

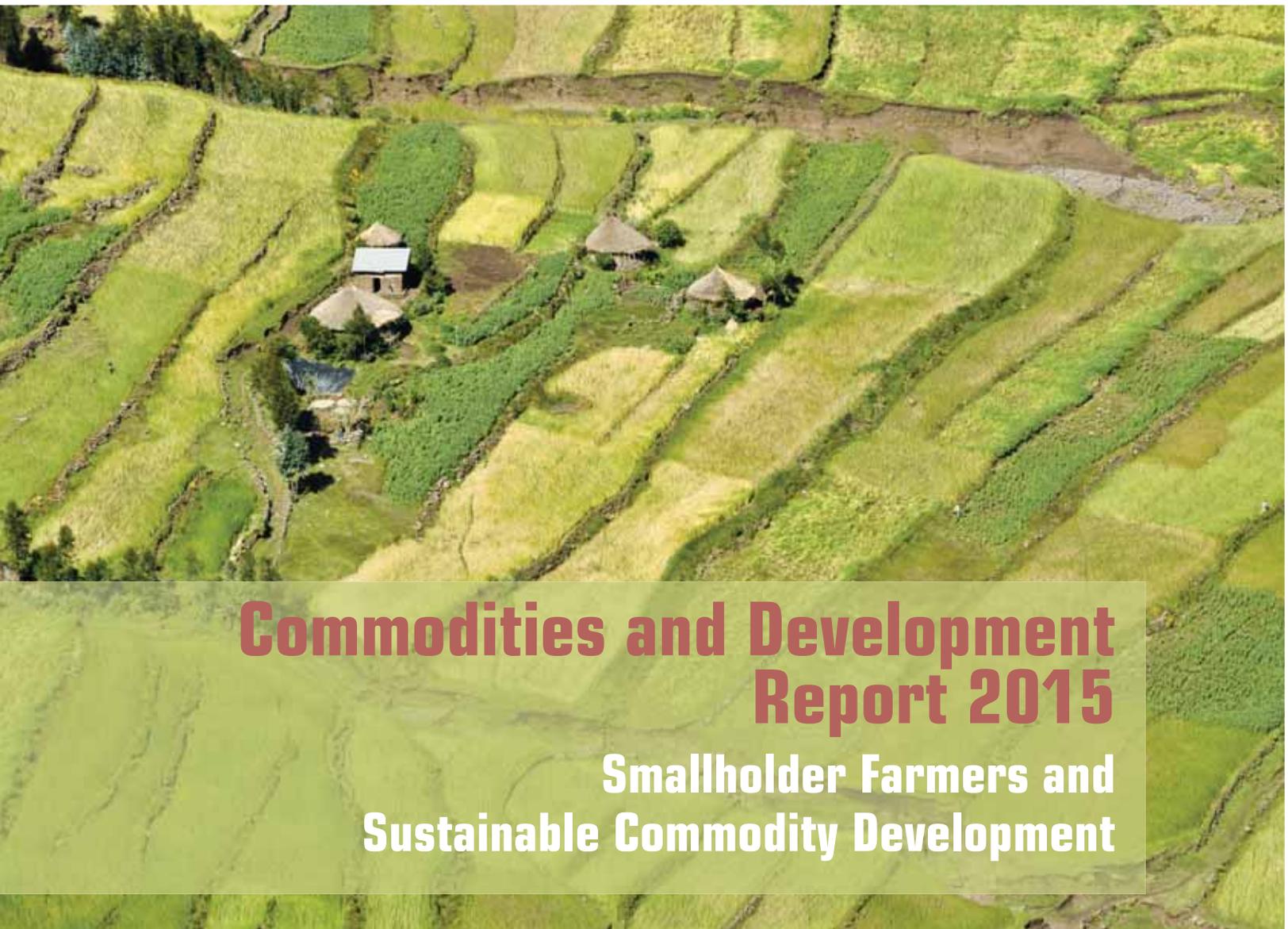


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17 December 2015, 10:00 GMT

(11:00 Geneva, 13:00 Nairobi – 17 December 2015)



Commodities and Development Report 2015

Smallholder Farmers and Sustainable Commodity Development



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UNITED NATIONS
UNCTAD
New York and Geneva

Acknowledgements

The Commodities and Development Report 2015 was prepared under the overall guidance of Samuel K. Gayi, Head, Special Unit on Commodities (SUC) and the direct supervision of Janvier D. Nkurunziza, Chief, Commodity Research and Analysis Section. The SUC team that worked on the Report consisted of Rachid Amui, Taro Boel, Milasoa Chérel-Robson, Thorunn Devoy (intern), Alexandra Laurent, Denise Penello-Rial, Kris Terauds, Komi Tsowou, Yanchun Zhang and Yan Zhang.

In its early stages, the Report made use of a background paper prepared by Tom Lines and was presented at a meeting that identified its focus areas. Charles Adjasi (University of Stellenbosch), Boubakar Ben Belhassen (FAO), Enrique Dominguez (Permanent Mission of Mexico), Jonathan Hepburn (International Centre for Trade and Sustainable Development), Andrey Kuleshov (Common Fund for Commodities), Silencer Mapuranga (International Trade Center), and Francis Mbroh (African Export and Import Bank) actively participated in the discussions. Junior Davis, Patrick Osakwe, Chantal Dupasquier, Pilar Fajarnes-Garces and Harriet Odembi provided extensive written comments while Richard Longhurst provided comments and did some editorial work.

Secretarial support was provided by Danièle Boglio and Catherine Katongola-Lindelof. The cover was designed by Nadège Hadjemian. The text was edited by Praveen Bhalla.

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This publication has been edited externally.

UNCTAD/SUC/2014/5

Explanatory note

Use of the term “dollar” (\$) refers to United States dollars.

The term “billion” signifies 1,000 million.

The term “tons” refers to metric tons.

Use of a dash between years, e.g. 1999-2000, signifies the full period involved, including the initial and final years.

An oblique stroke between two years, e.g. 2000/01, signifies a fiscal or crop year.

References to sub-Saharan Africa in the text or tables include South Africa, unless otherwise indicated.

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Abbreviations

AGRA	Alliance for a Green Revolution in Africa
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
FAO	Food and Agriculture Organization of the United Nations
FDI	foreign direct investment
GDP	gross domestic product
GHG	greenhouse gas
ha	hectare
ICT	information and communication technology
IFAD	International Fund for Agricultural Development
IPCC	Intergovernmental Panel on Climate Change
LDC	least developed country
MDG	Millennium Development Goal
NGO	non-governmental organization
ODA	official development assistance
R&D	research and development
SDG	Sustainable Development Goal
SSA	sub-Saharan Africa
TNC	transnational corporation
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
WFP	United Nations World Food Programme
WRF	warehouse receipt financing
WTO	World Trade Organization

Overview

Introduction

The United Nations General Assembly declared 2014 as the International Year of Family Farming, recognizing contributions of family farming to food security, poverty reduction and sustainable development. And in 2015, the international community agreed on a set of Sustainable Development Goals (SDGs). In line with this international development agenda, UNCTAD's *Commodity Development Report 2015* focuses on Smallholder Farmers and Sustainable Commodity Development. The Report aims to demonstrate the need to devote more attention and resources to smallholders as a way to achieve the newly agreed SDGs relating to poverty, nutrition, hunger and environmental sustainability. To this end, the Report provides an analysis of the context within which smallholders operate at the national, regional and international levels. The Report then offers policy recommendations for establishing the conditions for smallholders to fulfil their potential as sustainable business enterprises integrated into domestic, regional and international trade.

The many definitions for smallholders reflect the various perspectives from which smallholders can be analysed. Although there are strong intercountry and interregional differences in the average size of small farms, it is estimated that more than 90 per cent of the 570 million farms worldwide are managed by an individual or a family and that they mostly rely on family labour. Estimates further show that 84 per cent of these farms are smaller than 2 hectares (ha) and that about 2.5 billion people depend on agricultural production systems for their livelihoods, either as full- or part-time farmers, or as members of farming households. However, the size threshold for a "small" farm differs across countries, regions and socio-economic contexts. In Latin America, the size of an average holding is about 20 ha. In Brazil, for example, a smallholder is a farmer who works on up to 50 ha. In Asia and in sub-Saharan Africa (SSA), average farm sizes are much smaller. It is estimated that about 81 per cent of farms in India are smaller than 2 ha, and in China, farms that are smaller than 2 ha make up 95 per cent of all farms. In Bangladesh, where the average farm size is 0.5 ha, small farms of less than 2 ha account for 96 per cent of landholdings. Such characteristics of small farms are common in most Asian countries, with the exception of Pakistan. In Africa, on average, 80 per cent of landholdings are smaller than 2 ha, as in Nigeria, for example.

In this report, the term smallholder is used to refer primarily to those cultivating 2 ha or less of land. According to this size threshold, data from the Food and Agriculture Organization of the United Nations (FAO) estimates that in the period from 2001 to 2004, about 87 per cent of small farms are in the Asia and Pacific region, 8 per cent are in Africa, 4 per cent are in Europe and less than 1 per cent are in Latin America. UNCTAD's analysis also considers farmers cultivating larger sized plots as smallholders when they have the following characteristics: they are small relative to the median farm size; they use primarily family labour; and they have limited interaction with input, output and credit markets.

The focus of UNCTAD's *Commodities and Development Report* on smallholder farmers is important for three reasons. Firstly, despite being major contributors to national and global food security smallholders constitute the majority of the world's poor. Evidence shows that global poverty remains a predominantly rural phenomenon, with 70 per cent of the developing world's 1.4 billion extremely poor people living in rural areas, particularly in South Asia and in SSA. Achieving poverty reduction goals will therefore require designing and implementing policies that cater to the needs of smallholders. With regard to food security, smallholders control only 12 per cent of all agricultural land but produce more than 80 per cent of the world's food, in value terms.

Historically, food security has always been a concern for both developed and developing countries, but with the advent of surplus agricultural production such concern has weakened in developed countries' national policymaking. Nonetheless, protectionist measures by net food exporting countries during the 2008 food crisis revived fears of food shortages in some net food importing countries. Such fears led to a renewed interest in food security policies, both at the national and international levels. As a result, many governments in both developed and developing countries have revamped their food security policies, prioritizing smallholders. At the global level, the social unrest resulting from food shortages has reignited awareness of the consequences of food insecurity and poverty on international migration flows, and more generally on global security. This renewed awareness is illustrated by the current United States government's emphasis on investment in food security as a cost-effective way of improving national security.

The second reason for this Report's focus on smallholders is that, in addition to contributing to food security, smallholders contribute to economic growth through their rational economic choices. In countries with a large rural population, agricultural growth, in turn, contributes to poverty alleviation. The third reason is that in many countries, smallholders are part of export value chains and contribute to social and environmental sustainability. Moreover, as they tend to be labour-intensive, small farms are key employers and thus help promote social stability. However, the survival of family farming depends on the extent to which young people are capable and willing to perpetuate this agricultural tradition. Unfortunately, evidence suggests this is increasingly unlikely.

Smallholders are also important agents of environmental sustainability. An in-depth analysis shows that they tend to use environmentally friendly farming practices. However, smallholders are both perpetrators and victims of higher net human-induced greenhouse gas (GHG) emissions. When access to arable land is limited, smallholders tend to adopt environmentally harmful choices, including clearing forested areas. Overall, however, considering that a large proportion of their farming practices rely heavily on weather conditions and a low level of technology, smallholders are mostly the victims of climate change.

Despite their contributions to food security and economic growth, and their need for support, smallholders have suffered from policy neglect. For a long time, agricultural development policies have generally been based on an approach to development that has tended to neglect rural areas. This has led to the disproportionate allocation of public resources to urban areas in what Michael Lipton referred to as an "urban bias". During the 1980s and 1990s, many countries, particularly in Africa, withdrew State support to smallholders under structural adjustment programmes (SAPs), which prescribed reducing the role of the State and "getting prices right." As a result, in many cases, extension services were either abolished or weakened, and smallholders no longer had access to affordable inputs (e.g. fertilizers and seedlings). Remoteness and high transaction costs implied that marketing conditions were not attractive enough for the private sector to step in and fill the gap left by the traditional public institutions. Moreover, where such services were provided, they tended to be biased against women.

Until the mid-2000s, the benign policy neglect of smallholders was exacerbated by the poor quality of data on their livelihood patterns, resulting in a lack of understanding of their true contribution to total agricultural production and gross domestic product (GDP), and of their rate of participation in the labour force. Available survey data on the characteristics and contributions of smallholder farmers were too restricted and hence could not be extrapolated to a wider sample of countries. The situation has somehow improved since then.

Access to markets: Some key issues

The extent of smallholders' participation in input and output markets partly determines their productivity, and hence their earnings. Better linkages with markets can induce rural populations to consider farming as a profitable, and therefore a viable, livelihood choice. Participation in well-functioning agricultural input markets can enable farmers to increase yields, thus producing a marketable surplus, which, if sold in competitive output markets, can enable them to obtain higher prices and consequently increase their incomes. This in turn improves their capacity to cope with risks and market instability. Understanding the nature of the interaction between smallholders and markets can thus help shape appropriate policies that could help these economic actors increase the benefits they derive from their activities.

Smallholders' interactions with input markets

Farmers use a range of inputs in the production process, including seeds and fertilizers, land and labour. Smallholders in most of the developing world face a number of constraints that limit their access to much-needed inputs and farming services. For example, few smallholders in developing countries, particularly in Africa, are able to afford expensive seeds and fertilizers without subsidies. This partially explains the very low levels of fertilizer use in these countries, and therefore their low productivity, when assessed against the standard criteria used for measuring agricultural yields. Similarly, land ownership by smallholders is often restricted by inefficient land markets, land tenure and land management systems. Furthermore, in many countries, especially in Africa, thin rural labour markets and low wages imply that smallholders' own agricultural activities are their main, and sometimes only, sources of income.

Smallholders' interactions with output markets

Transaction costs and the availability of market information are key determinants of where smallholders sell their products. With small quantities and limited or no access to market information, in spite of the development of information and communication technologies (ICTs), many smallholders continue to sell at the farm gate or village markets, where profitability and growth potential are limited. Whether or not smallholders are able to access larger, more lucrative national or regional markets depends on many factors, including the available logistical connections to those markets, the accessibility of market information, and the products in question: staples are generally produced for domestic and regional markets, whereas non-staples are generally produced for international markets.

With a growing middle class in several developing countries, an increasing number of smallholders have an opportunity to sell to urban supermarkets and regional markets, where their produce fetches higher prices than in village markets. However, their participation is limited due to poor or non-existent infrastructure, shallow integration in agricultural markets at the regional level, lack of market information and difficulty in complying with quality standards. Indeed, those standards are becoming increasingly stringent as a result of more demanding supermarkets in response to the preferences of urban consumers.

In addition, with the exception of those who are integrated into supply chains through contract farming, for example, smallholders are usually remotely, if at all, linked to export markets. Moreover, as price takers, smallholders are subject to price swings in international markets. Intermediaries play an important role in linking farmers with markets by providing them with services such as marketing, inputs and finance through contractual arrangements; they also help create economies of scale by aggregating small quantities from individual smallholders to sell in bulk to exporters. There is evidence that intermediaries and exporters use their control of supply chains to capture a large share of the international prices of the exported commodities.

Smallholders' welfare is adversely affected not only by their inability to benefit from international price hikes of agricultural produce, but also by volatile food prices, which lead to significant variations in the prices of their crops. Farmers who increase their investments following a period of high prices may find it difficult to recoup their investments when agricultural prices fall. Most smallholders have little, if any, access to risk management tools to hedge against price swings, and are therefore fully exposed to the vagaries of commodity markets.

Empirical analysis based on time series econometric techniques is used to further assess the extent to which smallholders are integrated into some international commodity markets. The analysis focuses on the co-movement of producer prices and international prices of selected commodities – coffee, cocoa and wheat – in eight countries. The results show that there is a stable relationship between producer prices and international prices of the selected commodities, implying that shocks to international prices are transmitted to domestic prices. The analysis also investigates the impact of domestic policy changes in developing countries on producer prices, using trade liberalization as an example of a policy change. It appears that the trade and economic reforms adopted in the sample countries in the 1980s and 1990s increased the exposure of small producers to developments, both negative and positive, in international markets.

Smallholdings as sustainable business enterprises

To be sustainable, smallholdings should be viewed as business entities that pursue profit, with social stability and environmental sustainability as important outcomes. The process of commercialization has the potential to raise household incomes and thereby improve smallholder welfare. But smallholders face a number of constraints on the sustainability of their business activities. The first set of constraints relates to access to technology, due to limited or unsuitable research and development (R&D). The second set of constraints pertains to business facilitation, involving help in the identification and seizing of opportunities, as well as the protection of production and income. This is generally facilitated by access to finance, risk management tools, market information and market access. However, in much of the developing world, smallholders have limited access not only to traditional loans, but also to other more innovative financing mechanisms that are currently available on financial and risk management markets. Furthermore, investment promotion activities and the accompanying incentives are generally targeted to large-scale investments including foreign direct investment (FDI), with no equivalent set of measures designed for smallholders. Though FDI has considerable potential for generating a positive impact on agricultural development, there is increasing evidence of the lack of adequate safeguards for protecting smallholders' interests and their continued access to natural resources.

Despite the many constraints they face, smallholders can benefit from emerging opportunities by producing higher quality and environmentally and socially responsible products as a result of increasing public awareness of the environmental impacts of agricultural activities. Furthermore, the number of innovative partnerships in the provision of financing highlights the potential for a brighter future for smallholder farming.

Smallholders and sustainable commodity production and trading: Policy proposals

As key players in efforts to achieve food security objectives, smallholders need policy support. The emerging body of evidence on good practices and success stories with regard to smallholder-centred policies demonstrates that change is possible and positive results can be achieved. In this light, this Report proposes a policy framework that combines measures at the national, regional and international levels.

Creating an enabling environment at the national level

An enabling environment at the domestic level should include sound and predictable economic policies, a stable macroeconomic framework supportive of agricultural development, strong and effective institutions, adequate infrastructure (including reliable and affordable access to power) and secure land tenure systems, with gender equality as an overarching theme across the policy spectrum. The following are some of the other major components of a smallholder-friendly environment.

Strong political leadership that champions smallholders

The Report asserts that there cannot be any sustainable development of smallholder farming without strong political leadership dedicated to the cause of smallholder farming. This argument is supported by several examples, such as Brazil's mainstreaming of the smallholder-focussed Zero Hunger Programme in its government strategy, and the drastic improvement of Nigeria's agricultural sector under the committed leadership of its Ministry of Agriculture over the last few years. Such commitments require either honouring existing budgetary commitments to agriculture or increasing government expenditures to the sector, if required, with special attention to issues of direct relevance to smallholder farming.

Developing rural infrastructure

Improved rural infrastructure could bring tangible benefits to smallholder farmers, both in terms of higher productivity and lower transportation costs, resulting in increased profits. Experience in most developing countries suggests that governments should take the lead in addressing the major infrastructural deficit in rural areas. Examples of successful financing of large infrastructure projects show that this often requires designing and undertaking public-private partnerships.

Fostering strong farmers' organizations

Farmers' organizations should be supported as they enable individual smallholders to aggregate their produce and increase their bargaining power in their interactions with input and output markets. Public support should also focus on promoting their professionalization in order to help them manage the increasing complexities of standards and trade requirements at national, regional and international levels.

Science, technology and ICTs should be tailored to the needs of smallholders

Science, technology and ICTs are the cornerstones of improvements in agricultural production and trade. Experience shows that advances in these areas depend on a combination of public and private investments steered by clear and effective public policy. As with all initiatives in support of smallholders, approaches to innovation policies should be inclusive and participatory. Technology policy should aim to increase smallholders' productivity while at the same time fulfilling the requirements for environmental sustainability. Concerning ICT support, mobile phones enable better access to market and price information, connection with buyers, as well as improved and more efficient delivery of extension services. Public-private partnerships can be used to scale up connectivity in rural areas.

Creating a business-friendly environment for smallholders

Governments should also facilitate investments in other segments of the value chain, with particular incentives provided to encourage inclusive business models that recognize the specificities of small actors along the value chain. For smallholder farming to be a sustainable option for making a living, policies and

actions are needed to make it attractive to the youth in developing countries. Such policies should include regulatory tools and start-up funds that specifically support entrepreneurial initiatives by young people in the agricultural and connected sectors.

Other necessary measures for establishing an enabling environment at the national level include the following:

- Securing the land rights of smallholder farmers
- Access to traditional finance and innovative financing for smallholder farmers
- More affordable alternative certification schemes in order to help smallholders gain greater access to organic markets
- Incentives for environment-friendly farming practices

With regard to the specific case of access to finance, in addition to private sources of finance, public support should be made available for the development of innovative financing tools customized to meet the needs of small and vulnerable agribusinesses. Moreover, the volatility of external financial flows, the slow rate of disbursements of aid commitments and the low level of aid allocated to agriculture, as well as the large investment gap in the sector calls for stronger mobilization of domestic financial resources that are allocated for agricultural development. Governments should also provide a supportive environment for the development of innovative financing mechanisms, such as warehouse receipt financing and factoring. In addition, more efforts should be devoted to increasing access to risk management instruments, such as index-based weather insurance, which has proven effective in dealing with production risks. Similarly, the use of contract farming can be promoted as a means to hedging against price risks.

Cooperation on food security at the regional level

Existing efforts at regional integration should be accelerated to facilitate regional trade in food products. In particular, members of regional economic blocs could cooperate in the following areas: developing much-needed infrastructure and storage facilities, including cold chains; establishing regional financial facilities for agricultural entrepreneurial activities; strengthening or investing in intraregional and interregional centres for research and technology transfer targeting smallholders in particular; supporting specialization in agricultural value chains within the regional bloc based on each member country's comparative advantage; establishing investment promotion measures for market-seeking intraregional FDI in agricultural value chains through contractual arrangements involving smallholders; and establishing public-private partnerships to scale up non-State initiatives with a proven track-record of positive impacts on smallholders. In addition, the immediate and medium-term impacts of the 2008 food crisis on vulnerable groups underscore the need for supranational grain reserves for emergency purposes.

Policies and measures at the international level

More action is needed to make the international environment more conducive to smallholders' participation in sustainable commodity production and trade. Measures that would contribute to creating such an enabling environment should comprise the following actions.

Support smallholders' interests in international trade negotiations and in investment treaties

Addressing distortions in agricultural markets would support efforts towards the achievement of the SDGs on poverty and hunger. Similarly, negotiations relating to cotton represent a major test of the capacity of the World Trade Organization (WTO) to deliver on its promise to boost development. The cotton issue should therefore continue to be given priority. In addition to the trade and development aspects highlighted at the WTO, collective efforts should be deployed to provide more resources to alleviate constraints relating to productivity, marketing and value addition, along the lines of the multi-stakeholder Pan African Cotton Road Map.

