farm household responsibility system (HRS). The reallocation of collective land for the use of households through contract arrangements with the collectives was a fundamental component of the HRS. Subsequently, markets were opened up in the mid-1980s (von Braun, Gulati and Fan, 2005). Reforms ultimately led to the steady dismantling of the state-run procurement and input supply systems and the creation of a largely market-driven system (World Bank, 2007a; von Braun, Gulati and Fan, 2005).

Institutional reforms, particularly the HRS and price reforms, are considered the dominant factors that led to increased

productivity and annual growth in agricultural incomes of about 15 percent between 1978 and 1984 (McMillan, Whalley and Zhu, 1989; Lin, 1992; World Bank, 2007a; Fan, Zhang and Zhang, 2004). These were complemented by government investment, notably in agricultural research, development and extension, which tripled between 1984 and 2000 and strongly stimulated growth in agricultural production and poverty reduction (Fan, Zhang and Zhang, 2004) (see also Chapter 5).

Other types of investment also played an important role. For example, over the period 1953–78, China invested heavily in electricity. By 1998, about 98 percent of Chinese villages had access to electricity. This helped agricultural productivity growth and the establishment of township and village enterprises, which were a critical factor in the success of reforms (von Braun, Gulati and Fan, 2005). Investment in large-scale irrigation was also important: the proportion of cultivated area under irrigation increased from 18 percent in 1952 to about 50 percent in the early 1990s (Huang and Ma, 2010).

The experience of China shows the remarkable productivity and income gains that farming can generate when markets are allowed to operate, the incentives are right and public investments in technology and rural infrastructure are supportive.

## BOX 13

**Accounting for investment in natural capital**

Natural resources are among the most important assets of developing countries. Investing in sustainable natural resource management is imperative for maintaining agricultural productivity, reducing risk of and vulnerability to natural disasters and ensuring provision of environmental services (such as hydrologic functioning, sediment control and biodiversity conservation). Yet natural capital is generally ignored in national accounts and in estimates of capital and are excluded from the United Nations System of National Accounts that is the basis for measuring GDP and other macro-level aggregates (except to the extent to which soil and water quality and water availability are capitalized into farmland values).

One approach to incorporating natural resource values and the costs and benefits of environmental services is "environmental accounting", which

"provides a framework for organizing information on the status, use and value of natural resources and environmental assets ... as well as expenditures on environmental protection" (INTOSAI, 2010). However, few examples exist of attempts to include agriculture and land use in national-level environmental accounting systems, partly because of greater interest in the extractive sector in several countries, partly because of the sheer scale of agriculture and number of farms, and also because the complexity and heterogeneity of the ecosystems on which agriculture depends make truly comprehensive environmental accounting a daunting task. In March 2012, the UN Statistical Commission adopted the System of Environmental and Economic Accounting Central Framework as a recognized international statistical standard for environmental accounting.

concluded that 15 of the 24 global ecosystem services reviewed – including freshwater provision, climate regulation, air and water purification, natural hazard regulation and pest regulation – were being degraded or used unsustainably. In a world of gradually tightening natural resource constraints, ensuring the inclusion of environmental costs and benefits in the incentives faced by producers and investors in agriculture remains a key challenge.

Agriculture has multiple *impacts*, both positive and negative, on natural resources. In addition to producing food, fibre and fuel, the sector also produces a wide range of non-marketed outputs – externalities<sup>17</sup> – that result in broader costs and benefits to society that cannot be captured by farmers themselves (FAO, 2007; Morris, Williams and Audsley, 2007).

<sup>17</sup> An externality refers to a situation where an individual's (for instance a farmer's) actions have unintended side-effects that benefit (positive externalities) or harm (negative externalities) another party. Both positive and negative externalities are pervasive in economic production, including in agriculture.

These outputs include some that result in net costs to society – greenhouse gas emissions, water pollution, soil erosion and degradation, groundwater depletion, etc. – as well as others that create benefits for society. These positive externalities include soil carbon sequestration, habitat creation and species protection, scenic beauty, flood control, recreational values and contributions to rural communities. In some cases, the value of the positive externalities created by agriculture can be enough to offset the costs (Buckwell, 2005).