Smallholders' interest should also be taken into account in international investment treaties. Considering the major contributions of smallholders to national, regional and global food security and to economic growth, the international community should ensure the protection of smallholders' interests at two levels: in contractual arrangements between States and investors; and in investment treaties, mostly at the bilateral level. Similarly, investors should be encouraged to adopt responsible investment principles.

Support smallholders' interests in regulations relating to commodity markets

The international community needs to consider devising mechanisms for better ensuring that international commodity markets do not hinder the development of smallholder farming. UNCTAD has repeatedly called for the adoption of strong and prompt policy and regulatory measures both in the financial and physical markets. Some of these policy proposals are of direct relevance to smallholders, such as the call for increasing transparency and for providing better and timely data on fundamentals in physical markets.

Support smallholders' interests in development and in climate finance

Smallholders account for the largest proportion of the poor in many countries. This, in addition to their other attributes discussed in this Report, should induce donors to allocate a greater share of official development assistance (ODA) to agricultural and rural development. Smallholders should also benefit from the increasing supply of climate finance for funding environmentally friendly agriculture.

Align policies, pledges and actions at international, regional and national levels

To achieve greater results and impact on the well-being of smallholders, better policy alignment in international policymaking is needed. In addition, careful attention should be paid to the alignment of actions at national, regional and international levels.

Establish mechanisms for greater accountability and monitoring

There is an urgent need for greater accountability and monitoring of progress on key commitments and financing pledges related to smallholders. In spite of commitments made at the international level, high levels of poverty among smallholder farmers persist. The international community should therefore design a framework for monitoring and reporting on issues relevant to smallholders in the areas of productivity, market access, finance, investment and technology. The accountability framework should include governments, farmers' organizations, civil society organizations, private sector and development partners, including relevant international organizations. Such a framework should establish links between international, regional and national accountability mechanisms.

To make such an accountability framework a reality, a first step could be the strengthening of statistical systems at national, regional and global levels, and establishing appropriate statistical tools to measure the extent to which commitments are met and how they benefit smallholders. This would include an indicator showing ODA that is directed to smallholder farming. In addition, monitoring indicators are needed on issues relevant to smallholders in the areas of trade, finance, investment and technology.

Introduction

The contributions of family farming to food security, poverty reduction and sustainable development were specifically recognized in 2014 when the United Nations General Assembly declared that year the International Year of Family Farming. Building on this momentum, this *Commodities and Development Report* focuses on smallholders. The Report aims at providing a convincing demonstration of the need for devoting more attention and resources to smallholders as a way of achieving the newly agreed Sustainable Development Goals (SDGs) relating to poverty, nutrition, hunger and environmental sustainability. It advocates that smallholders play a key role in the achievement of a more inclusive and socially as well as environmentally sustainable development path at the national and global levels. This Report is timely for three reasons. First, 2015 is a pivotal year for the international development agenda, marked by the final assessment of the Millennium Development Goals (MDGs). Additionally, the Report provides a useful reminder of the importance of smallholders in achieving the environmental sustainability agenda. The Report's insights are also topical in the context of the United Nations Climate Change Conference, COP21 in Paris in December 2015.

Second, concerns about food insecurity following the 2008 food crisis have led to a renewed interest in food security issues. As will be highlighted by the evidence provided in chapter 1, smallholder farmers have long been associated with the achievement of food security. While recognizing the multiple elements that constitute food security, the Report focuses on two of them: food availability and food access. Although the Report might not be of primary relevance to issues of nutrition security and malnutrition – the so-called “hidden hunger” – its thematic analysis would be informative for stakeholders of the United Nations Secretary-General’s initiative, the Zero Hunger Challenge (ZHC) launched in 2012, whose objective is to eliminate hunger during our lifetime. The Report's findings are specifically of interest to two of the five elements of the Challenge, namely, “*The sustainability of food systems*” and “*Attaining a 100 per cent increase in smallholder productivity and incomes.*”

Third, the Report's analysis and policy recommendations regarding the establishment of an enabling environment at the global level are relevant considering the ongoing agricultural negotiations under the Doha Round, including at the 10th WTO Ministerial Conference in December 2015 in Nairobi, Kenya. Moreover, beyond this year's events, the Report seeks to be a useful reference for policymakers and other stakeholders on smallholder issues as they embark on the implementation of the SDGs.

The Report begins by charting the key reasons for choosing to focus on smallholders. To this end, chapter 1 highlights some of the characteristics that define smallholders. It then explains why smallholders are important for inclusive and sustainable development. The Report underscores the major constraints facing smallholders at national and global levels and highlights the relative policy neglect that smallholders have suffered. Chapter 2 follows by asserting why access to markets is important for smallholders, and discusses some of the challenges and opportunities associated with their participation in input and output markets in low-income developing countries. It also offers an analysis of the extent of smallholders' integration into international trade. Chapter 3 builds on the debate and evidence charted in chapter 2, and proposes the contours of a sustainable farming business model, where profit-seeking is emphasized as the main driver of the farming business, with an emphasis on the full integration of social stability and environmental sustainability as the core elements. In addressing these issues, the Report highlights the importance of scaling up investments, both domestic and foreign, in agriculture. This discussion underscores both the potential of foreign direct investment (FDI) in generating a positive impact on agricultural development in developing countries, as well as the lack of adequate safeguards for creating the right conditions for the development of smallholder farming.

Recognizing that smallholders are already indirectly integrated into the global economy, the Report provides policy recommendations to enhance their contribution to sustainable commodities production and trade. Chapter 4 highlights policies that have proved to be effective in addressing constraints on the development of smallholder farming, and offers possible innovative solutions. In the light of its findings, this Report advocates that creating an enabling environment for smallholders at the national, regional and global levels is a necessary condition for ensuring that they are not left behind in the process of achieving the SDGs on poverty and hunger. The Report underlines the need for strong leadership at all levels – domestic, regional and international, particularly with regard to policy clarity and policy alignment across these three levels. Because business as usual is not an option if the SDGs are to be achieved, the Report calls for a mechanism for greater accountability based on the monitoring of progress on key commitments related to smallholders.

Chapter 1: Smallholders in commodity production and trade

This chapter presents the rationale for the Report's focus on smallholders. First, it briefly reviews the characteristics and categorizations of smallholder farmers, and clarifies their definition. Section 2 provides justification for the Report's focus on smallholders, followed by a brief conclusion in section 3.

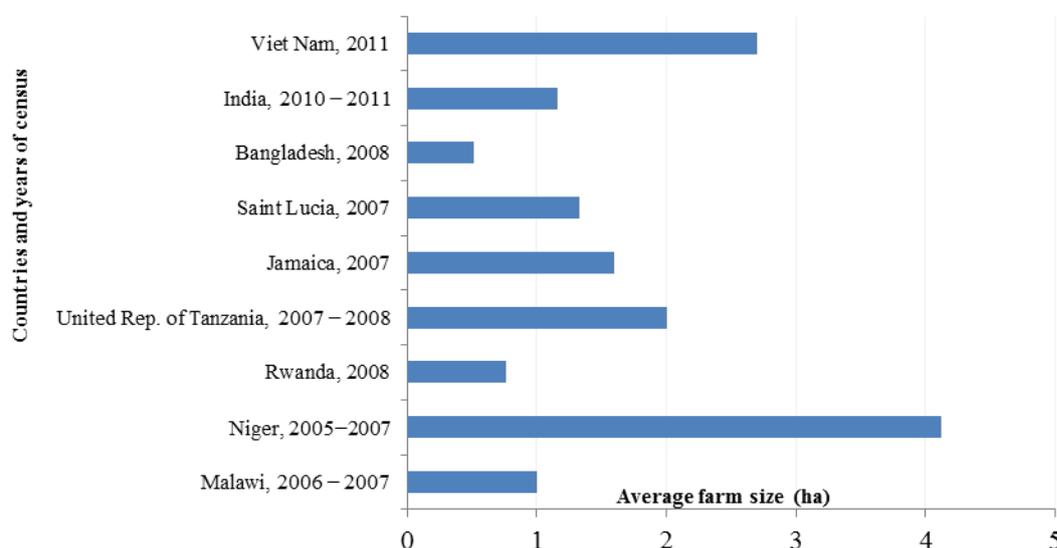
1. Who are smallholders?

1.1 Farm size and market orientation

The multiple ways of defining smallholders reflect the various perspectives from which they can be analysed (Nagayets, 2005). Smallholders are sometimes described as peasants, subsistence or near-subsistence farmers, or owners of family farms, although in practice not all family farms meet the small size criterion. Hence, rather than adopting a standard characterization of smallholders, they are often identified based on a combination of specific characteristics. These include small size, the type of crop(s) they cultivate, utilization of (own) labour, gender division of labour, restricted access to input and output markets and limited financial capacity, including poor access to credit markets. In addition, small farmers use rudimentary technology, and they have limited access to market information (Lipton, 2013; Fafchamps and Hill, 2005).

Though there are strong intercountry and interregional differences in the average size of small farms, it is estimated that more than 90 per cent of the 570 million farms worldwide are managed by an individual or a family, mostly relying on family labour (FAO, 2015). Further, estimates show that 84 per cent of these farms are smaller than 2 hectares, as illustrated in figure 1.1, and they employ, either part-time or full-time, a total of about 2.5 billion people worldwide (IFAD and UNEP, 2013). However, the threshold of farm size considered “small” differs across countries, regions and socio-economic contexts. In Latin America, most average holdings are 20 ha (Berdegue and Fuentealba, 2011). In Brazil, for example, a smallholder can hold up to 50 ha (HLPE, 2013). In Asia and in sub-Saharan Africa (SSA), average farm sizes are much smaller. It is estimated that about 81 per cent of farms in India are smaller than 2 ha (Dev, 2012), compared with 95 per cent in China and 96 per cent in Bangladesh. Such ratios characteristics are common to most Asian countries (IFAD, 2009). There are also instances where the size criterion depends on the crop grown, as in Kenya, where tea producers holding less than 20 ha of land are considered smallholders (Ethical Trading Initiative, 2005).

Figure 1.1: Average farm size (in ha) in selected countries, various years



Source: Data from FAO (see: <http://www.fao.org/economic/ess/ess-wca/wca-2010/countryinfo/en> accessed 10 June 2014).

Smallholders are generally classified based on their market orientation. Smallholders participate in markets either to buy food, procure inputs or sell their produce. They also engage in off-farm work to earn an income that helps them to meet their needs. Their involvement in output markets can take different forms: they may grow a combination of staples and cash crops, or engage solely in cash crop production; or they may produce only staples. Based on their level of market orientation, Wegner and Zwart (2011) distinguish between two types of small farmers: *subsistence* smallholders, whose main objective is to grow food for home consumption; and *small investor* farmers, who are market oriented. Most of them rely on their own seeds or seedlings for planting, and sell a fairly small proportion of their output in markets. Most of their production, especially if it comprises food crops, is used to feed their families, while the rest is sold in local or village markets to meet their requirements for health care, education and sometimes food. A survey by FAO in Malawi, for example, found that in 2007 about 66 per cent of households, mostly smallholders, purchased food in the market only when they could not rely on their own production.

Smallholder classifications also vary across regions. In Asia, three categories have been identified: subsistence, semi-commercial and commercial systems (Wiggins et al., 2011). In Latin America, the three categories of smallholders are: asset-poor smallholders, those with limited assets and asset-rich smallholders. In West Africa, Elbehri et al. (2013) have distinguished the following four categories of smallholders:

- (i) Those engaged in subsistence farming (30 to 50 per cent), who therefore lack access to markets or choose not to participate in them because of high transaction costs and other constraints;
- (ii) Those with limited access to markets (20 to 30 per cent);
- (iii) Those with frequent access to markets (3 to 15 per cent); and
- (iv) Those entirely dedicated to commercial farming (less than 2 per cent).

In this Report, the term smallholder is used to refer primarily to farmers cultivating less than, or about, 2 ha, but also to farmers cultivating larger sized plots that are regarded as small, relative to the median farm size, and displaying one, or a combination, of the characteristics discussed in this section, particularly the use of family labour and limited interaction with input, output and credit markets. Based on the definition of small farms being less than 2 ha, FAO data covering the 2001–2004 period estimate that about 87 per cent of small farms are in the Asia and Pacific region, 8 per cent are in Africa, 4 per cent are in Europe and less than 1 per cent are in Latin America.

1.2 Farm labour

A defining characteristic of smallholders is that they rely largely on own or family labour (Lipton, 2013). There are, for example, about 45 million small farms in Africa, many of which consist of subsistence farmers who rely entirely or partially on family labour (FAO, 2011a). Women account, on average, for 43 per cent of the agricultural labour force in developing countries. There are however, strong interregional and intercountry variations. In 2010, the share of female labour in agriculture varied from a regional average of below 10 per cent in Central America to 50.7 per cent in West Africa and 60.7 per cent in South-East Asia. At country level, estimates range from 0.1 per cent in Hong Kong (Special Administrative Region of China), to 6.1 per cent in Brazil, 7.5 per cent in Malaysia and 93.3 per cent in Burkina Faso. Male labour and youth constitute the other sources of family labour. While available statistics do not provide information on the share of youth in the total labour force working on farms, as discussed below (subsection 2.3), the sustainability of small farming will depend on the extent to which a country's youth will adopt farming as a career option.

2. Why the focus on smallholders?

The Report's focus on smallholders is justified on three main grounds. The first reason is that, although smallholders constitute the majority of the poor, they are a major contributor to national and

global food security. Second, as outlined below, smallholders are key contributors to economic growth. Third, they play a major role in ensuring social and environmental sustainability of the agricultural sector. Despite their social and economic importance, smallholders have suffered from policy neglect over the past few decades.

2.1 Poverty reduction and food security

Global poverty remains a predominantly rural phenomenon, with 70 per cent of the developing world's 1.4 billion extremely poor people living in rural areas, particularly in South Asia and in SSA (FAO, 2011a, based on World Bank data). Several econometric studies show that in countries where rural poverty accounts for the largest share of total poverty, agricultural growth is essential to poverty reduction, and leads to consumption and production linkages in the overall economy (Ravallion and Datt, 1996, 2002; Hazell and Haggblade, 1990). Therefore, in order to achieve the SDG on poverty, it will be necessary to design and implement policies that cater to the needs of smallholders while also generating benefits for the wider economy.

Smallholders manage only 12 per cent of all agricultural land but produce more than 80 per cent of the world's food, in value terms (FAO, 2015). This suggests that, considering their sheer weight in the world's food production, smallholders warrant greater attention and enhanced support. The discussion that follows briefly highlights the historical reasons underpinning the centrality of food security in policymaking, the renewed interest in national and global food security today, both in developed and developing countries, and its implications with respect to the role of smallholders in overall efforts to achieve food security.

Food insecurity and famines are among the issues that can be deemed universal. In Europe, for example, there were three great famines during the nineteenth and twentieth centuries (Curran et al., 2015): the Great Irish famine of 1845–1850, the Great Hunger years in Finland in the late 1860s and the Ukrainian famine of 1932–1933. In Ireland, which had a population of 8.5 million people, there were more than 1 million famine-related deaths with another 2 million people migrating. In Ukraine, famine-related deaths are estimated to have been around 4.5 million people. Accounts of the consequences of these famines are as graphic as the more commonly known narratives and images of famines in the Horn of Africa. Their root causes are to be found in the prevailing political and social structures of the time.

Historically, fears of food shortages prompted efforts to maximize domestic food production. The fear of geopolitically motivated embargoes and trade restrictions of the past when food could be used as a weapon led to mistrust in relying on international markets for national food security. This is in sharp contrast to the global interconnectedness of the food system today. With the advent of surplus agricultural production in contemporary times, the prioritization of food security has tended to be a minor concern in developed countries, with a few exceptions (OECD, 2010). One such exception is that of the United States Government, which considers domestic food production as being part of its national defence policy (see, for example, Le Cuyet, 1977). Similarly, in most Asian countries, food security is a national security issue, and maximizing domestic production of food is explicitly stated as a policy objective. For example, rice self-sufficiency is explicitly stated as an objective in Indonesia, the Philippines, Thailand and Viet Nam (Dawe, 2013).

The 2008 food crisis, by generating a number of protectionist measures in net food exporting countries, thus threatening the provision of food to net food importing countries, refocused attention on food security both at the national and global levels. At the national level, many governments in both developed and developing countries revamped their food security policy, giving centre stage to smallholders. These new developments prompted country members of the Organisation for Economic Co-operation and Development (OECD) to hold an Agriculture Ministerial Meeting in 2010, the first since 1998. That meeting considered the global context of population growth, increasing demand for some food items due to changing diets, climate change and pressure on land, water and other natural resources. Its participants acknowledged the need to rethink food security policies based on an integrated approach comprising a mix of domestic production, international trade, stocks and safety nets for the poor. They also acknowledged the importance of making food systems sustainable and the need to ensure farm households' access to risk management tools (OECD, 2010). In addition, the

adoption of the Common Agricultural Policy 2014–2020 by the European Union led to reforms that include a number of new provisions such as top-up payments for young farmers, simplified payment procedures for small farmers and the allocation of 30 per cent of direct payments conditional on demonstrating sustainable and ecological farming practices (OECD, 2014).

Countries in Asia, Latin America and Africa have explicitly considered smallholders in their food security policies. East and South-East Asia, where most of the world's smallholders live, have been the most successful subregions in achieving the target of MDG-1C on reducing hunger. Their success has been attributed to a more inclusive process of economic growth, rapid productivity growth in agriculture, increased food availability and improved access to food for the rural poor (FAO, 2015). In sub-Saharan Africa, where agriculture is also dominated by small family farms, only countries that have managed to secure agricultural productivity gains have succeeded in reducing undernourishment. For example, out of the 18 sub-Saharan countries that have achieved MDG-1C, Angola, Benin, Ethiopia, Gabon, Ghana and Mali have seen their labour productivity in agriculture increase by 69 per cent between 1990-1992 and 2012 (FAO, 2015).

With regard to Latin America, most countries have achieved high levels of food security with the exception of the Caribbean countries. An examination of existing national food security policies across the region shows four approaches taken to support smallholders (Piñeiro et al., 2010). The first comprises public actions directed at providing support to small family farms through technology transfer and measures aimed at increasing agricultural production and the monetary income of small farm units. The second consists of procurement contracts between public agencies and small farms for public food distribution and direct feeding programmes. The third comprises measures aimed at supporting the development of off-farm activities by small farms, such as small businesses, in order to diversify their sources of income. Fourth, many countries have acknowledged the need to support smallholders through customized social protection schemes linked to family farming. The Brazilian experience outlined in box 1.1 provides a valuable insight into the integration of small farms in food security policy elevated as a mainstream government policy.

Box 1.1: Small farmers in Brazil's Zero Hunger Programme

Upon his election in 2003, President Lula appointed an Extraordinary Ministry for Food Security and Combating of Hunger to coordinate issues related to food policy across all Government ministries. The resulting Fome Zero programme is what President Lula now considers to be his true legacy. It consisted of over 30 complementary programmes that cut across structural policies, as well as specific and local policies, designed to address the immediate and underlying causes of hunger and food insecurity. Specific measures included the rebuilding of food security stocks and the re-establishment of key institutions and policy mechanisms that had been previously dismantled.

In recognition of the fact that family farms produce the bulk of the food consumed daily in Brazil, new policy tools were designed to support them. They included a credit programme and allowing farmers the possibility to sell their produce directly to the government without having to go through a tender process and at prices close to market prices. In addition, under specific conditions, they could receive advance funds for sowing seeds to stimulate food production. Other support measures included the construction of water supply infrastructure and underground dams.

By mid-2006, some of the major achievements of the Zero Hunger Programme included the following: a renewed presence of the Federal Government in the smallholder farmers' environment; providing farmers with the opportunity to sell their surplus produce at market prices; offering incentives to farmers to organize themselves into cooperative groups; increased production and diversification of better quality food for self-consumption; a substantial increase in funds earmarked for extending credit to farmers, including funds from extra budgetary sources, resulting in almost 2 million small farmers gaining access to credit, more than 700,000 of whom for the first time in their lives; an expansion of the scope and scale of harvest insurance programmes for family farming; an expansion of programmes for procurement of produce from family farms.

Sources: Delgado et al., 2005; Graziano da Silva et al., 2011; and former president of Brazil Lula da Silva's video message at Expo Milano, 2015.

Although large farms remain the predominant agrarian structure in Latin America, and despite the spread of contract farming dominated by transnational corporations (TNCs), most national food security frameworks pay due attention to smallholders. In Brazil, for example, where a dual agricultural system exists, small farms cover about a quarter of the country's total agricultural area, while large corporations control three quarters of the land. Nevertheless, smallholders produce 87 per cent of the country's cassava, 70 per cent of its beans, 46 per cent of its maize, 59 per cent of pork, 58 per cent of all milk and 50 per cent of chicken (IBGE, 2009; Swensson, 2015). The size of a smallholding in Brazil is slightly smaller than the sub-continental average of 20 ha, and therefore much larger than the 2 ha definition used in this Report. Countries with smaller farm sizes should encourage those units to form cooperative groupings to allow them to reach minimum scales for more efficient production.

Reasons for the survival of smallholder farming despite difficult conditions vary across countries. However, the strategic importance given to smallholder farming in achieving food security objectives is often justified on the premise that the small farming model is not driven solely by profit maximization. Small farms generally are the outcome of a combination of various natural factors and social structures that value farming and are heavily dependent on family labour; therefore they are not always affected by labour market prices. In addition, owing to the cultural value given to household self-sufficiency in rice, as in most rural areas in South-East Asia, political leaders in those countries tend to give high priority to family farming in national development plans. This complex web of factors has led smallholders to become major contributors to world food production, showing resilience that has allowed them to produce even in the most difficult circumstances.

At the global level, social unrest resulting from food shortages has reignited awareness of the impact of food insecurity and poverty on international migration flows, and more generally on global security. The importance given by the United States Government to investment in food security has become emblematic of this approach. Its policy discourse emphasizes that investments in global food security are worthwhile, as the benefits far exceed the costs of the consequences of inaction.¹ As the main operational arm of this strategy, the Feed the Future initiative of the United States Agency for International Development (USAID) became the vehicle for implementing this vision with the objective "to unleash the proven potential of small-scale agricultural producers to deliver results on a large scale." As the programme is set to continue, along with the passage of a Global Food Security Act, smallholders and their role in ensuring global food security will remain in the limelight, at least in United States foreign policy.

Smallholders will continue to play a key role in the attainment of global food security objectives. The latest estimates show that feeding a world population of 9.1 billion people in 2050 would require raising overall food production by some 70 per cent between 2005-2007 and 2050 (FAO, 2015). Production in developing countries would need to almost double. This implies significant increases in the production of several key commodities. Annual cereal production, for instance, would have to grow by almost one billion tons. The attainment of this objective should not be taken lightly, as the food crisis of 2008 reminded governments the world over. At the same time, efforts to achieve food security will need to fulfil environmental and social sustainability objectives.

2.2 Economic growth

In addition to contributing to food security, smallholders make rational economic choices, responding to incentives and contributing to economic growth. In what follows, the evidence of smallholders' productivity is discussed as well as their role in their countries' export sectors despite the challenges they face. A fuller treatment of the latter is provided in chapter 2.

¹ As stated by Joe Biden, Vice President of the United States, "Investments made to ward off food insecurity and prevent its recurrence can prevent the vicious cycles of rising extremism, armed conflict, and state failure that can require far larger commitments of resources down the road." [<https://blogs.state.gov/stories/2011/10/28/food-security-contributes-national-security>]

2.2.1 Farm productivity

Small farms are productive economic entities that contribute to agricultural growth. Though the extent of their contributions has already been established in section 2.1 above, recognition of their ability to be productive can be traced back to the recurrent debate on small farms versus large farms in fostering agricultural growth and consequently economic development. There are two strands in this debate. First, a number of quantitative analyses attempting to establish that farm size is a determinant of agricultural outcomes reach inconclusive results. In this regard, the diversity in the characteristics of crops and value chains across countries and regions reveals that there is no systematic relationship between farm size and yields. Second, an examination of past agricultural policy choices shows that they mostly reflected the prevailing political ideology and socio-economic structure of the time. This subsection briefly reviews these three strands of the literature.

Though puzzling to many sceptics, a number of empirical studies reveal the existence of an inverse relationship between farm size and productivity. They show that *ceteris paribus*, smaller farms have higher yields than larger farms. This has been one of the most astonishing facts in development economics. Further to Chayanov's discovery of the existence of an inverse relationship between farm size and productivity among Russian farms (Chayanov, 1926), in what is generally considered as a seminal work on this topic, Sen (1962) noted that small Indian agricultural households were also much more productive than their larger counterparts. A similarly inverse relationship has been found across regions and over many decades of econometric studies: in Africa (Collier, 1983; Barrett, 1996; Kimhi, 2006), in Asia (Carter, 1984; Heltberg, 1998; Akram-Lodhi, 2001; Benjamin and Brandt, 2002; Rios and Shively, 2005), in Europe (Alvarez and Arias, 2004) and in Latin America (Berry and Cline, 1979).

Many reasons have been suggested for the persistence of the inverse relationship. First, small farms are more productive than large ones because of the lower real cost of labour on small farms than the wage rate on large farms (Sen, 1966). In the same vein, it has also been shown that small farms have lower unit transaction costs (per ha and per unit of output) because they operate in labour surplus and capital-scarce rural areas and incur lower costs for training and supervision of family labour. They also benefit from the flexibility of family labour that can be adjusted to seasonal needs and variability of production (Lipton, 2013). On family-operated small farms, in particular, monitoring of labour and moral hazard are either negligible or better handled (Lipton, 2013; Deininger and Byerlee, 2012). Second, imperfections in the land market and the absence of insurance markets might result in the adoption of different risk management strategies by households that own small farms and those that own larger ones. As owners of small farms are more likely to be net buyers of staple crops, they tend to oversupply labour on their own farms in an attempt to be less exposed to price fluctuations when buying from markets in contrast to owners of large farms (Barrett, 1996). Another factor explaining the inverse relationship is the higher index of cropping intensity² and diversity among small farms (IFAD, 2009).

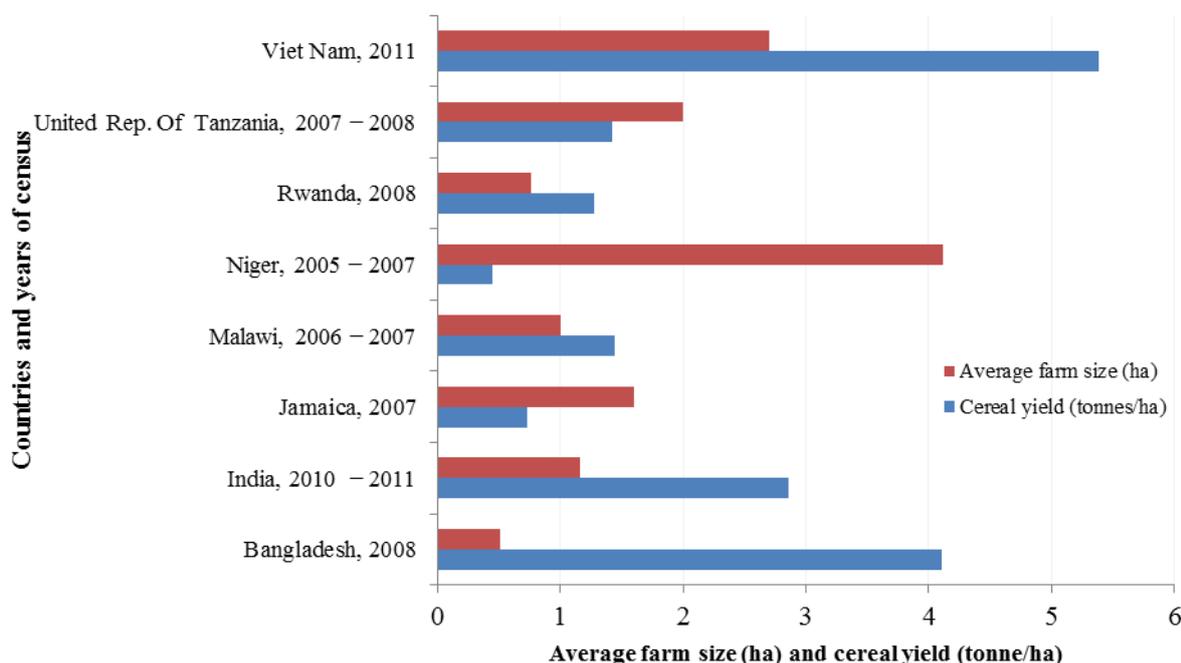
Sceptics of the robustness and the consistence of econometric results that show the inverse relationship between farm size and productivity usually argue that those results are undermined by econometric problems such as omitted variable bias (e.g. soil quality is not sufficiently disaggregated, as studies that combine geophysical data with household survey data are scarce) and measurement errors related to estimates of farmers' landholdings. Furthermore, other studies, building on Sen's work, underpin the role of multiple factor market failures in generating the inverse relationship. As part of this strand of the literature, a study based on data from Madagascar used a model that took account of both detailed soil quality characteristics and household fixed effects recently found that soil quality was not a significant explanatory variable.

² Cropping intensity is the number of times a crop is planted per year in a given agricultural area. It is the ratio of effective crop area harvested to the physical area.

Furthermore, it showed that only about a third of the inverse relationship could be explained by market failures, whereas a large part of it could be explained by measurement errors or allocative inefficiency within households (Barrett et al., 2010).

The measurement hypothesis could be supported by examining country data on farm size and yields. It shows that the relationship between them varies greatly (figure 1.2). In 2012, for example, the cereal yield in the United Republic of Tanzania was 1,314 kg/ha for an average farm size of 2 ha. In 2008, in Bangladesh the average farm size, which was only 0.51 ha, had a higher average yield of 4,100 kg/ha. In Brazil in 2013, where the average small farm size is slightly smaller than 20 ha, the average cereal yield was 4,598 kg/ha. To conclude, while lending support to the existence of the inverse relationship between farm size and productivity, empirical evidence is inconclusive as to the factors that drive such a relationship.

Figure 1.2: Farm size and cereal yields in selected countries and years



Source: Data from FAO, *FAOSTAT* and World Bank, *World Development Indicators*.

Agricultural policy design in developing countries does not appear to have been influenced by the two contrasting views of small and large-scale farms. In practice, these farms coexist in various regions of the world mostly due to historical and pragmatic reasons (Deininger and Byerlee, 2012).

The second set of issues requiring attention in order to understand farm productivity revolves around the role of governments' policy choices in charting countries' agricultural development. In Latin America, land abundance and the policy environment have led to the development of large-scale farms (Berdegué and Fuentealba, 2011). Though the large majority of farms in the region are still family owned, business models have become complex and usually consist of integrating operational units into "superfarms". Two main reasons explain this trend. First, the need for labour supervision has been drastically reduced as a result of increased mechanization, such as the use of tractors and combine harvesters, in large farms. The latter are also better than small ones in handling integration into supply chains and certification of products, which are increasingly becoming a requirement in international trade (Deininger and Byerlee, 2012). The Cerrado region in Brazil, for example, where the median farm size is 1,000 ha, but many farms are a hundred times bigger (Deininger and Byerlee, 2012), has been lauded as a model of successful commercial agriculture (Collier, 2008). However, a closer analysis of the Brazilian experience reveals the dual structure of the country's agricultural system, as described above.

In contrast to the Latin American model, the Green Revolution in Asia, characterized by high production of food staples between 1965 and 1990, was driven mostly by smallholders (Lipton,

2013). Government policies led to rapid advances in agricultural sciences and to substantial public investment and policy support for agriculture, including through increased availability and adoption of appropriate technologies. As a result, the increase in the production of all three major cereal crops, namely rice, wheat and corn, was mainly due to yield growth. Smallholders' prominent role was made possible by a series of government interventions that specifically facilitated their market participation through the provision of rural infrastructure including transport, irrigation, agricultural research and extension services (Hazell, 2009). As already noted, today, agriculture in Asia is still mostly undertaken by small farms. Moreover, in contrast to developments in Latin America, the prevailing trend in Asia has been that of declining farm size as evidenced by China, India, Pakistan and the Philippines (IFAD, 2009).

In Africa, farm sizes have been largely the outcome of government policies during the colonization and decolonization eras, especially in the case of Southern Africa (Jayne et al., 2010). In the immediate post-independence period, a few countries such as Ghana, Nigeria, Sudan and the United Republic of Tanzania experimented with large-scale, and in some cases socialist-type, farms. However, these experiments failed. In the United Republic of Tanzania, the advent of a socialist regime in 1967 led to an environment that became less favourable to private ownership, especially of large-scale coffee farms (Barkan, 1994).

The second strand of the literature on farm productivity in developing countries documents the variation in the average size of farms according to crops, and illustrates the underlying complexity hidden behind the averages. In South-East Asia, for example, large farms dominate the palm oil value chain in Indonesia and Malaysia (Deininger and Byerlee, 2012), and enjoy strong government support, whereas small farms remain widespread in the rubber sector where high labour intensity is the norm. Again, the diversity in the characteristics of the value chains of different crops does not permit generalizations.

To conclude, small-scale farming remains the dominant characteristic of agriculture in much of the developing world. Existing evidence does not support those who believe that large-scale farming is associated with higher productivity. Most attempts to establish a systematic causal relationship between land size and productivity have led to inconclusive results, thus making it difficult to derive generic policy implications. And yet, until recently, neither governments nor the international donor community recognized the significant contributions of smallholders to agricultural development, in particular, and to economic development in general. This was exacerbated by the poor quality of data on the number of smallholders, their contribution to total agricultural production and GDP, and their share in labour force participation. While this Report focuses on small farmers, it should not be construed as suggesting that large farms do not have a place in developing countries' agricultural systems.

2.2.2 Smallholders' contribution to export sectors

Smallholders are the backbone of several commodity-dependent developing countries' agricultural sector in Africa, Asia and parts of Latin America. The discussion so far has shown that in Asia and SSA, they provide much of the food consumed. They also contribute to the export of tropical agricultural products such as cocoa, coffee, tea, rubber and palm oil, among others. For example, in Ghana, 90 per cent of its cocoa is grown by smallholder producers cultivating on farms of 2–3 ha. The country is the second largest exporter of cocoa after Côte d'Ivoire and its cocoa exports account for about 30 per cent of its foreign exchange earnings and for 8 per cent of its GDP (FAO, 2013).

In the past two decades, several countries have diversified into non-traditional, high-value exports of horticultural and floricultural products, in several cases under “contract farming” arrangements with TNCs. This has provided additional opportunities for some smallholders to increase their incomes, thereby helping to alleviate poverty, in particular because the value per unit, or weight, of these products is much higher than that of traditional tropical products. A successful case, often cited, is that of the palm oil industry in Indonesia, where contractual arrangements between palm oil companies and smallholders are enforced by the Indonesian Government. Overall, the experience seems to be positive as the companies provide quality seeds and introduce better planting techniques that increase

smallholders' productivity (Cahyadi and Waibel, 2011). Participating smallholders appear to be better off in terms of income than those who do not participate in contract farming. Other studies also suggest that productivity, quality and income gains can accrue to smallholders engaged in contract farming (Agar and Chiligo, 2008; Barrett et al., 2012). However, there are challenges associated with contract farming, particularly the prevalence of a higher debt burden among participants relative to non-participants and considerable environmental damage due to the cutting down of forests to make way for these crops.

Being more labour-intensive (about two to four times) than cereal crop production, horticultural production has created a relatively large number of jobs in several developing countries. A review of cross-country data on the average number of labour days spent per ha, for example, show that in the Philippines, producing cereals requires 93 labour days, but it takes 185 labour days to produce vegetables, whereas in Cambodia, farmers need 81 labour days to produce cereals compared with 437 labour days to produce vegetables (Weinberger and Lumpkin, 2007). Thus horticultural production provides greater opportunities for hiring additional labour mainly from among smallholder farmers and landless labourers. As a result, in countries such as Bangladesh, Kenya and Senegal, net farm incomes per family member have increased for households participating in horticultural exports.

Despite these positive outcomes, however, diversification into non-traditional export crops is still hampered by non-tariff measures, including increasingly stringent health, safety and quality standards, which are challenging for smallholder farmers who have limited assets and capacities. Also, the number of farmers taking advantage of these opportunities is small relative to the total number of smallholders. Furthermore, these diversification schemes are not without controversy, as some of the new crops compete with food crops for the same resources such as land, water and labour.

The example from Indonesia shows that smallholders respond to market incentives, and are active participants not only in their local markets, as discussed earlier, but also in global ones. However, access to the latter markets has been far more challenging for them due to a variety of constraints discussed in chapter 2. Removing, or at least easing, those constraints could help increase the contribution of smallholders to trade (domestic and international), economic growth and poverty reduction. Additionally, linking smallholders to global markets should increase the share of ecological products in global agricultural trade while helping to foster environmentally sustainable indigenous knowledge systems.

2.3 Social and environmental sustainability

The labour intensity of small farms makes them a key contributor to social stability as they create more jobs than large, high-tech farms. However, the sustainability of family farming depends on the extent to which youth will embrace agriculture as a career option. As such, the reliance of smallholder farming on family labour makes it vulnerable to current demographic trends. The emerging literature on the future of farming highlights mixed evidence on the attractiveness of agriculture for youth (see Juma, 2007, for the United Republic of Tanzania, and Tadele and Gella, 2012, for Ethiopia). Findings on the aspirations of about 1,500 people in 23 rural, urban and peri-urban communities in low- and middle-income countries of Asia (Bangladesh, Indonesia, Pakistan and Viet Nam), Africa (Burkina Faso, Ethiopia, Kenya and Zambia) and Latin America (Bolivia and Guatemala) in 2012 show that young people tend to have a negative attitude towards agriculture due to the numerous constraints facing smallholders in rural areas, as discussed in chapter 2 (Leavy and Hossain, 2014). As a result, young people in rural areas tend to abandon agriculture and move to cities, thereby threatening the medium and long-term development of the agricultural sector. Moreover, the experience of countries such as Tunisia and Egypt during the Arab Spring uprisings has shown that the growing numbers of unskilled young people in urban and peri-urban centres represent a risk to social stability.

And yet, the underdevelopment of agriculture in many developing countries could be viewed as a source of future business opportunities. If the major challenges facing agriculture were to be overcome, skilled young people could be attracted to the cash crop and food production sectors, as in China (Sanders, 2006). The attractiveness of being self-employed, coupled with higher agricultural commodity prices, has created an interest in agribusinesses, including among urban youth. In addition, some initiatives have been taken to attract youth to agriculture. For example, in March 2015, the first

edition of the National Youth Agric Festival was held in Abuja, Nigeria. Prior to the event, a campaign was launched to change the negative image of young people working in agriculture, who are considered to be poor and illiterate, by promoting a modern image of agribusiness entrepreneurs.

Smallholders also play a key role in making agriculture conform to environmental sustainability objectives. The close relationship between farming and environmental sustainability suggests that smallholders need to include environmental and ecological considerations in their investment decisions. Due to their limited use of chemicals in farming compared to larger farms, smallholders are considered to be the guardians of ecological and environmental sustainability at the local level. They also typically rely on traditional knowledge when predicting the weather. However, this has become increasingly difficult due to climate change, as seasons follow a more irregular pattern, and droughts, floods and storms have become more frequent. In addition, the incidence on agricultural production of water stress, soil erosion and infestations has increased. In addition to the evidence provided by agricultural institutions, the impact of climate change on agriculture and the importance of local, community-based knowledge have both been substantiated in scientific reports of the Intergovernmental Panel on Climate Change (IPCC, 2012 and 2013). Recent findings of the IPCC on climate change and agriculture based on the contribution of Working Group I to the Fifth Assessment Report of the IPCC show that climate change and extreme weather events will have greater impacts on sectors linked to natural production, such as agriculture and forestry. Clear links have also been established between the ability of the agricultural systems to adapt to these impacts and their potential consequences for food security. The IPCC's Special Report (2012) further asserts that there is high confidence that changes in climate have the potential to seriously affect water management systems.

In light of these findings, it is critical that smallholders adopt environmentally friendly farming practices; they should not replicate the experience of some countries in Asia and Europe where overuse of fertilizers has resulted in pollution and degradation of natural resources. China's agricultural production system, for example, has had negative impacts on the environment through its pollution of natural resources (Li et al., 2013). According to estimates, agriculture accounts for more than 15 per cent of China's total greenhouse gas (GHG) emissions and for nearly 90 per cent of its nitrous oxide emissions, largely due to excessive fertilizer use (Wang et al., 2010). To combat high fertilizer use, the Government has been promoting technology aimed at calibrating fertilizer dosages according to soil characteristics.

Public awareness of the environmental impacts of agricultural activities has created new opportunities and incentives for smallholders to invest in higher quality and environmentally and socially responsible organic agriculture. Various studies have shown that, in addition to the positive impact on the environment, organic production can be as productive as agriculture based on the use of synthetic fertilizers. Moreover, many organic produce fetches higher prices. However, despite the existence of a niche market for organic products, there are high costs in tapping this opportunity, particularly the costs associated with organic certification. Reducing those costs and alleviating other structural constraints would therefore be required on order to enable smallholders' to seize opportunities linked to this niche market.

2.4. Policy neglect

For a long period, development policies were guided by a development paradigm that tended to favour urban economic activities at the expense of agricultural development, including smallholders (Cooper, 2002; Lipton, 2005). The consequent biased allocation of public resources in favour of urban areas led Michael Lipton to coin the phrase "urban bias" in 1977. Subsequently, the introduction of SAPs in the 1980s and 1990s marked the end of the provision of services to smallholders by crop marketing boards in several countries. And in the post-liberalization period, many smallholders have been left to fend for themselves, as the private sector in their countries has not been able to take over effectively and efficiently the services performed by State-owned crop marketing companies. An Independent Evaluation Group (IEG) report on the World Bank's lending to agriculture in SSA over the period 1991–2006 observed that under marketing reforms the private sector failed to fill the vacuum left when the public sector withdrew, and that projects had not been successful in promoting private sector participation in seed promotion. It concluded that results fell short of expectations

because of “inadequate background analytical work, weak political support and insufficient appreciation of the systems’ incentives” (Independent Evaluation Group, 2007). This candid acknowledgement by the very institution that pushed for the dismantling of cash crop commodity boards may be considered an indirect recognition that the measures promoted under SAPs made agriculture, and hence small farmers, particularly in Africa worse off than before the introduction of SAPs.

Despite the recognition of higher poverty levels amongst smallholders and the structural constraints that they face in many parts of the developing world, there has been little policy response to address these issues. In addition, ODA flows to agriculture fell drastically between 1979 and 2004 (World Bank, 2007) before rising again over the last decade (OECD, 2015). Until 2006, this benign policy neglect was exacerbated by the poor quality of data on smallholders, resulting in a lack of understanding of their true contribution to total agricultural production and GDP, and of their rate of participation in the labour force. Available survey data on the characteristics and contributions of smallholder farmers were too limited, and hence could not be extrapolated to a wider sample of countries. The situation has since then partially improved.

3. Conclusion

The analysis in this chapter points out that, considering their contributions to food security and economic growth smallholders have the capacity to achieve higher productivity and efficiency, and an increased engagement with markets. Their sheer numbers should have warranted a higher allocation of public resources, but despite this and the relative policy neglect, smallholders have so far displayed a high level of resilience. However, considering the increasing threats linked to climate change, the growing scarcity of natural resources, the demands of competitiveness on world markets and the range of constraints (analysed in greater details in chapter 2) smallholders deserve urgent policy attention both at the national and global levels. As highlighted in the following chapters, given the emergence of a number of agriculture-related initiatives in recent years and growing signs of a turnaround in the situation of smallholders, there is reason for optimism for their future growth and development.

Chapter 2: Smallholders' integration into markets

As established in chapter 1, the majority of smallholders in developing countries derive their livelihoods from farms of less than 2 ha, on average. Even though they account for a major share of the world's food production, many of them are poor and food insecure subsistence farmers. The chapter's analysis also showed that empowering smallholders is good for the development of agriculture, which in turn contributes to economic growth and poverty reduction. With this background, this chapter aims to contribute to a better understanding of the state of smallholders' integration into domestic, regional and international markets. It argues that smallholders' integration into the international trading system can be welfare enhancing if market imperfections are corrected.

Smallholders' participation in markets is gauged by analysing the extent to which they interact with input and output markets. The chapter begins with a brief account of why market integration matters for smallholders (section 1), followed by a review of the impediments to the efficient functioning of rural markets (section 2). Specific challenges to accessing input markets are then examined (section 3) as well as those related to output markets at the domestic, regional and international levels (section 4). The discussion underscores the significant role played by high transaction costs in limiting smallholders' participation in markets. The chapter's analysis is complemented by an econometric modelling exercise that establishes the extent of integration of smallholders into specific supply chains. Using prices as the main transmission mechanism and accounting for domestic trade and economic policy changes, the modelling exercise also assesses the impact of developments in international commodity markets on smallholders' well-being. Section 5 concludes.

1. Why market integration matters for smallholders

Understanding the determinants of smallholders' participation in markets has important policy implications. Yet the causes of their limited market participation have long been misunderstood by academics and policymakers alike. For a long time, a large body of the literature on peasants explained the specificities of peasant behaviour and their motives by postulating that they are not utility maximizers. A strand of economic anthropology stated that, where markets exist they are solely a ritual process, not an economic activity (Malinowski, 1921). Going one step further, economic anthropologists of the substantivist school, such as Polanyi, rejected the validity of using formal economic analysis based on optimization behaviour. Polanyi (1944) argued that in "primitive" societies the welfare of the community was a priority for the individual. It was not until the formalist approach judged the anti-market mentality to be obsolete (Firth, 1946; Cook, 1966) that formal economic analysis was applied to peasant behaviour based on the recognition that peasants also participate in markets.