Incorporating external costs and benefits into the incentives available to farmers and private investors and into the calculations underlying public investment decisions is crucial to ensure patterns of investment that are optimal from a social perspective. In deciding whether to clear a forest for use as cropland, most farmers would probably evaluate the costs of the labour and machinery required and the loss of any income derived from the forest against its projected value as cropland. Most farmers would lack incentives to consider the loss of forest carbon to the atmosphere, siltation of

waterways downstream and loss of species habitat from the forest – and thus would disregard these factors.

In both public and private investment decisions, the problem is largely the same. Failure to consider the values to be assigned to natural resources and environmental goods and services – both costs and benefits – skews the investment decision by ignoring these goods and services. Addressing this problem involves major challenges. The sheer number of farmers in developing countries and the remoteness and poverty of many exacerbates the logistical difficulties and transaction costs involved. The complexity of agricultural ecosystems makes it difficult to accurately measure, quantify and monitor the biogeochemical and natural resource flows that underlie agriculture. There is a lack of analytical tools and mechanisms readily available to measure, value and account for resource use and loss in agricultural production systems. Several efforts are under way to remedy this situation, for example within the framework of the World Overview of Conservation Approaches and Technology (WOCAT) and the Land Degradation Assessment in Drylands (LADA) project.

### Policy options for incorporating environmental values into investment decisions

A wide range of policy options are available for incorporating environmental values into investment and resource management decisions that are relevant for agriculture (FAO, 2007).

- **Command-and-control.** In this approach, governments use their regulatory powers to mandate certain behaviours, prescribe others and impose penalties for non-compliance. Command-and-control is the norm for pollution control in industrial settings, but the dispersed and fragmented nature of agricultural production makes such systems more difficult to implement.
- **Financial penalties and charges.** This approach modifies incentives through financial signals of taxes and fees. It does not prohibit certain activities but makes them more expensive to would-be polluters.
- **Removing perverse incentives.** In some cases, policy measures aimed at increasing agricultural production or productivity may unintentionally generate incentives to produce negative

#### BOX 14

#### Barriers to smallholder investment in sustainable land management

FAO recently conducted a review of the empirical evidence on the barriers to adoption of one important category of smallholder investment: sustainable land management (McCarthy, Lipper and Branca, 2011). Sustainable land management comprises agricultural practices such as agroforestry, soil and water conservation and grazing land management. A common feature of these practices is that they involve investment in ecosystem services to derive longer-term production as well as environmental benefits.

The review indicated that delayed benefits from these practices are a serious obstacle for many farmers. Up to five years may be needed to realize appreciable benefits, while costs are incurred immediately, partly in the

form of opportunity costs arising from foregone income during initial phases of transition to sustainable systems. Lack of information and limited local experience with such techniques is a further deterring factor as it increases the uncertainty and risks involved in the investment.

On the other hand, well-functioning input supply and systems for managing collective resources such as pastures and waterways were found to have a positive impact on investment in sustainable land management. The review concluded that overcoming such barriers to widespread adoption of these techniques requires increased levels of public support, even though they generate higher returns to both farmers and the environment over the long run.



externalities. A classic example is subsidies on inputs, such as fertilizer or irrigation water, leading to excessive use, contamination of water through runoff and water depletion.

- **Establishing property rights to an externality.** This instrument relies on the privatization and allocation of rights to generate an externality, for example through permits to emit a defined quantity of air pollution or carbon. Such mechanisms often work in combination with other mechanisms such as payments for environmental services.
- **Payments for environmental services (PES)** encompass a wide range of instruments that involve various forms of payment for the provision of a positive environmental externality such as biodiversity conservation, watershed protection or climate change protection.

To the extent that environmental policies are applied to agriculture, command-and-control instruments or penalties and taxes have been the most common approaches. More recently, there has been increased interest in and development of payments for environmental services (PES). OECD (2010) notes the proliferation of PES programmes across developed and developing countries, mobilizing increasing amounts of finance and supporting international dialogues on efficient means of improving ecosystem services. The emergence of PES programmes is considered a promising approach that should be pursued by local and national governments as well as the international community (World Bank, 2007a). In the Global Environment Facility (GEF) and World Bank portfolios, PES schemes are increasingly being integrated into wider rural development and conservation projects, as a component for sourcing sustainable financing for investment (Wunder, Engel and Pagiola, 2008).