As a departure from these perspectives, while also recognizing the specific characteristics of the social and cultural environments of farmers in the developing world, development economists believe that smallholder commercialization stimulates better use of resources according to their comparative advantages, hence leading to an increased diversity of marketed commodities and specialization in production (Pingali and Rosegrant, 1995; Kurosaki, 2003). Cash crop production by smallholders is part of a broader strategy of comparative advantage whereby markets allow households to increase their incomes by producing whichever crops provide the highest returns to land and labour. The resulting cash is then used to buy consumer items that households need but cannot produce (Pingali, 1997). Market integration and better functioning of markets are expected to result in improvements in productivity, post-harvest processing and distribution systems. Notwithstanding these potential benefits, it is also recognized that in the context of imperfect markets and high transaction costs, many smallholders are unable to exploit the expected gains from commercialization (de Janvry et al., 1991; Key et al., 2000).

It is generally agreed that transformation from subsistence to more market-oriented agricultural systems is a necessary condition for smallholders to move out of poverty and achieve food security (von Braun, 1995). Deeper market integration of smallholders is considered an important means of achieving these two objectives. However, smallholders' decision to participate in markets depends on

their capacity to meet minimum production requirements, both in terms of quantities and product standards; it also requires that expected profits will be large enough to encourage them to produce. Smallholders' capacity to produce a marketable surplus is in turn a function of a combination of factors. First, it is dependent on their ability to access, both physically and financially, markets that supply productive technologies and a range of adequate inputs and services. Second, there needs to be public investments in technological progress, as well as in institutional and physical infrastructure. Third, the degree and manner of smallholder organization matter. And finally, small farm households' private asset endowments play a key role in stimulating their market participation. Once surplus produce is available for sale, smallholders assess the importance of the transaction costs associated with market participation. These include transport to output markets, the opportunity cost of time spent selling the produce and searching for the best price, the risk associated with market price fluctuations and other possible costs that vary among small farmers.

2. Impediments to well-functioning rural markets

Well-functioning rural markets help farmers to achieve productivity growth, which is a key determinant of agriculture's contribution to economic growth. However, in many developing countries small-scale farmers face a wide array of challenges that ultimately hinder their productivity. This section analyses the current state of rural infrastructure, which is a major constraint, including its impact on post-harvest losses. It also investigates other significant impediments to the proper functioning of rural markets, particularly the limited access of smallholders' to market information and the existence of gender inequalities.

2.1 Poor state of rural infrastructure

Rural infrastructure has a strong impact on smallholders' productivity, access to markets and marketing costs, and hence the profitability of their farming businesses. In many developing countries, weak or non-existent infrastructure constitutes a major bottleneck for viable smallholder farming businesses. In particular, the poor state of transport infrastructure in many countries means that smallholders face high transport costs, especially during the rainy season when rural roads become barely usable, preventing farmers from seeking alternatives to farm-gate sales (Prudencio and Ton, 2004). For instance, a study of the East African regional maize market and marketing costs (World Bank, 2009a) found that transport charges averaged up to 76 per cent of total marketing costs in Kenya, Uganda and the United Republic of Tanzania. Transport prices per ton/km from farm gate to primary markets are 3–5 times higher than those from secondary to wholesale markets located in those countries' capital cities.

The high transport costs prevent smallholders from exploring marketing opportunities at the national and regional levels. In West Africa, for example, only 3–15 per cent of smallholders have frequent access to markets and less than 2 per cent are totally dedicated to commercial farming. In Southern Africa, it is reported that only 20–35 per cent of smallholder farmers have frequent access to markets (Jayne et al., 2002). Moreover, in many instances, smallholders use public transport, usually passenger buses, to take their produce to distant markets. This inadequate mode of transport often leads to bruising and damage to the produce, which is generally poorly packaged, thus reducing its quality. This problem becomes more acute as the distance from the farm to the market increases. Hence, smallholders are often forced to sell their produce at lower prices when they finally get to the market.

In addition to the insufficient transport infrastructure, limited access to storage facilities and unreliable electricity supply result in post-harvest losses. Most farmers often rely on open-air storage, as other storage facilities, such as sheds and stalls, are lacking in village markets. Hence, they have no other choice than to sell their produce, sometimes at significantly low prices, before it rots. Some smallholders fail to sell even at discounted prices, leading to significant losses. The degree of this loss depends on the crops and the nature of value chains. According to the Institution of Mechanical Engineers (2013), poor harvesting practices, unsuitable storage and inadequate local transportation are the main causes of waste of large quantities of agricultural commodities in least developed countries

(LDCs). For example, post-harvest grain losses in SSA are estimated to have reached nearly \$4 billion a year in 2005–2007, out of an estimated annual value of grain production of \$27 billion during that period (World Bank, Natural Resource Institute and FAO, 2011). Recent analyses, however, suggest that estimates need to be considered with care. Indeed, recent findings suggest that previous research is likely to have overestimated such losses. A careful meta-analysis by a multidisciplinary team of African and international post-harvest experts, based on a survey of hundreds of previous studies on the subject covering a wide range of commodities in six African countries in West, East and Southern Africa, detected serious ambiguities in the methodologies previously used. For instance, analysing the often-used example of maize, the authors found that the magnitude of losses was between 4 per cent and 21 per cent, well below the 40–50 per cent loss frequently cited (Affognon et al., 2015). Similarly, using household survey data and focusing on on-farm post-harvest losses, Kaminski and Christiaensen (2014) found that similar losses were between 1.4 per cent and 5.9 per cent of the national maize harvest in Malawi, Uganda and the United Republic of Tanzania. They also found that such losses were concentrated among less than a fifth of households.

Regardless of differing estimates of the extent and the value of post-harvest losses, the resulting low returns on farming investments may discourage many farmers from engaging with markets, and retreating into subsistence farming or off-farm activities instead. Mitigation technologies vary by product. For perishable fruits and vegetables, introducing and maintaining cold storage facilities in rural areas is challenging in most low-income countries because of the high capital investment needed, unreliable electricity supply and lack of maintenance. The absence of a domestic cold-chain infrastructure also limits the possibility of smallholders to participate in regional and international value chains.

Irrigation is another central determinant of agricultural productivity as well as a catalyst for integration into formal supply chains. Studies based on Indian data, for example, found that the influence of irrigation on productivity is above and beyond its value as an input (Rosegrant and Evenson, 1995). The spread of irrigation facilities varies across developing countries. According to the World Bank (2007), only 4 per cent of the production area is under irrigation in SSA, compared with 39 per cent in South Asia and 29 per cent in East Asia. Research at the International Food Policy Research Institute (IFPRI) has found that Africa's agricultural productivity is the lowest in the world, in part because of the underuse of irrigation in sub-Saharan Africa (You et al, 2010). There are ample water resources, but they remain untapped. Moreover, poor water control systems and a lack of irrigation infrastructure limit the size of the continent's arable land by keeping potentially arable land unproductive. In the Caribbean, many small farmers are exposed to the potential risk of crop loss and poor pasture performance due to drought conditions, hurricanes and floods (Graham, 2012). Climate change and competition with industries and city habitants for the use of groundwater further aggravate the situation. In addition, insufficient irrigation not only undermines smallholders' production potential; it also reduces their opportunity to integrate into the formal supply chain, as the quality and consistency of their products cannot be ensured. Hernández et al. (2007) suggest that good irrigation infrastructure enables farmers in Guatemala, for example, to sell their tomatoes to supermarket chains, because it allows them to supply their produce throughout the year, and achieve greater productivity and consistency.

2.2 Limited market information

Access to agricultural markets and marketing information systems (MIS) is generally credited with increasing the efficiency of marketing systems and for promoting price formation. An FAO survey conducted in 1995-1996 in 120 developing countries found that only 53 governments had MIS, and that most of those systems functioned poorly (Shepherd, 1997). Despite their poor functioning, there is evidence to suggest that access to market information does make a difference to smallholders' income. A study in the United Republic of Tanzania, for example, showed that farmers with better access to market information through the use of ICTs tend to sell a lot more and receive relatively better prices than other farmers (Mwakaje, 2010). Similarly, a study of the coffee sector in Uganda found that smallholders selling organic coffee failed to get a better price for their produce due to their lack of market information (Ferris and Robbins, 2004).

Marketing information systems are a mix of government and private efforts and public-private partnerships. Commodity exchanges are part of these endeavours. Several African countries initiated commodity exchanges with two objectives: as a means of improving the access of farmers to markets and for guaranteeing better prices. Unlike in other developing and emerging economies, many of these exchanges have now collapsed or are not functioning as expected (box 2.1). The reasons for this include weak transport and lack of storage infrastructure, a low volume of transactions due to limited participation or thin markets, a low level of liquidity due to limited or lack of involvement of financial institutions (Sitko and Jayne, 2012) and an absence of strong farmers' associations.

Box 2.1. Commodity exchanges in Africa: Have they benefited smallholders?

Over the past two decades, a number of developing countries have promoted agricultural commodity exchanges aimed at matching buyers and sellers, in particular smallholders, in an increasingly competitive environment. The main objectives have been to foster market transparency and price discovery, reduce opportunities for collusion among market actors, provide more accurate information to all market players and moderate agricultural commodity prices in case of high volatility. Commodity exchanges are therefore intended to contribute to increasing market efficiency in commodity supply chains by reducing transaction costs, promoting transparency and institutional development, and encouraging adherence to standards. Reliable product grading and market mechanisms help smallholders to access finance, thereby fostering increased productivity and higher rural incomes. In India, for example, agricultural commodity exchanges have boosted incomes and risk management capabilities among agricultural producers, who are predominantly small family farmers. However, with the exception of the South African and perhaps Ethiopian exchanges, most of the others in Africa have had limited success. An important reason is the low participation of smallholders due to a number of constraints. These include low productivity and the scattered nature of small-scale farmers, lack of adequate transport, storage and warehouse facilities, weak farmers' associations, poor quality of crops, paucity of finance, poor telecommunications infrastructure, and weak supportive legal and regulatory frameworks. Therefore, African countries such as Cameroon, Côte d'Ivoire, Ghana, Nigeria, Rwanda and Togo, which are taking steps to establish national or regional commodity exchanges in the near future, should first tackle these issues to ensure that their smallholders can benefit from these exchanges.

Sources: UNCTAD, 2009a; Robbins, 2011; EuropeAid, 2012.

Despite recent developments in ICTs, smallholders in many countries still depend on unreliable word-of-mouth market information from fellow farmers, relatives or middlemen owing to poor market information systems. Limited access to market information is an impediment to farmers' ability to negotiate prices, and often prevents them from meeting market requirements (Soule, 2013).

2.3 Gender inequalities

A number of cross-country analyses, some of which are discussed below, have revealed gender disparities in access to land, inputs, services and markets. Throughout the world, women farmers control less land (as highlighted below), make far less use of better technologies and inputs such as fertilizers, have lower access to credit and insurance, and are less likely to have access to extension services, which are the main source of information on new technologies in much of the developing world with the exception of large emerging countries such as Brazil, China and India. Reasons include cultural norms, the perception that knowledge has to be transmitted to men first (Meinzen-Dick et al., 2011) and the lower proportion of women employed as extension service workers. Limited access to agricultural extension services prevents many women from adopting the technologies that would help them to increase their yields. As a result, an estimated yield gap between men and women, averaging around 20–30 per cent, has been observed (FAO, 2011a), and this hinders the growth of the agricultural sector in many developing countries.

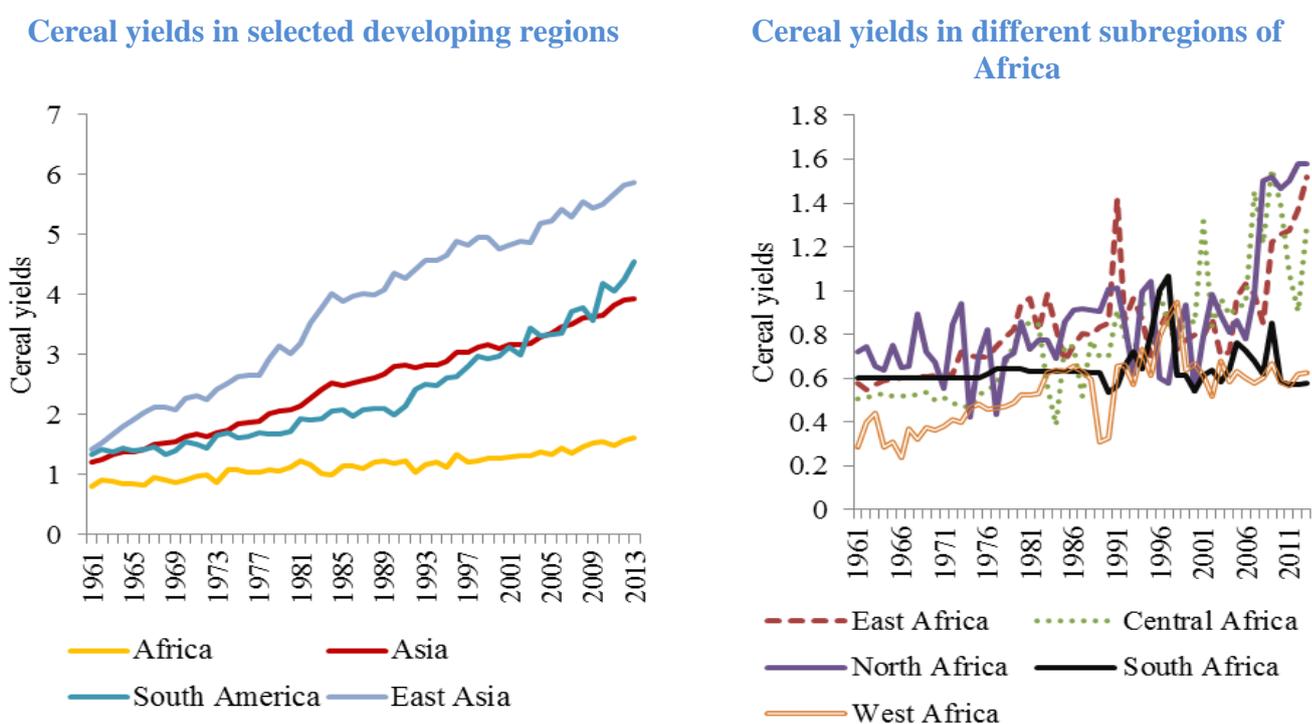
3. Smallholders and input markets

This section shows that in many developing countries, limited access to input markets continues to impede the maximization of smallholders' agricultural potential. This in turn limits their capacity to produce a marketable surplus.

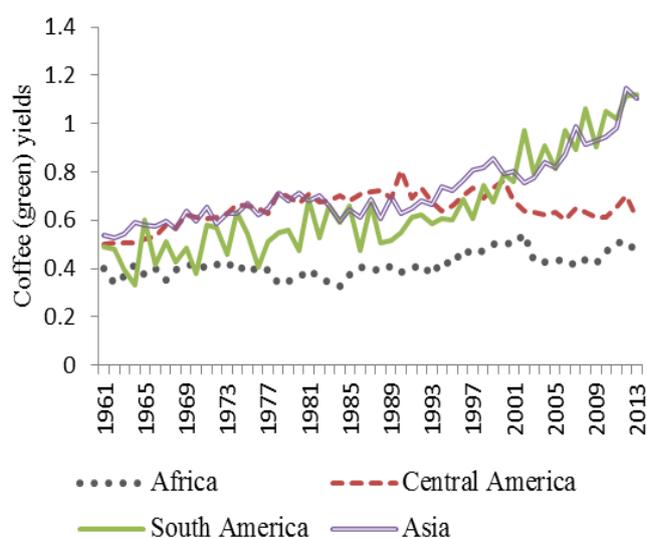
3.1 Seeds and fertilizers

Seeds and fertilizers are key determinants of agricultural productivity. Existing evidence shows that smallholders' access to seeds and fertilizers varies depending on country circumstances. This explains to a large extent the differentials in agricultural productivity. For example, three quarters of the variation in agricultural productivity in SSA is due to variations in the use of conventional inputs, namely land, labour, physical capital, livestock and fertilizers (Wiebe et al., 2001). However, the quality of land, labour and livestock in Africa is comparable to that of other developing regions. Limited use of fertilizers and to some extent physical capital (proxied by the number of tractors used) have been singled out as the main factors explaining low agricultural productivity, despite some improvements. Cereal yield in Africa increased from 0.8 tons/ha in 1961 to 1.8 ton/ha in 2013 (see figure 2.1). In comparison with progress made in other regions, this is very low.

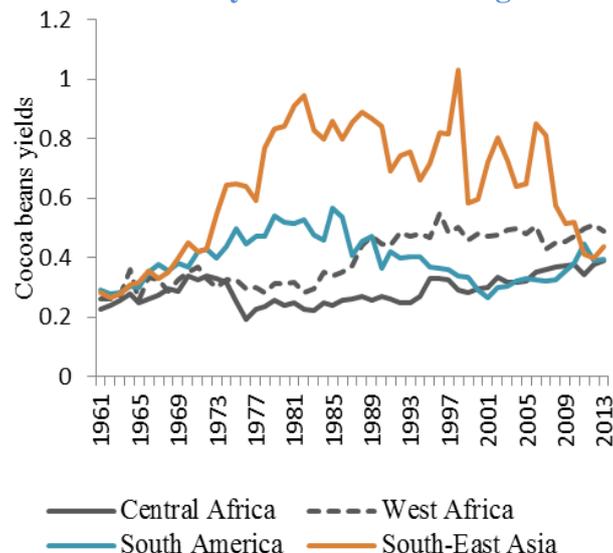
Figure 2.1: Yields of specific commodities in selected developing regions and in Africa, 1961–2013 (tons/ha)



Coffee (green) yields in selected developing regions



Cocoa bean yields in selected regions



Source: UNCTAD secretariat, based on FAOStat.

In contrast, many countries in Asia and South America have achieved dramatic improvements in agricultural productivity over the past 50 years by increasing the use of fertilizers. As table 2.1 shows, in less than 10 years, China increased its fertilizer use from 358 kg/ha in the early 2000s to 554 kg/ha in the late 2000s – a 50 per cent rise. In East Asia, productivity increased fourfold, from 1.4 tons/ha in 1961 to 5.9 tons/ha in 2013. In contrast, Africa's current cereal productivity is almost equal to East Asia's 50 years ago. Africa similarly lags behind other developing regions in productivity of cash crops, though the differences are not as great as for cereals.

The low use of seeds and fertilizers by smallholders in Africa is largely explained by the inefficiency of agricultural input markets. Seed markets in developing countries are generally divided into formal and informal systems.³ Formal markets are characterized by thinness and the high costs of quality seeds resulting from expensive seed certification processes and significant transaction costs. As a result, smallholders can seldom afford them. For example, according to one report (REPOA, 2007), 77 per cent of farmers in the United Republic of Tanzania did not use improved seeds due to their high costs. In India, owing to poor access to quality seeds, despite the country's well-established seed industry, about 80 per cent of farmers rely on their saved seeds, which are not necessarily of good quality (Smale et al., 2009).

Most developing countries rely on imported fertilizer. While the functioning of fertilizer market varies across developing regions, it is generally characterised by market failures at the national, regional and international levels. At the regional level, markets for seeds and fertilizers are rarely well integrated. For example, according to the World Bank, the absence of market integration for seeds and fertilizers is one of the main impediments to regional food trade in Africa (World Bank, 2012). At the national level, fertilizers are sold to smallholders through both public and private channels, but their price tends to be too high for the smallholders. This is due to a number of factors, including the strong power of sellers due to market concentration at the global and regional levels, high prices in

³ Discussions concerning the controversial issue of adopting genetically modified organisms (GMO) are beyond the scope of this chapter.

international markets, poor infrastructure, lack of market information, lack of knowledge of farmers concerning fertilizer use and their limited access to finance at the national level (Hernandez and Torero, 2011; Druilhe and Barreiro-Hurlé, 2012).

These market constraints and failures have been associated with low fertilizer use in many LDCs compared with higher income developing countries and developed countries (see table 2.1). In addition, the extent to which these factors affect prices paid by farmers to procure fertilizers differs across countries. For example, it was estimated that in 2007 farm-gate prices for chemical fertilizers in the United Republic of Tanzania and Mali were \$419 and \$509 per ton, respectively, and in Thailand it was \$282 per ton (Wanzala and Groot, 2013). In the absence of subsidies, many smallholders are unable to afford such high prices. Examples of countries that have attempted to address this problem by providing subsidized access to seeds show that this solution is difficult to sustain over time. In an effort to address supply-side problems, in 2005, Malawi introduced a policy of providing so-called smart subsidies to its smallholders under its Agricultural Input Subsidy Programme. This resulted in an increase in productivity. However, the policy was short-lived for a variety of reasons, including poor targeting, heavy bureaucracy leading to abuses, and little involvement of the private sector (Masanganise, 2009).

Table 2.1: Average fertilizer consumption in selected countries, 2002–2010 (Kg/ha of arable land) in order of the rate of consumption in 2008–2010

<i>Selected developing countries and LDCs</i>	<i>2002–2004</i>	<i>2005–2007</i>	<i>2008–2010</i>
Congo	0.88	0.16	1.96
Burundi	0.92	2.85	2.30
Angola	2.65	3.08	3.78
Bolivia	4.35	5.90	6.92
Azerbaijan	10.02	12.45	14.77
Ghana	7.93	14.61	17.20
Kyrgyzstan	17.81	23.09	20.99
Côte d'Ivoire	29.56	21.51	21.91
Zambia	27.38	28.67	30.93
Argentina	39.13	42.36	33.05
Mexico	63.63	70.60	55.33
Colombia	318.26	520.22	518.26
China	358.20	440.70	553.81
Chile	376.42	481.00	557.28
Selected developed countries			
Greece	182.93	141.82	117.89
France	214.51	195.86	150.04
Germany	218.30	208.35	184.20
United Kingdom	306.86	260.36	233.32

Source: Based on data from the World Bank, *World Development Indicators*.

High fertilizer prices also lead to unwarranted consequences. High fertilizer prices may prompt farmers to use fertilizers for food crops that were initially intended for industrial crops; use of the wrong type of fertilizer, partly also due to the failure to carry out soil tests to determine which

fertilizer best suits the soil and crop, may affect the safety of the produce, contaminate soils and reduce productivity. Furthermore, the dramatic improvements in agricultural productivity as a result of greater fertilizer use in many Asian countries might encourage other countries to replicate their experience. However, as discussed in chapter 3, adopting such a strategy, particularly an excessive use of fertilizer might be inconsistent with the aim of ensuring environmental sustainability in smallholders' operations as business enterprises.

3.2 Land

Access to land, when it is secured by legal documents, encourages smallholders to engage in long-term investments, eases their access to credit (as they can use the land as collateral) and allows them to generate revenues through land rental or sale. Despite these positive benefits of land titling, in many developing countries, inefficient market mechanisms, insecurity of land tenure systems and poor land management have posed obstacles to smallholders' access to land. In several regions, customary systems of land ownership continue to dominate, thereby skewing land distribution. Problems relating to land distribution are worse for women farmers who face additional gender-related constraints, including legal or social norms that prevent them from inheriting or simply owning land (FAO, ILO and IFAD, 2010).

FAO's agricultural census data show that less than 20 per cent of landholders are women. Estimates range from 10 per cent of land owners being women in West and Central Africa, West Asia and North Africa, to up to 30 per cent in East and Southern Africa and in parts of Latin America (FAO, 2011a). These inequalities originate in national civil codes, family codes and labour codes that discriminate against women, most notably with regard to inheritance rights, regardless of equality provisions in national constitutions. Furthermore, where the law might provide adequate rights, in rural areas, customary rights often take precedence. In India, for example, populations that apply Hindu Personal Law do not grant inheritance rights to married daughters without male offspring.

Similarly, a study in Rwanda reveals that although women constitute the majority of the Rwandan population and labour force, before land reforms were enacted that led to countrywide land titling, they continued to face discrimination in access to land. The study further found that despite the existence of family law that provides for equal inheritance for both women and men, discrimination persisted as a result of "Rwandan culture and tradition, which considered the girl child inferior to the boy, physically, intellectually and socially and subjected her to man" (Kairaba and Simons, 2011: 6). As a result, over 80 per cent of constraints on land ownership were believed to be related to inheritance, and a major cause of gender disparities in access to credit and other services. As such, the land reform was historic as it required the names of both woman and man to appear on the land registration certificate, and finally on the land title for a family, thus unlocking access to credit for women among many other advantages.

Box 2.2. Smallholders and large-scale land acquisitions in Africa and Latin America

The 2008 food crisis prompted agro-food TNCs to search for new opportunities in countries with sizeable land endowments. Investors from countries in West Asia, as well as in China, India and the Republic of Korea have secured large swathes of land to improve their countries' food supply from overseas. In 2009 alone, foreign investors expressed interest in about 56 million ha of farmland, 70 per cent of which is in African countries. Some of these transactions were not finalized. In Madagascar, for example, public protests prevented the conclusion of a land deal between the Government and Daewoo (Republic of Korea). Land rushes have also gained momentum in Latin America and the Caribbean from the 2000s onwards, driven primarily by national investors and intraregional firms. The financial crisis of 2008-2009, which reduced the profitability of traditional investments in financial assets, also contributed to this global land rush.

Sources: Deininger and Byerlee, 2012; Borras et al., 2012; ECLAC et al., 2009.

Land access has also been made more difficult by the overall shrinking of arable land owing to population pressure, climate change, water scarcity (Madiodio, 2011) and, more recently, by massive

land acquisitions for large-scale farming – so-called “land grabs” (see box 2.2). In Asia, the poor quality of soils due to an excessive use of chemical fertilizers and pesticides has driven farmers to cultivate on increasingly degraded and less productive land. About 74 per cent of agricultural land in South and South-East Asia has been severely degraded by chemical pollution (UNESCAP, 2009).

3.3 Labour

As noted in chapter 1, one of the characteristics of smallholder farmers in developing countries is that they rely mainly on family labour (Birner, 2014) partly owing to the high cost of hiring labour, including selecting, supervising and paying rates that are often beyond the financial and managerial capacity of a small farmer (Hazell et al., 2010). It should also be added that rural labour markets are relatively thin, as they serve non-agricultural and agricultural activities that often compete for available labour resources. In many low-income developing countries, they are generally informal and tightly tied with the seasonality of agricultural activities (Wodon and Beegle, 2006). Small farming households use rural labour markets not only to sell their own labour for wages, but also to buy labour to work on their farms. As a result, those markets offer smallholders an opportunity to increase their incomes, diversify their sources of revenue and smooth the seasonality of agricultural incomes (Estudillo et al., 2012).

In many countries, especially in Africa, thin rural labour markets and low wages imply that smallholders derive most of their revenue from their own agricultural activities. Challenges to smallholders’ participation in rural off-farm labour markets include the lack of human, financial and physical capital, gender-related issues, restrictions on geographic and occupational mobility, poor educational levels and weak government support (Haggblade et al., 2010; Jayne and Mghenyi, 2010). On the other hand, rural labour markets allow farmers to hire labour in order to access specific skills their households lack, diversify their households’ labour between on-farm and off-farm activities and respond to seasonal spikes in labour demand during intensive work periods in the agricultural cycle. Most labour exchanges involve monetary transactions, but many smallholders participate in reciprocal labour-sharing arrangements within their community.

3.4 Credit and other financial services

The financial sector in developing countries is characterized by the coexistence of formal and informal activities. Formal finance is provided by commercial banks, but they have limited penetration in rural areas, whereas informal finance is dominated by intermediaries, including landowners, money lenders, credit associations, cooperatives and microfinance structures. These entities provide financing, such as credit, savings and other services, to small farmers, which help them not only to better manage their cash flow, but also to invest when opportunities arise, while being protected from the vagaries of markets and production systems (Wiggins and Keats, 2013).

In many developing countries, smallholders have little access to formal credit. In Africa, only about 1 per cent of commercial lending goes to agriculture, mostly to large-scale farmers (Salami et al., 2010). Formal financial institutions are often reluctant to provide financial services to small farmers due to their lack of collateral, such as titled land, unstable revenue flows, the risky nature of farming activities and difficulty in evaluating small farmers’ capacity to repay their loans. Where credit is available, interest rates are often too high relative to the rates of return of farmers’ investments (ASFG, 2013). Notwithstanding these general features (as further discussed in chapter 3), there are some instances of smallholders gaining access to formal sector finance.

The scarcity of formal financial services in rural areas has led to the emergence of informal financial intermediation, particularly microfinance. However, for a typical smallholder, the main shortcoming of microfinance is its high interest rates – annualized, these rates can reach 100 per cent. As a result, many farmers cannot afford to borrow from microcredit institutions, and consequently rely on other informal financing mechanisms such as moneylenders, pawnbrokers, crop-buying agents and group savings, as well as credit associations and cooperatives (Rao, 2012; Kadri et al., 2013). In some instances, poor access to credit has led smallholders to enter into partnerships with traders who provide them with the money they need during the planting season in exchange for their crops, often on very unfavourable terms for the smallholders (Bergaly Kamdem et al., 2009).

As discussed in chapter 3, the provision of other kinds of financial services, such as insurance services, is also lacking in most developing countries. Yet such services would benefit smallholders in many ways, for instance by enabling them to better manage market and weather risks, expand their farming businesses and gaining easier access to credit.

4. Smallholders and output markets

The numerous difficulties related to smallholders' access to input markets result in transaction costs that adversely affect the profitability of their participation in output markets. This section discusses existing evidence on the state of smallholders' access to different segments of output markets in low-income developing countries. Smallholders' decision to participate in larger, more lucrative national or regional markets depends on the degree of constraints they face relative to the benefits they could derive from such participation. The availability of market information plays an important role in their decision. In this section, domestic and regional markets mostly refer to transactions involving staple crops, whereas smallholders' interaction with international markets is usually based on transactions involving non-staple crops. Producer prices tend to increase as the farmer chooses to sell at a village rather than a farm-gate market, and to an urban rather than a village market.

4.1 Domestic markets

Smallholders produce mainly for domestic markets, which include farm-gate, village and urban markets. Producer prices depend on the type of market where they sell their crops. In general, farm-gate and village market prices are lower than those in urban markets. Traders who buy produce from smallholders at the farm gate tend to offer relatively low producer prices, taking advantage of smallholders' lack of market information and the high transaction costs they face individually (Fafchamps and Hill, 2008). In addition, farm gates and village markets in developing countries are generally informal and their quality requirements tend to be low. Although they are easily accessible to farmers, they offer low profitability and growth potential. In Burundi, for example, 20 per cent of smallholders' production reached any market in 2008 (IFAD, 2008), and in Uganda's 2009–2010 National Household Survey, only 4.3 per cent of rural households were considered to be commercial farmers (UBOS, 2010).

With regard to commercial opportunities, urban domestic markets sometimes offer greater opportunities to smallholders than export markets. In Côte d'Ivoire, for example, transactions in local urban markets for staple foods represented about \$1.1 billion compared with revenue of \$0.63 billion from exports in 2009. The corresponding amounts for Senegal were \$0.74 billion against \$0.03 billion respectively (Elbehri et al., 2013). In China, the domestic market for fresh produce was estimated to be 40 to 50 times larger than the export market in the early 2000s (IFAD, 2011). In several Latin American countries, including the Bolivarian Republic of Venezuela, Bolivia, Mexico and Peru, the share of the domestic market in agricultural and agro-industrial products exceeded 70 per cent in 2002 (Berdegué and Fuentealba, 2011). Furthermore, the emergence of supermarkets in several developing countries gives smallholders access to middle and high-income market segments that generate higher value for less volume compared with local or village markets. The participation of Kenyan vegetable farmers in supermarket chains, for instance, enabled them to increase their per capita revenue by 50 per cent (Rao and Qaim, 2010). Despite the growing evidence on the potential benefits of participation in supply chains, farmers are prevented from taking full advantage of these opportunities due to the constraints discussed earlier.

4.2 Regional and global markets

Agricultural trade in regional markets consists mainly of transactions involving food produce. In most developing regions, the potential for regional trade is not fully exploited. Intraregional trade in agricultural commodities varies across developing regions, but remains far below the level of developed-country trading blocs such as the European Union (EU). Exports of agricultural products account for 59.1 per cent of total merchandise exports in Asia, 27.5 per cent in Africa and 16.4 per cent in Latin America, compared with 75.9 per cent in the EU (WTO, 2014). Studies have identified

transport infrastructure and the persistence of non-tariff barriers as some of the major obstacles to intraregional trade (Mbekeani, 2010). Other impediments include the complexity of the trade integration architecture in Latin America and the multiplicity of regulatory frameworks in Africa, which deter farmers' access to regional markets (Rosales and Herreros, 2013; World Bank, 2012). The combination of these factors makes access to regional markets costly, especially for smallholders.

Crops traded in international markets include traditional cash crops such as cocoa, coffee, tea and cotton, as well as high-value products such as vegetables, fruits and flowers. For many developing countries, these markets offer greater demand and higher prices than domestic markets (Wiggins and Keats, 2013). As such, they are an important source of hard currency for governments, employment and income for farmers, traders and exporters. As discussed in section 5 below, smallholders' participation in international markets has been limited so far. Sub-optimal market conditions have tended to limit smallholders' ability to benefit from such participation. In Madagascar for example, a study involving a sample of 9,000 small farmers producing on farms of 1 ha or less who were contracted to grow beans for export, found that once the costs of all inputs advanced by the contracting company had been deducted, farmers were left with a final net income of \$45 from their vegetables (Minten et al., 2011). In this case, integration into supply chains for export to Europe allowed smallholders to earn additional income that enabled them to smooth consumption during the lean season but was insufficient to set them on a sustainable path out of poverty.

In addition to constraints on market participation arising from high transaction costs due to domestic and regional factors, smallholders are also indirectly affected by some rules governing the international trading system. The key features of these constraints are discussed below.

4.2.1 Non-tariff measures

Non-tariff measures (NTMs) comprise a diversity of instruments covered in commercial policies, such as quotas and subsidies, price and quantity control measures, anti-dumping and safeguards, sanitary and phytosanitary (SPS) standards and technical barriers to trade (TBTs). Other categories including export measures, trade-related investment measures, distribution restrictions, restrictions on post-sales services, measures related to intellectual property rights and rules of origin (UNCTAD, 2012). These measures disproportionately affect agricultural products and some of the manufactured products that are often of export interest to developing countries. Whereas agricultural exports of low-income countries face an average tariff of only about 5 per cent, thanks to various preferential schemes, the effect of NTBs raises the overall level of restrictiveness of agricultural exports of low-income countries to about 27 per cent (UNCTAD, 2012). Some products are affected more than others. For example, more than 60 per cent of food-related products, many of which are produced by small-scale farmers, are found to be affected by at least one form of SPS measure.

Existing studies offer mixed conclusions about the net effect of standards on the well-being of smallholders. On one hand, by contributing to boosting trade in products targeting niche markets, abiding by standards has enabled smallholders to derive some of the benefits associated with these markets (Rao and Qaim, 2010). With regard to the overall welfare effect of standards certification on small-scale farmers, a study of the fruit and vegetable export supply chain in Senegal concludes that tightening food standards has led to structural changes in the supply chain, including a shift from smallholder contract-based farming to large-scale, integrated estate production. The study's results show that this shift has had a positive impact on poor rural households through a restructuring of the supply chain. In addition, there is also evidence that the benefits of standards certification on local households are increasingly transmitted through labour markets instead of through product markets (Swinnen et al., 2013). However, considering the importance of smallholders for food production and for the diversification of agricultural production (see chapter 1), the overall net benefit of this switch might not be as significant as it first appears.

On the other hand, the requirements in terms of quality and safety standards in regional trade agreements often exceed multilaterally accepted norms. In such cases, standards may represent a disguised form of a non-tariff barrier (NTB) (Li and Beghin, 2012) – a discriminatory and protectionist measure that hampers the participation of developing countries in international markets.

Compliance with standards requires considerable knowledge, financial and technological resources which small farmers do not have (Lee et al., 2012; Wiggins et al., 2011). In Ecuador, for example, large banana and pineapple producers generally comply with SPS and TBT requirements whereas medium-sized and small producers find it almost impossible to comply with the stringent requirements of high-income markets such as the EU (Wong, 2007). There is also evidence that agricultural firms from low-income countries that produce highly perishable goods are the worst affected by lengthy testing and inspection procedures due to the inadequacy of their production processes and certification bodies. These processes ultimately affect decisions about whether to enter export markets (Chen et al., 2006). As the agricultural sector in low-income countries is dominated by smallholders, the ripple effects from the resulting increase in production and marketing costs constrain their greater participation in regional and international markets.

4.2.2 The Agreement on Agriculture and the Doha Development Round

The current state of the multilateral trading system, with particular reference to the application of the WTO Agreement on Agriculture (AoA), has implications for smallholders producing either food crops or cash crops. The stated objective of the AoA is to establish a fair and market-oriented agricultural trading system by introducing disciplines on domestic support measures, market access and export subsidies. The Agreement gives developing countries special and differential treatment (SDT) to LDCs. In addition, article 6.2 of the Agreement provides exemptions for agricultural and rural development. These include agriculture-specific investment subsidies and agricultural input subsidies generally for low-income or resource-poor producers. Some recent developments in the Doha trade negotiations with regard to food crops, cotton and trade facilitation are of relevance to smallholders. Although these might evolve in the near future, it is worth noting the implications of these processes so far.

As part of the process leading up to the Bali Ministerial Conference held in December 2013, the G-33 – a coalition of developing countries with large populations of smallholder farmers – made two specific proposals likely to have consequences for smallholders. The first proposal was to extend the green box (i.e. the category of farm support with minimal trade-distorting impacts) to include an additional list of rural development policy measures such as land rehabilitation and rural employment programmes. The second proposal was that current WTO farm subsidy rules be relaxed so as to allow governments to establish food stockholding programmes that would include the possibility of buying food from low-income and resource-poor producers at administered prices, rather than solely at market prices as allowed in the green box under the existing WTO rules. According to existing rules established at the end of the Uruguay Round, the difference between the administered price and a fixed external reference price is viewed as a trade-distorting subsidy subject to WTO limitations. The G-33 proposal eventually culminated in an agreement on a “peace clause”, whereby countries committed to exercise “due restraint” in challenging developing-country food stockholding programmes. Countries wishing to take advantage of this flexibility were also requested to share additional information about the nature and scale of the support provided under these schemes. The peace clause is an “interim” mechanism that applies until countries negotiate a permanent solution for adoption by the WTO’s eleventh Ministerial Conference in 2017. In addition, the Bali Ministerial key achievement, the Trade Facilitation Agreement (TFA), is expected to benefit commodity-dependent developing countries (CDDCs) through a reduction of trade transaction costs, the boosting of regional trade and an increase in trade volumes.

With regard to cotton, despite the commitment undertaken in Hong Kong (China) in 2005 to treat cotton “ambitiously, expeditiously and specifically”, and even though all WTO member States recognize the real economic benefits of cotton for many poorer countries (Imboden, 2014), there was no progress made on cotton in Bali. The Bali Ministerial Decision simply reasserts previous decisions and adds requests to enhance the transparency and monitoring of the trade-related aspects of cotton. Regardless of the lack of change at the international level, some large developing countries have scaled up their support to their domestic cotton sector. In contrast, despite the growing recognition that progress on the trade front should be accompanied by greater investments and proactive action by the governments of cotton-producing LDCs to improve the efficiency of their cotton sector and the

functioning of the cotton value chain, little has been done so far (Imboden, 2014). In light of this, and in parallel with trade negotiations, a coalition of stakeholders concerned with improving the African cotton sector designed a Pan African Cotton Road Map (box 2.3).

Box 2.3. The Pan African Cotton Road Map

In December 2008, the Secretary-General of UNCTAD convened a multi-stakeholder forum to discuss the problems afflicting Africa's cotton sector. Subsequently, UNCTAD organized a Pan-African cotton meeting in Cotonou in 2011, with the financial support of the secretariat of the African, Caribbean and Pacific Group of Countries (ACP), EU/Cos-coton, the Common Fund for Commodities, and the Centre for the Development of Enterprise. The meeting marked the first time that cotton stakeholders from West, East, Central and Southern Africa overcame linguistic barriers to engage in a dialogue for one common purpose: the sustainable development of the African cotton sector. Using UNCTAD's analytical research as a basis, more than 150 delegates, including high-level government representatives and private sector stakeholders representing the entire cotton value chain – from farm to factory – collectively identified the following critical areas in the Pan African Cotton Road Map (PACRM): increasing productivity, improving marketing and enhancing value addition.

UNCTAD further participated in stakeholder meetings in Nairobi, Bamako, Brussels and Accra to collect additional inputs for the Road Map. Existing national and regional cotton strategies were also reviewed to identify common issues to be addressed at the pan-African level, and to promote coherence and consistency. UNCTAD published the Road Map in 2014 and formally handed it over to Cos-coton, the Steering Committee of the EU/Africa Partnership on cotton, for consideration as the basis for a framework for their support to the sector. As part of the Partnership's tenth anniversary, UNCTAD was invited to present the Road Map at a meeting held in Cotonou in March 2015. As a follow-up to the second Cotonou meeting, a working group, co-chaired by the secretariat of the African Union's New Partnership for Africa's Development (NEPAD), is working to update the Road Map to make it fully consistent with the newest policy developments at the pan-African level.

Source: UNCTAD secretariat (UNCTAD, 2014a).

4.2.3. Financialization of international commodity markets

Though weather conditions and national policies are the primary determinants of the supply of agricultural commodities to international markets, research by UNCTAD (2012b) has underlined the role of the financialization of commodity markets as a major factor contributing to increased commodity price volatility. Highlighting “the hundreds of billions of dollars of bets placed on expectations”, UNCTAD has noted that, as the volumes of exchange-traded derivatives on commodity markets have become 20 to 30 times larger than physical production, the influence of financial markets has transformed real markets into financial markets.

5. Assessing the impact of trade and economic policy on smallholders

5.1 Background

Recent trends in international commodity markets have been characterized by high and volatile agricultural commodities prices. Variability in international prices for wheat and cocoa beans, for example, increased significantly after 2000 (table 2.2). Price instability introduces uncertainty in the market, rendering it difficult for farmers to make production decisions. Farmers are likely to incur losses if they invest during a period of high prices, only to harvest and sell during periods of low prices. Such risks discourage them from making additional investments.

Table 2.2: Variability of international prices for wheat and cocoa beans, real terms, 1980–2012

Wheat		Cocoa beans	
1980–1999	2000–2012	1980–1999	2000–2012
13.8	17.2	15.6	23.00

Source: UNCTAD secretariat calculations, based on data from *UNCTADStat*.

Note: The table reports the standard deviation of changes in international prices (denominated in dollars) deflated by the United States consumer price index (CPI).

The negative effect on farmers of price variability in international markets became particularly acute following market liberalization policies introduced in most developing countries in the 1980s and 1990s. This is illustrated by producer prices of wheat in Pakistan and cocoa in Côte d'Ivoire, which experienced dramatic changes during the 2000s (table 2.3). High volatility seems to have gone hand in hand with generally increasing prices, as Figure 2.2 shows.

Table 2.3: Variability of producer prices in Pakistan and Côte d'Ivoire, real terms, 1980–2009

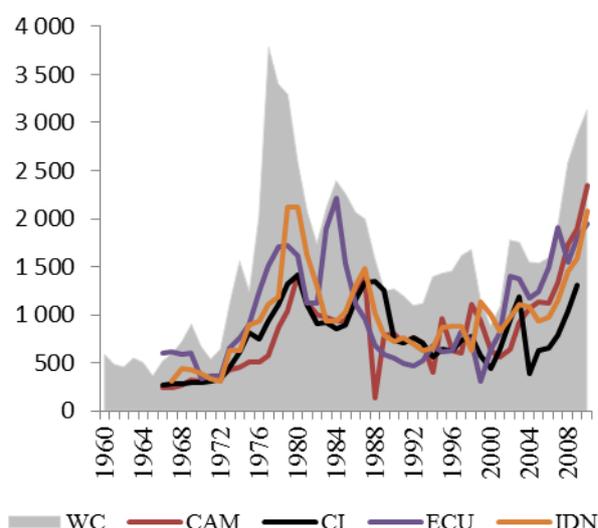
Pakistan (Wheat)		Côte d'Ivoire (Cocoa beans)	
1980–1999	2000–2010	1980–1999	2000–2009
8.9	28.56	16.1	35.5

Source: UNCTAD secretariat calculations, based on data from FAO (producer prices) and IMF (CPIs).

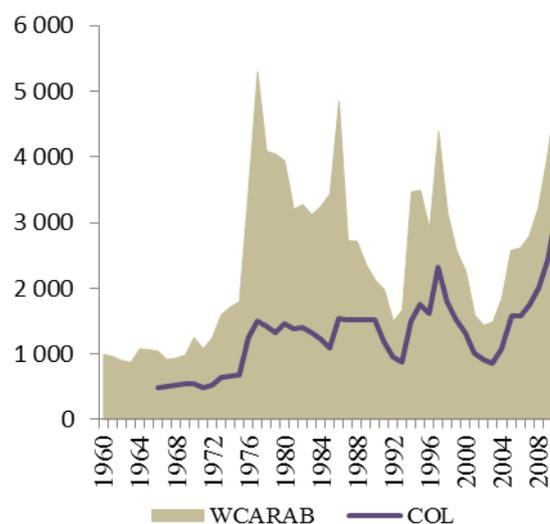
Note: The table reports the standard deviation of changes in producer prices deflated by national CPIs. Differences in sample periods between this table and table 2.2 are due to lack of data after 2009.