In spite of the interest in payments for environmental services, the number of functioning mechanisms in agriculture is limited. This is partly due to the numerous constraints – both conceptual and practical – still faced by such schemes (FAO, 2007; Lee, 2011). Policies and institutions that facilitate low transactions costs and the possibility for wide-scale replication are needed to realize the potential of this instrument to generate a

significant and effective source of investment finance for sustainable agricultural development (Lipper and Neves, 2011).

### Capturing opportunities to link to environmental finance

Resources available for investment in sustainable agricultural development can be augmented by linking to environmental public and private sources of finance (Lipper and Neves, 2011). The GEF is the largest public funder of projects to improve the global environment, providing grants for projects related to biodiversity, climate change, international waters, land degradation, the ozone layer and persistent organic pollutants.<sup>18</sup> An example from the private sector is the Livelihoods Fund, a mutual fund mobilizing 30–50 million euros from the private sector and foundations to finance programmes that contribute to both food security and carbon sequestration through the restoration of ecosystems. In return, investors receive carbon credits, which they can use as offsets or for sales. Linking climate finance to smallholder agricultural development is one of the objectives of the “climate-smart agriculture” approach (Box 15). However, the potential of environmental finance for smallholder agriculture development has been held back by the high transaction costs of measuring, reporting and verifying environmental benefits from small changes in a large number of agricultural operations; the lack of integration of such programmes into mainstream agricultural growth strategies; and the lack of legal and regulatory systems to create demand and willingness to pay for such services (Lipper and Neves, 2011).

### Key messages

- Governments have the responsibility to support a favourable investment climate for agriculture, by creating an enabling environment and ensuring appropriate incentives for investment in agriculture. The well-known elements of an enabling environment for investment in general are equally relevant for agriculture: good

<sup>18</sup> Since 1991, the GEF has provided US\$10.5 billion in grants and leveraged US\$51 billion in cofinancing for over 2 700 projects in over 165 countries (GEF, 2012).

## BOX 15

**Linking climate and agricultural development finance to support sustainable agriculture development: the “climate-smart agriculture” approach**

Climate-smart agriculture<sup>1</sup> seeks to support countries in increasing agricultural productivity and incomes, building resilience and the capacity of agricultural and food systems to adapt to climate change and reduce and remove greenhouse gases. Moving to sustainable and climate-smart agriculture will require higher levels of investment in human, social and natural capital. At the same time, changes in agricultural systems to increase sustainable growth can make a major contribution to sequestration, which could generate financial flows for the necessary investments (FAO, 2009a).

Achieving this requires actions at international and national levels. At the international level, climate financing commitments made in the Copenhagen Accord, for a goal of US\$100 billion

per year by 2020, must be fulfilled, and financing instruments that support the specificities of agricultural adaptation and mitigation must be established. At the national level, it is necessary to incorporate climate change adaptation and mitigation into national agricultural development strategies and investment plans. In Africa, incorporation of climate change issues into the CAADP provides an important platform for achieving this (FAO, 2012c). Also important is the building of national institutions, *inter alia*, to support the measurement, reporting and verification of adaptation and mitigation benefits from changes in agricultural systems that can serve as a basis for obtaining climate finance. (FAO, 2012c).

<sup>1</sup> Comprising crops, livestock, forestry and fisheries.

governance, the rule of law, political stability, low levels of corruption and the ease of doing business are strongly supportive of capital accumulation in agriculture. Governments that want to stimulate agricultural investment must get these basics right.

- Some elements are particularly important for agriculture, including secure property rights, rural infrastructure and public services, and market institutions. Vibrant agricultural input supply and agro-processing industries, which depend on an enabling environment, are also needed to ensure effective transmission of incentives to farmers.
- Government policies in agriculture and the broader economy can have a profound influence on the incentives – or disincentives – to invest in agriculture. Progress has been made internationally in reducing the policy distortions that have discouraged agricultural investment in many developing countries (relative to other sectors and other countries), but more needs to be done. Many low- and middle-income countries

continue to tax agriculture heavily and, within countries, the unequal burden on different commodities may create additional uncertainty and disincentives for investors.

- Ensuring an appropriate incentive framework for investment also requires the inclusion of environmental costs and benefits into the economic incentives facing investors in agriculture. Many obstacles must be overcome in order to do this, including lack of analytical tools to measure and account for natural resources as well as the development of efficient institutions and mechanisms to lower transaction costs.