Figure 2.2: International and producer prices of selected commodities in selected countries, 1960–2008 (\$/ton)

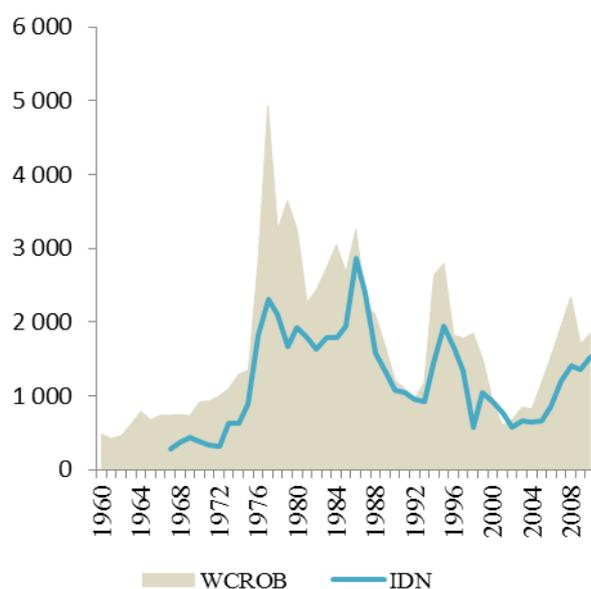
Cocoa (WC): producer prices in Cameroon (CAM), Côte d'Ivoire (CI), Ecuador (ECU) and Indonesia (IDN) in relation to international prices



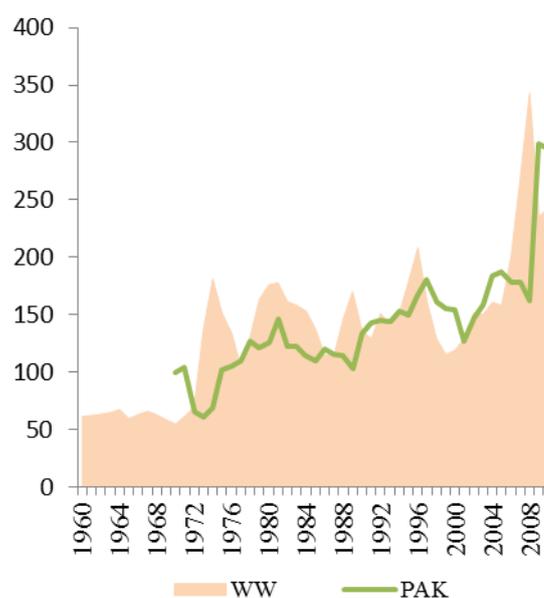
Arabica coffee (WCARAB): producer prices in Colombia (COL) in relation to international prices



Robusta coffee (WCROB): producer prices in Indonesia (IDN) in relation to international prices



Wheat (WW): producer prices in Pakistan (PAK) in relation to international prices



Source: Based on data from *UNCTADStat* and *FAOSTAT*

Tables 2.2 and 2.3 show that international prices of wheat and cocoa were less volatile than producer prices in Pakistan and Côte d'Ivoire, suggesting that volatility in producer prices is more than a simple transmission of price volatility from the international to the domestic market; domestic policies and market structure also contribute to producer price volatility. As shown in table 2.4 below, the countries included in the sample have all undertaken policy reforms that included a combination of liberalization of domestic markets and export trade. However, asymmetric power makes smallholders price takers, which potentially erodes their share of the international price of their exported commodities. The power structure in export crop markets is often unfavourable to scattered smallholders even when, collectively, they account for a large share of the export market for a specific product, as illustrated by the experience of cocoa producers in Côte d'Ivoire and Ghana. Where concentration is not significant in national markets, intermediaries play an important role linking farmers with markets by providing them with services such as marketing, inputs and finance through contractual arrangements (Poulton et al., 2010). In addition, they enable economies of scale by bulking and selling large quantities of crops to exporters, which may ultimately result in efficient marketing chains with cost savings potentially transmitted to farmers. However, when there are a large number of intermediaries along national value chains, each intermediary shares in the profits that could have been fully allocated to the farmers if they had had direct access to export markets (Lee et al., 2012).

In view of the role played by intermediaries, what is the extent to which changes in international markets affect smallholders? For example, to what extent do smallholders benefit from price increases in international markets? The next section explores these issues using a methodology based on time series analysis.

5.2 Methodology

An econometric analysis was undertaken to answer three key questions of policy relevance. First, is there a stable relationship between producer prices and international prices as suggested by their respective trends in figure 2.2? And if a relationship exists, how strong is it? Second, what are the short-term and long-term characteristics of that relationship? Third, how have those relationships been impacted by economic liberalization programmes, and in particular, trade reforms in the commodities sector undertaken by several developing countries in the context of SAPs in the 1980s and 1990s?

It is important to consider trade reforms when analysing the international-producer price linkage, as these may have introduced structural breaks in price patterns. Indeed, prior to reforms, government interventions through commodity marketing boards sometimes weakened the link between national and international commodity markets by acting as a buffer, absorbing both positive and negative price shocks emanating from the international market. Therefore, to address the third question, the analysis tested for cointegration and the existence of an error correction mechanism using producer and international price series before and after the introduction of policy reforms. The year of the abolition of commodity marketing boards was used to define the before and after periods (table 2.4). A full description of the methodology and data used is provided in annex 1.

Table 2.4: Sample countries' periods of analysis and break dates

Country and commodity	Period	Break date	Key reasons for break dates	Source of break date
Cameroon, cocoa	1966–2010	1989	Liberalization of domestic marketing and export trade started from 1989/90 crop season	(UNCTAD, 2008)
Côte d'Ivoire, cocoa	1966–2009	1996	From 1995/96, exporters began to purchase cocoa directly from farmers. However, disengagement of the State from the sector was progressive	(UNCTAD, 2008)
Ghana, cocoa	1991–2012	1993	Liberalization of the internal marketing of cocoa began during the 1992/93 crop season. Licensed private buyers started competing with a subsidiary of the Ghana Cocoa Board	(UNCTAD, 2008)
Ecuador, cocoa	1966–2011	1992	Market-oriented reforms, including liberalization of trade and capital flows started	(Vos, 2000)
Indonesia, cocoa	1967–2010	1985	Gradual relaxation of trade barriers started	(Baffes and Gardner, 2003)
Indonesia, coffee (Robusta)	1967–2010	1985	Gradual relaxation of trade barriers started	(Baffes and Gardner, 2003)
Colombia, coffee (Arabica)	1966–2011	1990	Trade liberalization reforms began	(Baffes and Gardner, 2003)
Pakistan, wheat	1970–2010	1991	Trade liberalization reforms began	(Santos-Paulino, 2002)

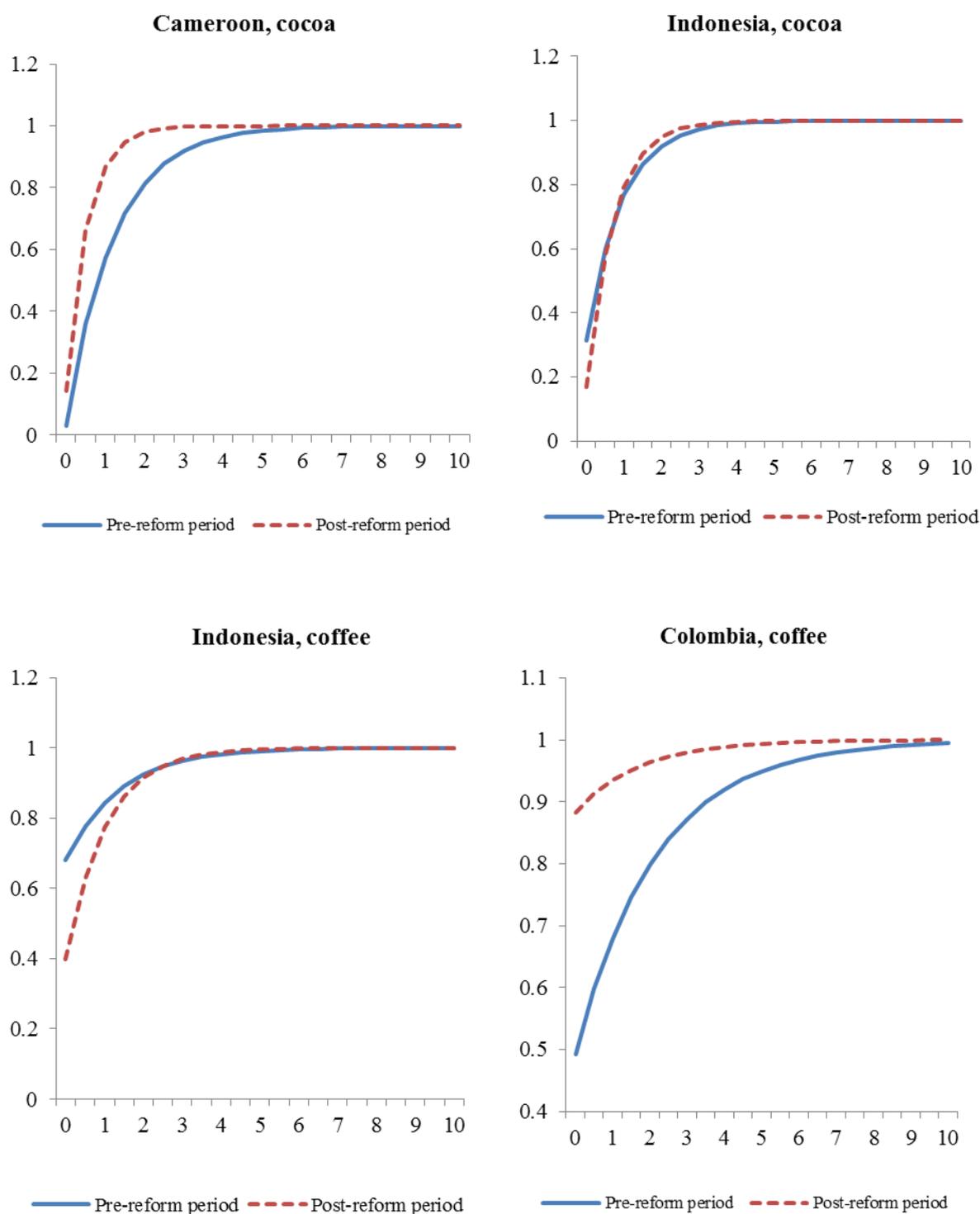
However, break dates should be interpreted with caution, as it may take several years for policy reforms to be fully implemented, even following official announcements. More generally, caution should be exercised in interpreting the results of the econometric approach and drawing definitive conclusions, since the data used have certain limitations. For example, producer prices from the FAO statistical database may be wholesale prices instead of prices paid to producers. Moreover, some prices may have been estimated by the FAO when countries did not provide the required data. However, this caveat notwithstanding, the statistics are considered to be a good enough indication and the methodology appropriate to generate useful insights.

5.3 Analysis of results

Stationarity tests for international and producer prices suggest that, a priori, producer and international prices could have a stable long-term relationship. However, formal testing is needed to confirm this (see annex 2.2 for detailed results of the econometric estimations). The results of cointegration tests, which do not account for policy changes that could have affected the relationship between producer and international prices (see annex 2.2, table A2.3), confirm the existence of a cointegrating relationship between the two prices for the selected commodities and countries, with the exception of cocoa in Ghana. This non-cointegration may be due to two factors: the strongly interventionist role played by that country's cocoa board (UNCTAD, 2008) or a bias introduced in the model due to the poor quality of available data. Stationary tests further revealed that cocoa producer prices in Ghana are trend-stationary. In Cameroon, for example, a unit decline in the international price of cocoa results in a 0.6 unit decline in the domestic price, whereas it leads to a 0.9 unit decline in Côte d'Ivoire. The implication is that small cocoa producers in Côte d'Ivoire are more exposed to changes

in the international price of cocoa than they are in Cameroon. Indeed, the results show that 78 per cent of the variation of the producer price of cocoa in Côte d'Ivoire is due to changes in the international price of cocoa, compared with 61 per cent in Cameroon and 38 per cent in Ghana. Similarly, 41 per cent of the variation of the producer price of wheat in Pakistan is due to changes in the international price of wheat. Coffee producers in Colombia seem to be even more exposed to changes in the international price of coffee, given that 88 per cent of the variation in domestic producer prices is due to changes in the international price of coffee. These long-term results suggest that small farmers in these countries are, to varying degrees, exposed to changes in international markets due to factors beyond their control, as they are price takers.

As for short-term effects, the results suggest the existence of a short-term transmission mechanism between producer and international prices for the selected commodities in six out of seven cases (annex 2.2, table A2.4). The time needed for a shock to the international price to end, the so-called speed of adjustment to equilibrium, varies by product and country, as figure 2.3 illustrates (blue curves). For example, the figure suggests that before policy reforms in Cameroon, it took about 4.5 years to absorb a shock in cocoa prices, whereas the corresponding period was about 2.5 years in Indonesia. For coffee, before the introduction of policy reforms, the absorption of shocks required about 3 years in Indonesia and more than 7 years in Colombia.

Figure 2.3: Speed of adjustment to equilibrium price

Source: Based on the econometric results.

In order to illustrate the effect of trade and economic policy changes on small producers of cash crops, the models estimated in the previous section are re-estimated with the inclusion of a dummy variable that captures the adoption of a new policy. Specifically, this section uses equations (4) and (5) in annex 2.1. The inclusion of structural breaks is based on information summarized in table 2.5. In brief, information in tables A2.5 and A2.6 (annex 2.2), which summarizes the findings of the cointegration tests taking into account the existence of structural breaks due to policy changes, establishes the

extent to which market liberalization increased the exposure of commodity producers to the vagaries of international markets.

With the exception of Ghana, all cases in table A2.5 (annex 2.2) show that there is a cointegrating relationship between producer prices and international prices both before and after the introduction of liberalization policies. The size of the elasticities of producer prices with respect to international prices is higher in the post-reform period than the period before. In Cameroon, for example, before the reforms, a 1 per cent increase in the international price of cocoa led to only a 0.3 per cent increase in domestic prices, *ceteris paribus*. The effect became much stronger after the introduction of reforms, as a 1 per cent increase in the international price of cocoa resulted in a 0.9 per cent increase in the domestic price, *ceteris paribus*. This result seems to confirm the assertion that the trade and economic reforms adopted in these sample countries in the 1980s and 1990s increased the exposure of small producers to the developments, both negative and positive, in international markets. The dismantling of institutions such as commodity marketing boards that guaranteed prices to producers, meant that the latter were exposed to price volatility, which had significant effects on their production and investment decisions, and hence their incomes.

Table A2.6 (annex 2.2) shows that the short-term relationship between producer prices and international prices is stronger in the period after the introduction of reforms in five out of seven cases shown. The implication is that policy reforms increased the exposure of small farmers to changes in international commodity markets. Moreover, the speed of adjustment to equilibrium was systematically faster in the post-reform period (figure 2.3), indicating that trade and economic reforms not only affected the elasticities measuring the extent to which changes in international commodity prices affect domestic prices, but also increased the speed at which prices adjusted to their equilibrium level. For cocoa producers in Cameroon, policy reforms halved the speed of adjustment to equilibrium price. In contrast, in Indonesia, policy reforms do not seem to have had any major effect on the speed of adjustment. The difference in the speed of adjustment is even greater when comparing coffee prices in Indonesia and Colombia (figure 2.3).

In summary, there seems to be a qualitative similarity of results before and after reforms, particularly for equilibrium prices. This suggests that, although prices were regulated in developing countries before the implementation of market liberalization policies, their State commodity marketing boards continuously adjusted producer prices over time to reflect, to some degree, international market realities. Moreover, even during the periods when trade was liberalized, governments still had ways of influencing producer prices through other domestic policies such as taxation. This partly explains the differences across countries in the producer shares of international export prices, as illustrated in table 2.5.

Table 2.5: Producer prices for cocoa, coffee and wheat as a percentage of international prices, selected countries, 1985–2009 (percentage)

	<i>Cocoa</i>					<i>Coffee</i>		<i>Wheat</i>
	Cameroon	Côte d’Ivoire	Ecuador	Ghana	Indonesia	Colombia	Indonesia	Pakistan
1985–1989	63	65	53	n.a	61	45	85	82
1990–1994	56	57	45	39	57	56	77	101
1995–1999	58	46	42	46	60	55	67	102
2000–2004	54	51	77	52	71	60	92	108
2005–2009	68	42	76	50	58	62	63	83

Source: UNCTAD secretariat calculations, based on *UNCTADstat* and *FAOSTAT*.

Notes: Price shares refer to shares of average annual prices (nominal terms) over the indicated periods.

The percentages of producer prices relative to international prices are unstable both within and across countries. For example, in Côte d’Ivoire, the world’s main producer of cocoa, the producer price share plummeted from 65 per cent in the second half of the 1980s to 42 per cent in the second half of the 2000s. In contrast, Ecuador’s producer price shares increased from 53 per cent in the late 1980s to 76 per cent in the late 2000s. Why do cocoa producers in Côte d’Ivoire receive almost half of what their

counterparts in Ecuador receive, assuming that both countries sell to comparable export markets? There could be various reasons (e.g. proximity to international markets), but the contrasting evolutions of producer prices in different countries might be explained, to some extent, by domestic factors.

High taxation of the domestic cocoa sector in Côte d'Ivoire could be one of the reasons why its smallholders receive only a fraction of the international price. Taxes there were 25–30 per cent of export prices over the period 2002–2009 (Kireyev, 2010). In contrast, the higher shares of producer prices in Ecuador could have been associated with national policies, such as minimum reference producer prices set by the Government and the abolition of export taxes (WTO, 2005; 2012). Other determinants could include domestic market regulation or deregulation, marketing and processing costs, greater bargaining power for producers, the national socio-economic environment and the level of farmers' integration into the cocoa value chain. If differences were mainly explained by proximity to international markets, there would be no substantial difference between domestic prices in Côte d'Ivoire and Ghana during the period 2005–2009, given that these two major cocoa producers are neighbours and export to the same markets.

The main conclusion from the econometric analysis is that, generally, smallholders are integrated into international markets through producer prices that seem to be strongly linked with international prices. This relationship appears to have strengthened in the post-liberalization period, which has exposed producers to wide swings in international prices, particularly in the 2000s. This heightened uncertainty increases the vulnerability of smallholders, who lack access to insurance instruments adapted to their needs. Moreover, for many countries in the sample examined above, substantial integration into international markets has coexisted with low producer shares of international prices, suggesting that the level of the international price is just one factor among many that affect producer prices. Smallholders face additional challenges, such as poor marketing skills and weak market power due to their atomization, as well as national policies, particularly fiscal regimes, which may be unfavourable to them.

6. Conclusion

Many market imperfections continue to hinder small farmers' participation in national, regional and international trade, including: widespread input and output market failures in rural areas and a power imbalance in favour of intermediaries and exporters that penalizes atomized small farmers who have little or no negotiating power. In addition, trade and price-based policy instruments assume smooth price transmissions that, in turn, assume smallholders' market participation. They do not take into account the fact that farming households' decision to participate in output markets depends on the extent of transaction costs they face. As a result, the policy environment often fails to trigger the expected supply response from smallholders.

Despite their weak market integration, smallholders have been affected by negative shocks from international commodity markets, while not fully benefiting from the positive ones. Smallholders have been particularly vulnerable to high price volatility since the dismantling of commodity boards in the 1980s and 1990s. The paucity of risk management tools has exacerbated the impact of such fluctuations on their incomes. Furthermore, although the international trading system includes provisions for rural development, most developing countries have not made use of them. In contrast, some large developing countries have requested changes to current rules to allow them to expand their support to resource-poor small farmers.

The persistence of market failures, at the domestic, regional and international levels, and their negative impact on the effectiveness of price and trade-based policies on smallholders' welfare, appear to reflect insufficient political will at the national and global levels to address the problems facing the rural smallholder economy. For instance, as noted in this chapter, it took Africa 50 years to double its productivity even though the initial level (in 1961) was very low. This helps explain the persistently high proportion of smallholders in the total number of poor people in developing countries.

Annexes

Annex 2.1 Domestic and international commodity market integration: Empirical model, the variables and main results

Establishing whether or not domestic commodity markets are integrated into international markets is carried out through an analysis of a possible cointegrating relationship between producer and international prices. Similar studies that consider the relationship between producer and international prices, such as those by Baffes and Gardner (2003) and Worako et al. (2008) have relied on dynamic models.

Consider y_t and x_t as the producer and international prices, respectively, of a given commodity expressed in logarithms. The link between the two prices may be expressed as follows:

$$y_t = \alpha + \beta x_t + u_t \quad (1)$$

where u_t is the error term. A necessary condition to conclude that a producer price is strongly related to the international price of a given commodity requires that y_t and x_t be cointegrated, meaning that:

$$u_t = y_t - \beta x_t \quad (2)$$

is a stationary process. If the two prices are cointegrated, their relationship is said to be in equilibrium or in a steady state. The short-term relationship is estimated through the following error correction model (ECM) equation: $\Delta y_t = \theta_0 + \theta_1 \Delta x_{t-1} + \gamma(y_{t-1} - \beta x_{t-1}) + \vartheta_t$

$$\Delta y_t = \theta_0 + \theta_1 \Delta x_t + \gamma u_{t-1} + \vartheta_t \quad (3)$$

where θ_1 gives the short-run relationship between the variation of y_t and that of x_t , and the coefficient γ is the adjustment coefficient. The latter captures the speed at which prices in equation (1) readjust to their equilibrium level following short-term shocks.

In order to consider the impact of possible structural breaks, such as the introduction of trade reforms that might have affected the relationship between the two prices, multiplicative dummy variables are introduced in equations (1) and (3), as in Worako et al. (2008). An additional dummy variable is also added to equation (1) to capture possible changes in the constant term before and after the reform periods. Denoting the dummy as $d_t = 1$ for prices obtained during the period after the introduction of reforms and zero otherwise, equation (1) becomes:

$$y_t = \alpha_0 + \rho d_t + \alpha_1 x_t (1 - d_t) + \alpha_2 x_t d_t + u_t \quad (4)$$

With this formulation, the constant term differs from the pre- and post-reform periods. The coefficients α_i ($i=1, 2$) represent the international price elasticity of producer prices, respectively, before and after the reform periods.

With the introduction of the dummy variables, the equivalent of the error correction model in equation (3) is:

$$\Delta y_t = \theta_0 + \theta_1 \Delta x_t (1 - d_t) + \theta_2 \Delta x_t d_t + \gamma_1 u_{t-1} (1 - d_t) + \gamma_2 u_{t-1} d_t + v_t \quad (5)$$

Coefficients θ_i ($i=1, 2$) describe the short-run effect of the variation in producer and international prices, respectively, before and after the reforms were introduced, whereas γ_i ($i=1, 2$) captures the speed of adjustment to equilibrium prices before and after the reform periods respectively.

Prices used for the econometric analysis are real prices. Nominal prices in dollars are deflated by the United States Consumer Price Index obtained from the World Bank database. Producer prices are from *FAOSTAT*. Where prices are expressed in local currency, they were converted into dollars using annual average exchange rates from *UNCTADstat*. International prices for the selected agricultural commodities are also from *UNCTADstat*.

International cocoa bean prices represent the average of the daily prices of the nearest three active futures trading months on the London Terminal Market and on the New York Coffee, Sugar and Cocoa Exchange at the time the London market closes, as defined by the International Cocoa Organization (ICCO). Prices of Arabica coffee represent average daily prices of Colombia mild Arabica (ex-dock United States). Prices of robusta represent the weighted average prices of Côte d'Ivoire robusta Grade 2, Uganda Standard, Indonesia EK Grade 4 and Vietnam Grade 2 (ex-dock United States). Finally, prices of wheat represent the free on board (f.o.b) prices of hard red winter wheat. Furthermore, all prices were converted into dollars per ton to facilitate comparison, and were transformed into natural logarithm.

Annex 2.2 Tables presenting the main results of the econometric analysis

Table A2.1: Stationarity tests for international prices of selected commodities

	Prices in level				Prices in first differences	
	Without trend		With trend			
	ADF	PP	ADF	PP	ADF	PP
Cocoa	-1.962	-1.621	-2.752	-2.055	-6.442***	-5.199***
Coffee, Arabica	-1.808	-1.825	-2.452	-2.378	-5.187***	-6.434***
Coffee, Robusta	-1.720	-1.536	-2.845	-2.307	-5.261***	-5.557***
Wheat	-2.180	-1.766	-2.923	-2.118	-6.156***	-5.406***

Table A2.2: Stationarity tests for producer prices

	Prices in level				Price differentials	
	Without trend		With trend		ADF	PP
	ADF	PP	ADF	PP		
Cameroon, cocoa	-1.687	-1.940	-1.754	-2.066	-5.630***	-7.808***
Côte d'Ivoire, cocoa	-1.565	-1.520	-2.431	-2.347	-5.011***	-6.580***
Ghana, cocoa	-1.836	-1.584	-4.818**	-3.090**	-5.058***	-4.158***
Ecuador, cocoa	-1.823	-1.734	-1.627	-1.519	-4.649***	-5.951***
Indonesia, cocoa	-1.650	-1.556	-1.742	-20.44	-4.422***	-6.253***
Indonesia, coffee (Robusta)	-1.518	-1.492	-2.349	-2.398	-4.52***	-5.796***
Colombia, coffee (Arabica)	-2.076	-1.909	-2.015	-1.784	-4.090***	-5.035***
Pakistan, wheat	-2.977**	-2.704*	-2.557	-2.268	-4.560***	-6.534***

Note: Significance levels at 1 per cent ***, 5 per cent ** and 10 per cent *.

Table A2.3: Cointegration between international and producer prices without structural breaks

	Constant	Beta coefficient	Adj-R2	ADF	PP
Cameroon, cocoa	0.674***	0.631***	61	-3.287**	-3.922**
Côte d'Ivoire, cocoa	0.606	0.923***	78	-3.386**	-3.982***
Ghana, cocoa	-0.212	0.958***	38	-2.469	-2.407
Ecuador, cocoa	-0.260	1.0928***	77	-3.072**	-3.374**
Indonesia, cocoa	0.266**	0.837***	81	-5.211***	-4.569***
Indonesia, coffee (Robusta)	0.297**	0.830***	81	-3.588**	-3.908***
Colombia, coffee (Arabica)	0.522***	0.71***	88	-2.963**	-2.498
Pakistan, wheat	0.824***	0.508***	41	-6.230***	-4.286***

Note: Significance levels at 1 per cent ***, 5 per cent ** and 10 per cent *.

Table A2.4: Error correction model without structural breaks

	Short-run effect	Adjustment coefficient	Adj-R2
Cameroon, cocoa	0.0689	-0.666***	38
Côte d'Ivoire, cocoa	0.496***	-0.5722***	40
Ecuador, cocoa	1.030***	-0.379***	39
Indonesia, cocoa	0.281**	-0.704***	46
Indonesia, coffee (Robusta)	0.427***	-0.551***	44
Colombia, coffee (Arabica)	0.713***	-0.250**	74
Pakistan, wheat	-0.228*	-0.389***	41

Note: Significance level at 1 per cent ***, 5 per cent ** and 10 per cent *.

Table A2.5: Cointegration between international and producer prices with structural breaks

	Break date	Beta coefficient		Adj-R2	ADF	PP
		Before reforms	After reforms			
Cameroon, cocoa	1989	0.312**	0.888***	65	-3.833***	-4.520***
Côte d'Ivoire, cocoa	1996	0.742***	0.988***	81	-3.838***	-4.469***
Ghana, cocoa	1993	0.839	0.972***	31	-2.255	-2.319
Ecuador, cocoa	1992	1.16***	1.133***	76	-3.251**	-3.527**
Indonesia, cocoa (Robusta)	1985	0.768***	0.755***	80	-5.130***	-4.525***
Indonesia, coffee (Arabica)	1985	1.156***	0.9000***	82	-4.02***	-4.355***
Colombia, coffee	1990	0.503***	0.980***	92	-3.729***	-3.040**
Pakistan, wheat	1991	0.442***	0.152	45	-5.605***	-3.883

Note: Significance level at 1 per cent ***, 5 per cent ** and 10 per cent *.

Table A2.6: Error correction model with structural breaks

	Break date	Short-run effect		Adjustment coefficient		Adj-R2
		Before reforms	After reforms	Before reforms	After reforms	
Cameroon, cocoa	1989	0.031	0.144	-0.562**	-0.846***	40
Côte d'Ivoire, cocoa	1996	0.143	1.22***	-0.438**	-0.914***	55
Ecuador, cocoa	1992	0.917***	1.274***	-0.294	-0.497**	38
Indonesia, cocoa	1985	0.315*	0.169	-0.659***	-0.750***	43
Indonesia, coffee (Robusta)	1985	0.681***	0.399**	-0.511**	-0.621***	51
Colombia, coffee (Arabica)	1990	0.493***	0.883***	-0.370**	-0.446**	80
Pakistan, wheat	1991	-0.1644	-0.472**	-0.278**	-0.722***	40

Note: Significance level at 1 per cent ***, 5 per cent **, 10 per cent *.

Chapter 3: Smallholdings as agricultural business enterprises

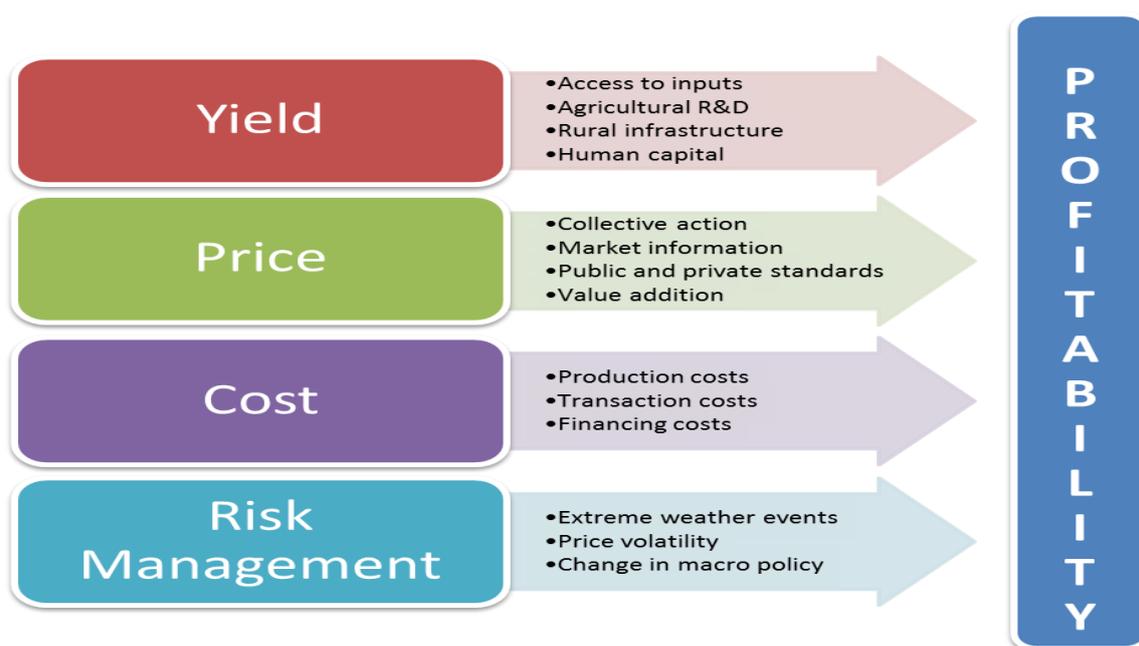
Smallholders are a heterogeneous group that includes farmers with commercial smallholdings and those with subsistence holdings. The former can be considered as running micro or small enterprises (MSEs). They use traded inputs to produce and sell agricultural commodities on a regular basis with the aim of generating a profit. Commercialization of smallholder farming has the potential to create a virtuous cycle of inclusive growth by creating more rural employment, building human capital and increasing on-farm investments. In Thailand's north-east region, for instance, the expansion of commercial agriculture increased absolute incomes for both farmers and farm labourers, stimulated rapid expansion of downstream segments of many agricultural value chains, increased agricultural and non-agricultural employment and improved education (World Bank, 2009a). Furthermore, as farmers are the main investors in agriculture in low- and middle-income countries (FAO, 2012), accrued profits from viable farming businesses can provide a reliable source of investment, which is critical for increasing smallholder productivity and future incomes. Subsistence smallholders, on the other hand, produce primarily for self-consumption.

This chapter builds on the earlier discussion on obstacles to smallholders' development and examines the conditions necessary for smallholders to become entrepreneurs. Evidence shows it is possible for smallholders to simultaneously pursue profit-seeking, environmental sustainability and social stability objectives. But the risks of adverse environmental impacts of the transition from subsistence to commercial farming must be acknowledged. On the one hand, improved productivity through commercial farming could contribute to the conservation of land, forests and woodlands. On the other hand, as already discussed the commercialization of agriculture, when associated with an excessive use of fertilizers, pesticides and water, can lead to the degradation of ecosystems, thereby endangering biodiversity. This has been observed in some parts of Asia over the past few decades of agricultural intensification (Li et al., 2013). In addition to their farming activities, some smallholders may have more opportunities to improve their livelihoods through non-farm employment. This Report does not address the wider context of smallholders' livelihood strategies and considers them as dependent on their local socio-economic context.

This chapter is structured as follows. Section 1 analyses the initial conditions needed for establishing a smallholder business model. Section 2 discusses some characteristics of the business environment in relation to the interests of smallholders. Section 3 examines the close relationship between smallholder farming and the ecological environment, and discusses how environmental sustainability can be made an integral part of the smallholder farming business model; and section 4 concludes.

1. Establishing a sustainable smallholder business: Initial conditions

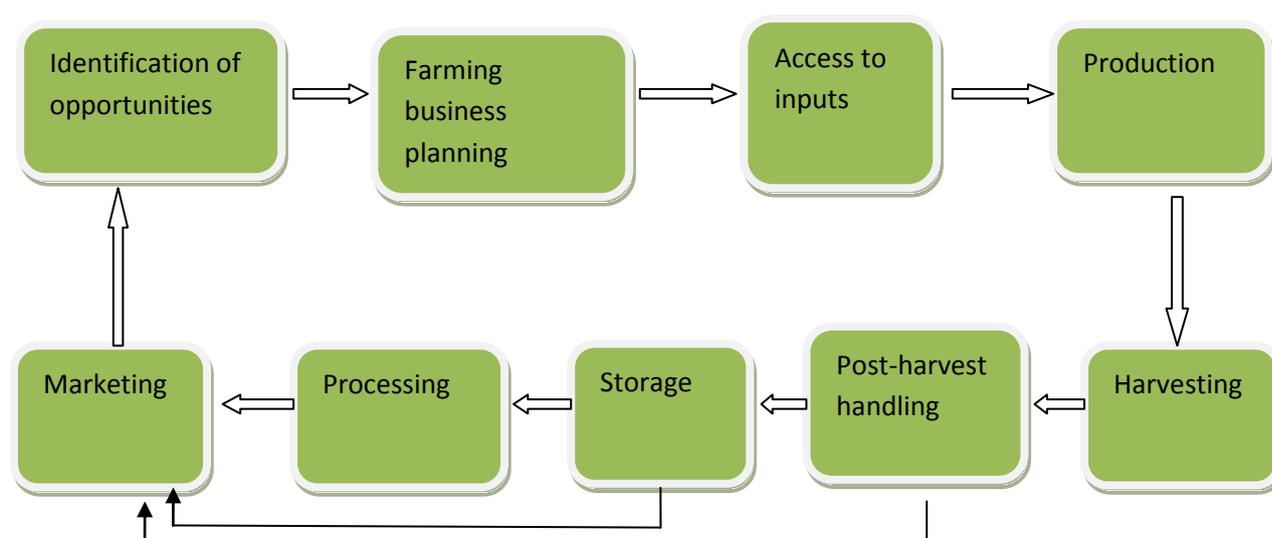
Chapter 2 extensively discussed other determinants such as access to input and output markets. This chapter focuses on two groups of factors. The first concerns agricultural productivity and its determinants, including R&D and its applications, the provision of extension services and human capital development. The second group comprises issues relating to access to finance, risk mitigation instruments and information, which are particularly important for identifying and exploiting business opportunities as well as protecting production and income. These factors determine the profitability of smallholder businesses, which is important for their long-term viability (see figure 3.1).

Figure 3.1: Factors affecting the profitability of a farming business

Source: UNCTAD secretariat.

1.1 The smallholder business cycle: A brief description

Among other skills, operating a profitable smallholder business requires managing a variety of factors (figure 3.1). Management skills vary among smallholders, depending on their level of education. Often, a lack of access to reliable market information and limited capacity for market analysis prevent smallholders from making informed business decisions. For profit-seeking commercial smallholders, identifying a business opportunity is the first important step. Based on market analysis and personal judgment about risk and the expected price trends in the targeted market, a smallholder would need to identify the most profitable crop(s) to plant under given ecological conditions. For smallholders who are specialized in the production of perennial crops (e.g. coffee, cocoa), this step may be less important, as they are locked into the production of such crops for several years (figure 3.2).

Figure 3.2: Business cycle relating to crop production

Source: UNCTAD secretariat.

Once a business opportunity has been identified, it is translated into a formal or, most often, an informal farming business plan. The plan assesses the availability of inputs, equipment and

technology for production, initiates a marketing strategy, determines potential buyers and expected prices, evaluates the profitability of the farming business, and identifies potential financing sources and risk mitigation measures. Preparing a feasible business plan is challenging for smallholders as they need to combine their agro-ecological knowledge with a basic understanding of accounting, finance and risk management. It becomes more complex when smallholder farmers are engaged in the planting of several crops and when part of the harvest is consumed by their families.

After production and harvesting, some steps, such as sorting, cleaning, drying and cooling, can enhance the quality of the produce and fetch higher prices for smallholders. These simple activities usually add value without involving any physical transformation of crops. Thus they increase the incomes of smallholders with minimum risk. Profit-oriented smallholders also evaluate seasonal arbitrage opportunities and decide on the percentage of their harvest that should be stored. This decision, however, depends on the availability of affordable, safe and pest-free storage facilities – a challenge in many developing countries where post-harvest losses are relatively high (see chapter 2).

In some cases, smallholders may also undertake the secondary processing of their produce before marketing in order to capture a higher value when they sell. Secondary processing involves the physical transformation of a raw material into a finished product, such as separating the edible parts (oil extraction), milling, grinding and roasting. Undertaking these activities typically requires additional capital investment. The success of higher value processing activities depends on many factors: technology, market conditions, competition, management skills and cost control. Without a market-oriented approach, these activities may not be profitable or sustainable.

Marketing is one of the most important and challenging steps in the smallholder farm's business cycle. As discussed in chapter 2, the major challenges encountered by smallholders in marketing their produce include lack of market information, poor infrastructure and logistics, difficulties in complying with standards in high-end markets and high price volatility, among others. Notwithstanding these constraints, when conditions are right, smallholders can do business with high-end domestic markets. As illustrated in the case study in box 3.1, capacity-building support can enable smallholders to go through the different steps that such transactions entail.

Box 3.1. Linking smallholders with high-end domestic markets: The case of Uganda

The Nyabyumba Farmer Group (NFG) is a Ugandan smallholder farmers' group formed in 1998 with support from Africare, a non-governmental organization (NGO), to produce disease-free seed potatoes. Its initial success took the form of higher yields and expanded production, which led to an oversupply in the local market. To find a larger market for potatoes, a market analysis was conducted. Based on the findings, NFG decided to focus on supplying Nandos, a multinational fast-food restaurant in Kampala. In discussions with the Nandos management, a basic production and marketing plan was developed. According to the purchase agreement, NFG was to supply 50 bags of 100 kg each of potatoes of a specified quality standard every two weeks throughout the year. The price was to be fixed for a year, payable by cheque on the 15th of each month after delivery. Based on these conditions, a basic profitability analysis was conducted and a detailed implementation plan was formulated.

To meet quality and quantity requirements, farmers upgraded their production systems. To ensure year-round supply, a low-cost irrigation system was established. Farmers were encouraged to produce as individuals but sell collectively in order to supply bulked and graded produce. The initial working capital came from savings, family borrowings and a loan from the local moneylender. Later, with contributions from each group member, a savings and credit cooperative was established. As transport costs proved to be significantly higher than envisaged, the group decided to buy a truck. The chairman purchased a mobile phone to maintain regular contact with Nandos and build trust in their business relationship. Following additional training on quality standards, the potato rejection rate fell from an initial 80 per cent to less than 10 per cent.

Source: Kaganzi et al., 2009.

1.2 Research and development (R&D)

For many years, agricultural research programmes have sought to develop technologies that increase yields on large and medium-sized farms. This creates a bias against smallholders, even when they prove to be more efficient, as noted in chapter 1. The private sector contributes most of the funding for R&D activities, which are mainly oriented towards technologies with the greatest profit potential and those that can be protected under intellectual property rights laws (OECD, 2011). For example, in recent years, policies and considerable public funding have sought to foster second generation biotech-based ethanol production in developed and emerging countries. These preferences are in sharp contrast to the relatively low amounts of public and private investments in R&D for increasing the productivity of food crops.

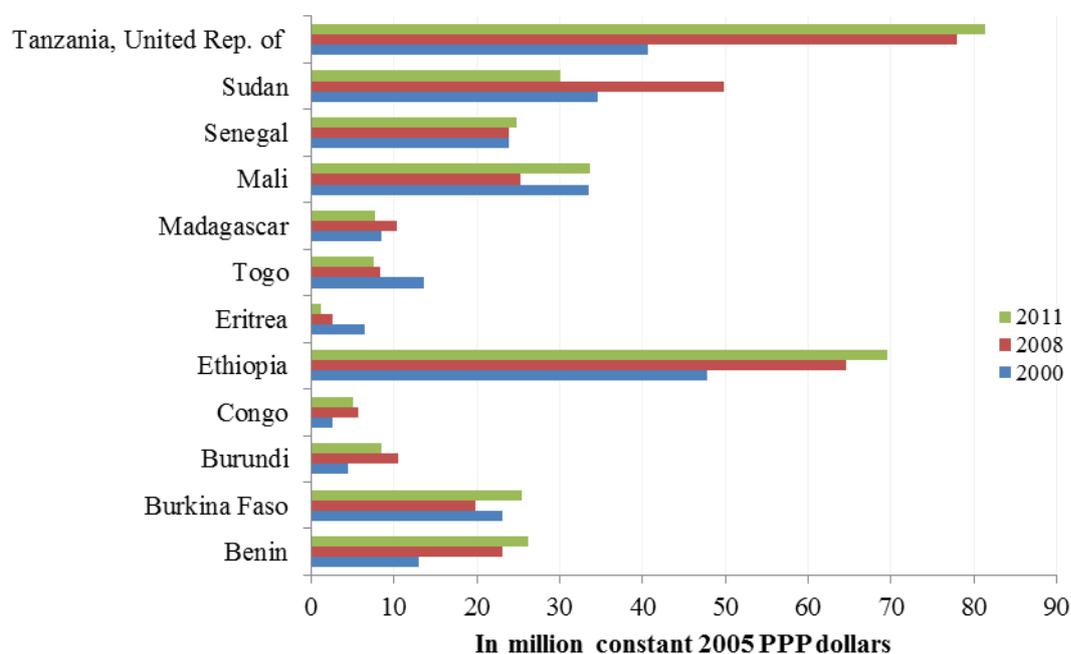
Technologies emerging from profit-oriented R&D activities are typically inaccessible to smallholders, who have limited means and, considered individually, represent only a small revenue stream with high dissemination costs. Moreover, such R&D generally focuses on increasing yields, without necessarily paying adequate attention to environmental consequences and other externalities resulting from its innovations. For their part, public R&D activities, with few exceptions, have generally also failed to develop technologies adapted to smallholders' needs and contexts, even though they are extremely important. The institutional framework also constitutes a major obstacle to the development of R&D geared towards smallholders. Perhaps as a legacy of the Green Revolution era's emphasis on yields, public institutions are predominantly structured to support the private, for-profit R&D model (Pingali, 2001). In other words, the current system favours a commercial process of technology adoption that is beyond the means and capacity of most smallholders. Furthermore, current levels of expenditure on agricultural research and the way agricultural R&D is carried out in many developing countries, especially low-income countries, are not geared to meeting smallholders' quest for improved productivity, higher incomes and sustainable agricultural production. For instance, in SSA, agricultural R&D, which is mainly funded by the public sector, suffers from insufficient public investment and is not targeted towards farmers' needs, partly due to a top-down research programme (ActionAid, 2013).

A close examination of public agricultural research spending in 12 SSA countries, for which data were available, confirms that the main constraint on research and agricultural development is public funding (Beintema et al., 2012). The ratio of agricultural research spending as a share of agricultural GDP in 2011/12 was lower than the 1 per cent target set by the New Partnership for Africa's Development. Moreover, even though public research spending for agriculture increased in some countries, including Benin, Ethiopia and the United Republic of Tanzania (figure 3.3) as well as in Zambia, a large share of such spending was allocated to recurrent costs. In 2011, among the countries shown in figure 3.3, one third (Eritrea, Madagascar, Sudan and Senegal) spent over 50 per cent of agricultural R&D resources on salaries, with relatively low amounts allocated to research programmes. Zambia's budget allocation for agriculture in 2006 shows that 63 per cent of discretionary spending was on subsidies, with 51 per cent on fertilizers and 12 per cent on output prices; operating expenditures accounted for 32 per cent and very little was allocated to R&D (Haggblade, 2007). Furthermore, spending on R&D has been highly volatile, particularly in low-income countries where R&D is dependent on external funding, both from donors and development banks (Beintema et al., 2012). This underscores the point made by Li et al. (2013) that a successful agricultural development model cannot depend on donor funding, given the unpredictability of external aid.

Another challenge is the lack of smallholder participation in agricultural research. Smallholders usually have a different set of needs compared with large-scale farmers owing to their particular farming systems or the farming equipment they use. However, rarely are they consulted in the design and development of agricultural research programmes in SSA. In Nigeria, for instance, only a few researchers have minimal interaction with smallholders in developing new technologies (Ragasa et al., 2010). Such lack of contact leads to a mismatch between research programmes and smallholders' needs. For example, crop protection and agricultural mechanization are not oriented to the mixed crops and cropping systems that characterize smallholder farming in SSA (Rabbinge, 2011). As suggested in chapter 4, one solution for providing effective assistance to smallholders could be to

establish a well-funded agricultural research and innovation programme with a major focus on resource-poor subsistence farmers.

Figure 3.3: Total public agricultural research spending in 12 sub-Saharan African countries, 2000, 2008 and 2011 (Millions of constant 2005 PPP dollars)



Source: ASTI country factsheets.

Notes: Data for Sudan are for 2012, and not 2011.

1.3 Extension services

Efficient extension services are critical for transferring advanced technologies and bringing new business ideas to farmers. During the Green Revolution, many extension services contributed to increasing agricultural productivity through the transfer of new technologies to all groups of farmers (Swanson and Rajalahti, 2010). Traditionally, extension services, which have been provided by government agencies, have focused on major cereals and export commodities. Often, they have not considered smallholders' priorities and resource constraints. Also, over the past two decades, public extension systems in many developing countries have been in decline, and the private sector has failed to meet the needs of low-income producers (FAO, 2011b).

The Uganda 2008–2009 Agricultural Census, for instance, found that extension workers visited only 19 per cent of the surveyed agricultural households during the survey period. A recent study of seven SSA countries by ActionAid (2013) found that their extension services in general were of poor quality. It identified two major problems. First, in most countries those services concentrated on increasing farm production, and neglected important aspects such as marketing and sustainable agricultural approaches. Smallholders were unable to seize available market opportunities owing to illiteracy and low education levels. Second, the services tended to focus on the better-off male farmers and neglected women and poorer farmers. For resource-poor, smallholder subsistence farmers, neglect by extension programmes and inadequate training in marketing and business skills hinder their transition to commercial farming. Some countries' extension services have adopted new approaches. In Zambia, for example, a business-focused extension service has led to increased smallholder production and incomes (box 3.2).

**Box 3.2: Zambia's Agricultural Support Programme:
A new approach to delivering extension services**

The Agricultural Support Programme (ASP) in Zambia was a five-year pilot programme under the Ministry of Agriculture and Cooperatives, funded by the Swedish International Development Cooperation Agency (SIDA) and managed by a consortium led by Ramböll Natura AB. Over its duration the programme provided intensive training and extension to 44,000 rural households. The design and delivery of extension services involved a process that began with the selection of target areas, organization of community groups and identification of business opportunities. This was followed by a needs assessment, action planning, resource mobilization, implementation and evaluation. Throughout the process, a business approach was used. All the training and advice focused on developing entrepreneurial skills of the farmers and building family farms as small commercial enterprises. Most of the training and extension services were delivered by the public extension system, while business training and financial advice were provided by private sector trainers. The group training was complemented by intensive follow-up with the households involved. This market-oriented extension service achieved notable results: participating households increased their income by 35 per cent relative to non-participating households; and 62 per cent of the participating households produced more maize than they consumed, compared with 49 per cent of the non-participating households. Furthermore, farmers became more business-minded, taking initiatives to establish savings and credit cooperatives, bulking produce and negotiating with buyers as groups.

Source: Chipetta, 2009.

1.4 Capacity-building

Education and training enhance farmers' ability to adopt modern technologies and cope with changing business environments. However, traditional agricultural education and training tend to focus on production technology at the expense of marketing and business development. Moreover, the level of formal educational of the rural population in many developing countries is very low, making technology dissemination and business learning even more challenging. In addition, there are also gender disparities in access to education. According to the World Bank (2007), on average, adult men receive only four years of education, and adult women only three in rural areas in SSA, South Asia, West Asia and North Africa. The FAO (2011a) also observes that, in most developing countries, female household heads in rural areas are particularly disadvantaged with respect to education and training due to a traditional bias against educating girls. The widest gender gaps in education, both in levels of enrolment and attainment, are found in South Asia and SSA.

Marketing and business management skills are particularly important for smallholders seeking to move from subsistence to profitable commercial farming. Such skills include information seeking, preparing a business plan, market development and networking, financial literacy and risk management. Jayne et al. (2011) have described how training in marketing provided by the Kenya Market Development Programme (KMDP) increased smallholders' business orientation and farm-gate prices in Kenya. Instead of complaining about the unscrupulous behaviour of private traders, smallholders often sought ways of increasing their margins, using certain strategies to get higher prices and even by-passing intermediaries. In May and June 2009, these KMDP-trained farmers were able to charge 10 per cent higher prices, on average, for their maize.

Often, however, even when smallholders have the opportunity to participate in some business training programmes, illiteracy and low education levels prevent them from fully benefiting from these programmes (Collett and Gale, 2009). The positive role of education in enhancing agricultural productivity and household incomes (Marenya and Barrett, 2007) underscores the need for governments not only to invest in education and training, in particular at primary and lower secondary levels of schooling, but also reduce the gender gap in education. The organization of smallholders into farmers' groups and the example of lead farmers are key ingredients in the success of farmers' training programmes, as illustrated by the NAFKA case (box 3.3).

**Box 3.3: NAFKA, Feed the Future programme in the United Republic of Tanzania:
A USAID success story**

USAID's NAFKA Initiative in the United Republic of Tanzania demonstrates that with the appropriate policy, institutional and technical support, it is possible to transform smallholders into agricultural entrepreneurs – "agripreneurs." Under this initiative, farmers are trained in good agricultural practices (GAP), such as the use of modern farm inputs and practices, and how to grow improved seeds. They are also linked to agricultural input supply companies. A group of 55 small-scale farmers (55 per cent of whom were women) received training in GAP. Selected farmers were those already engaged in farming and having significant land on which to farm, and demonstrating leadership potential to be able serve as facilitators for demonstrating GAP to other farmers. The "Progressive Farmers" used their own farms as learning or demonstration platforms for improved technologies, and showcased new planting techniques and corresponding yield increases compared to those adopting traditional practices (e.g. use of local seeds that had been recycled for several years). The Progressive Farmer network provided extension services to a total of 956 smallholder farmers (of which approximately 40 per cent were women), who have also increased their own productivity and, in turn, continue to share improved techniques with fellow farmers, thereby enabling the programme to have significant multiplier effects.

Under the village-based agriculture advisor, farmers are trained as self-employed extension workers and are provided with "starter-pack" inputs by input supply companies. A village-based approach promotes entrepreneurship among motivated farmers through whom private sector input supply companies extend into the rural areas. As a result, maize harvests have increased significantly, in one case fivefold – from 10 bags of 50 kg each to 50 bags of 50 kg each on a two-acre plot; and rice harvests in another instance have increased six fold as a result of improved seeds and proper spacing and fertilizer application. This illustrates the argument that if they are given the right training, smallholders are capable of increasing their productivity substantially.

Source: USAID, *Telling our story*, at: <http://stories.usaid.gov>.

2. The business environment

Smallholders' capacity to establish viable business enterprises should be facilitated by the business environment at the national level, including a supportive business environment and a smallholder-friendly innovation framework. However, as noted below, there is little evidence that smallholders' specific needs are reflected in investment policies. By contrast smallholder-friendly innovations have sprouted in areas such as non-traditional financing mechanisms, risk management tools and ICTs.

2.1 Investment policies

The overall share of foreign direct investment (FDI) in agriculture in total FDI flows remains marginal, but there has been an increase in the number of large land acquisitions in developing countries over the past few years (UNCTAD, 2009b). Agribusinesses, (sovereign) investment funds and government agencies have been acquiring long-term rights through either acquisitions or long-term leases (typically between 50 and 100 years) of large areas of land (larger than 1,000 ha in many cases). Private sector investments have been primarily driven by prospects of rising agricultural commodity prices and high returns, whereas public investments have been motivated by concerns about food and energy security.

The potential benefits of FDI include transfer of technology and know-how, the development of business linkages for local companies, job creation, investment in fixed capital and infrastructure and facilitating fostering host countries' integration into the world economy (UNCTAD, 2009b). On the positive side, a World Bank and UNCTAD study (2014), based on a field survey of agricultural operations of 39 large-scale, mature agribusiness investments in SSA and South-East Asia, found that these investments generally had more positive effects than negative ones. These included job creation, though limited, since the data showed an average ratio of one job created for every 20 ha of land; and thousands of farmers also benefited from contract farming.

However, the policy bias that has historically benefited large-scale farming (see chapter 1) also translates into investment policies that fail to include safeguards for smallholders in the face of increasing FDI in agriculture. Investment policy experts identified potential conflicts that may arise between FDI in agriculture and investment law (Van Aaken, 2014). They include the crowding-out effect and disincentives to local competitors as the legal and regulatory framework excessively favour foreign investors, TNCs' monopolistic market dominance, diversion of productive assets away from food production for local markets, competition faced by domestic and regional value chains from international value chains, increasing inequality due to the dualistic structure of agriculture, use of capital-intensive technologies that lead to greater land degradation and depletion of water resources relative to smallholders' agricultural methods. There are also some detrimental effects on land rights as resettlements associated with large agricultural projects are seldom sufficiently consultative, inclusive, or adequately compensated. In addition, assessment of the environmental impact was considered generally inadequate and non-transparent.

Moreover, there is evidence that investment promotion measures do not give appropriate consideration to sustainability-related factors. UNCTAD's analysis of FDI trends in 2013 showed that more than half of new liberalization, promotion or facilitation measures were related to the provision of investment incentives by government investment promotion agencies (IPAs) as a policy instrument for attracting investment, despite growing criticism that such incentives "are economically inefficient and lead to misallocations of public funds". Agriculture was among the top three target activities of IPAs, whereas environmental protection and development of disadvantaged regions did not rank high in their promotion strategies (UNCTAD, 2014b).

Given the paucity of evidence on existing investment policies directed specifically to the needs of smallholders, some recent studies have focused on examining the impacts of large-scale agricultural investments on a number of variables. In Africa, for example, the Consultative Group for International Agricultural Research (CGIAR), in partnership with the United Nations Environment Programme (UNEP), GRID-Arendal and FAO, was commissioned by the African Ministers' Council on Water to examine the impact of large-scale investments on natural resources such as water, and on environmental sustainability. Based on 148 cases of FDI in agriculture across 22 SSA countries between 2000 and 2012, the study's initial findings showed that FDI in agriculture in SSA had led to the foreign acquisition of at least 3.4 million ha of agricultural land, 26 per cent of which was acquired to grow food crops, 68 per cent for biofuel production, 3 per cent for cotton production and 3 per cent for the production of livestock (CGIAR, 2015).

The study also highlighted the following:

- FDI contracts did not adequately address the issues of water allocation, management and pricing;
- Few contracts explicitly stipulated inclusive "win-win" business models;
- Only around 5 per cent of the 3.4 million ha acquired by FDI projects were being cultivated for productive purposes;
- There was poor coherence and coordination across existing land, water and environmental policies;
- There was poor monitoring of the FDI schemes' compliance with environmental regulations;
- Insufficient disclosure in land acquisition contracts rendered it difficult to assess their full impacts on water resources, livelihoods and ecosystems.

These findings further demonstrate that the needs of smallholders are rarely considered in investment promotion policies.

2.2 Access to formal finance

As highlighted in chapter 2, smallholders' access to formal finance is limited. Example of successful initiatives based on partnerships between governments, financial institutions and development partners show that more can be done in devising solutions aimed at reducing the risk of extending credit to smallholders. Equity Bank of Kenya, for instance, has developed a credit model targeting

smallholders in the country, which shows that it is possible for the private sector to even make a profit when helping smallholders to transform their activities into sustainable small businesses. Thanks to partnerships with the Kenyan Government, the private sector and international development agencies such as the Alliance for a Green Revolution in Africa (AGRA), the International Fund for Agricultural Development (IFAD) and the World Bank, the Equity Bank of Kenya has introduced various types of agricultural loans, most of which are available to small farmers (table 3.1). These loans have contributed to helping nearly half a million small farmers in the country to move from subsistence to commercial farming.

Table 3.1: Different types of agricultural loans extended by Equity Bank of Kenya

Target/beneficiaries	Purpose
Small-scale farmers of commercial food crops	Finance the purchase of farm inputs, such as certified seeds, fertilizers, chemicals, renting of machinery, and labour and harvesting costs
Agribusinesses	Finance working capital and operational needs of agribusinesses, including agro-dealers, agro-processors, agro-input manufacturers and agro-importers and exporters
Farmers operating monthly remittance accounts with the Bank (e.g. tea and dairy farmers)	Help farmers to undertake farm improvements/upgrading as well as purchase of capital equipment (e.g. construction of farm houses, zero grazing yards, biogas plants and purchase of motor vehicles and land) and help meet social development needs. Also, help farmers in purchase of farm inputs, pay for land leases, buy livestock, and also finance other farming and socio-economic needs.
Smallholders and commercial farmers	Finance the purchase of modern agricultural tools and equipment, including irrigation equipment, greenhouses and spraying equipment.
Farmers, agricultural traders, agro-processors and agricultural service providers	Expand and deliver innovative financial services to small- and medium-scale agricultural producers, agribusinesses and agricultural entrepreneurs
Medium- and large-scale farmers, traders and processors; and agricultural organizations	Finance the bulk purchase of farm inputs such as certified seeds, fertilizers and chemicals, finance the lease or purchase of additional agricultural land, sinking of bore holes, buying of hybrid livestock, construction of biogas plants and farm houses, and support any other agribusiness or social development needs.
Legally organized associations of farmers	Support smallholder farmers working in organized groups and associations such as cooperative societies, community-based organizations, self-help groups and agricultural marketing federations

Sources: Equity Bank Kenya website (<http://www.equitybank.co.ke/loans/agriculture-loans>, accessed 27 July 2015); Equity Bank, 2013.

2.3 Access to credit through innovative financing mechanisms

As noted earlier, smallholders throughout the developing world generally have difficulty accessing credit. However, there are instances where innovative financing mechanisms, such as warehouse receipt financing (WRF) and factoring (a trade finance instrument) have enabled smallholders to circumvent the obstacles posed by the formal financial system. WRF uses stored commodities as

collateral for access to post-harvest working capital, thereby helping smallholders overcome constraints on borrowing due to a lack of collateral. This may also reduce interest rates, as this type of lending transaction is perceived as less risky and involves lower loan management costs. A study of commercialization by smallholder maize producers in Kenya, for example, found that the needs for cash to pay school fees and other requirements tended to push farmers to sell a portion of their maize at harvest time at unfavourable prices as they had no access to formal bank credit (Woolverton et al., 2014). WRF could cater to these smallholders' cash needs at harvest time, and help them exploit the opportunities of seasonal arbitrage for profit-making.

Inventory credit – a variant of WRF – allows smallholders to use loans to engage in revenue-generating activities, or sell the produce when prices are high in order to repay loans and interests. A review of WRF initiatives in West Africa found that village-level inventory credit schemes can help small farmers gain access to credit and inputs, and improve the marketing of products (Konlambigué, 2010). Other successful initiatives may be found in Niger (involving commodities such as peanuts, millet, cowpea and paddy rice) and Madagascar (paddy rice).

Factoring is another tool that has enabled smallholders to resolve the problem of delayed payments by high-end domestic customers and assist them in integrating into the local supply chain. Factoring involves the handing over of a seller's invoices or other receivables to a "factor" (usually a bank), which then discounts the receivables and takes over the responsibility for collecting all payments from the customer's buyers. Upon payment of the invoice, the balance, after deducting financing costs, is remitted to the seller. In Barbados, where tourism is an important source of revenue, farmers are usually paid 30–90 days after the delivery of their produce to hotels. Factoring has helped farmers to reduce this delay and improve their cash-flow situation. Though promising, the development of such innovative financing mechanisms requires secure market access, a high-rate of compliance, supply consistency, the creation of farmers' cooperatives or associations and access to agricultural insurance. It is also helpful if farmers have some degree of financial literacy.

2.4 Innovative risk management instruments

All farmers, large and small, face multiple risks associated with factors such as extreme weather conditions, pests and crop diseases, volatile market prices, institutional risks and political instability. Smallholders are particularly vulnerable due to their heavy dependence on agriculture and limited options for risk mitigation. In a survey of 600 smallholder households in Madagascar, 15 per cent reported losing more than half their crops to pests and diseases, and 31 per cent saw their household income reduced by more than 50 per cent due to cyclones (Harvey et al., 2014).

Smallholders in developing countries traditionally use instruments such as savings, contingent loans and intercropping to manage risks. In recent years, some innovative market-based risk management instruments have been developed in these countries. Among them is the weather-based index insurance scheme. This form of insurance, often linked to a measurable weather index such as rainfall, rather than actual loss, is helpful in protecting smallholder farming businesses from unexpected weather risks, which are becoming more frequent due to climate change. It eliminates the costly claim and verification process associated with traditional insurance products, and allows an automatic payout based on a trigger threshold. The insurance also helps to avoid moral hazard and adverse selection, two major problems caused by information asymmetry associated with traditional forms of insurance, as all buyers on the same contract pay the same premium and receive the same indemnity per unit of insurance, irrespective of their actions (WFP and IFAD, 2010). In recent years, weather-based index insurance schemes have been piloted in some developing countries, including low-income ones such as Ethiopia and Malawi, to cover weather-related risks (e.g. drought). In the Caribbean, where small island countries are particularly vulnerable to extreme weather events, similar insurance schemes have been developed at both the national, farm, and firm levels to protect governments, smallholders and financial institutions (Anthony, 2013).

Developing countries need to overcome three main challenges in scaling up weather-based index insurance schemes. First is basis risk, which refers to a situation when weather indexes will not move in the same way as crop yields or smallholder revenues. Second, the selection of the weather index and the availability of reliable weather data necessary to construct such an index are crucial. For this,

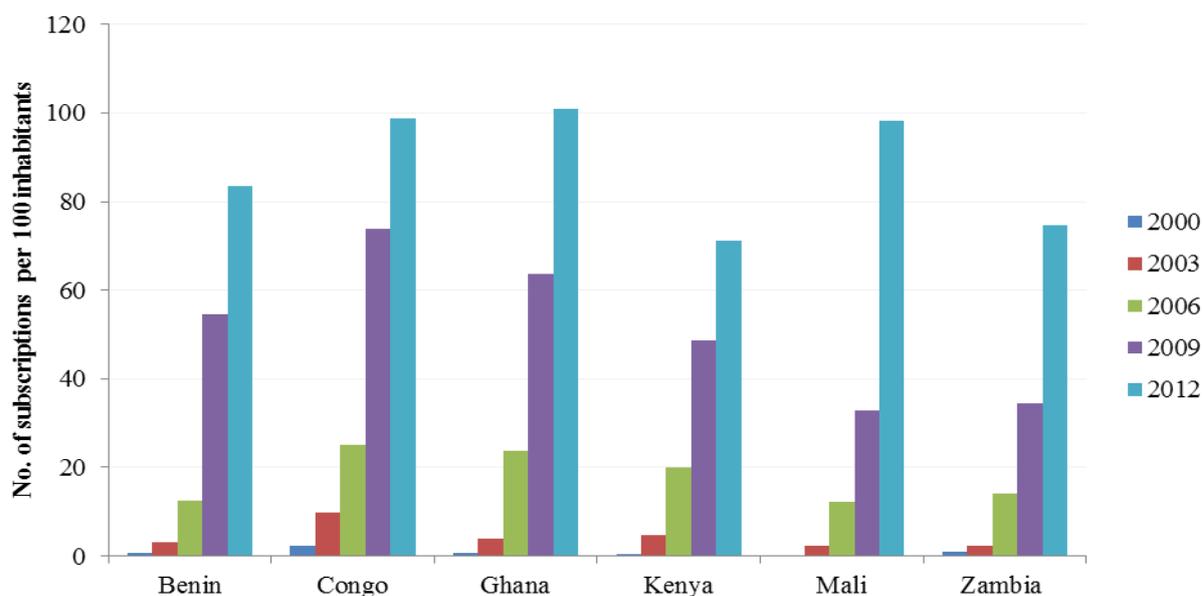
developing countries need to improve their weather stations and strengthen their national meteorological services. Third, product marketing is often expensive and adds costs to the services provided by the schemes. To date, experience suggests that it is possible to reduce marketing costs and expand the client base if partnerships are forged with financial institutions and key stakeholders of commodity chains (e.g. input providers and extension services) to incorporate weather-based index insurance schemes into their product packages.

With regard to smallholders' dealings with buyers, contract farming has become the most commonly used tool for price risk mitigation. This business model starts with a verbal or written agreement between farmers and buyers, whereby farmers commit to delivering agricultural produce of an agreed quantity and quality, at an agreed time. Under such an agreement, buyers guarantee to purchase the produce according to predetermined pricing structures if the produce meets the required standards. Sometimes, inputs, technical assistance and finance are provided by buyers to farmers, with the relevant costs being deducted upon delivery of the produce. The commonly used *ex-ante* fixed selling price of different grades of agricultural produce enables smallholders to be protected from future price volatility. Existing evidence suggests that in certain markets contract farming can be inclusive and beneficial to them in the form of increased productivity, quality and income gains (Agar and Chiligo, 2008; Barrett et al., 2012). However, it is difficult to ensure that smallholders obtain a reasonable predetermined price for their produce and to guarantee that the contract will be properly implemented or respected by both parties.

2.5 ICTs in support of smallholder farming businesses

During the past two decades or so, the expansion of supply chains and the rapid development of ICTs in developing countries have provided new opportunities for the development of smallholder farming businesses. In particular, the emergence of alternative financing mechanisms, weather index-based insurance and agricultural and financial services provision through mobile phones have provided new avenues for the development of smallholder enterprises. However, to date, agricultural investments typically target large-scale farming operations, with little focus on smallholders.

Meanwhile there has been a spectacular increase in the adoption and use of mobile phones in rural areas in developing countries, enabled by the availability of affordable handsets and the continued expansion of mobile telephony networks. According to estimates by the International Telecommunication Union (ITU), mobile cellular penetration rates surged to 89 per cent in developing countries in 2013. In the same year, 63 per cent and 16 per cent of populations in Africa had access to mobile phones and the Internet, respectively. In SSA, a mobile phone network existed in every country by 2009, compared with less than 25 per cent of countries in 1997 (Aker and Mbiti, 2010), and mobile phone subscriptions increased from less than 3 per cent in 2000 to more than 70 per cent in 2012 in several SSA countries (figure 3.4).

Figure 3.4: Mobile cellular telephone subscriptions per 100 people in six sub-Saharan African countries, 2000–2012

Source: ITU, *ICT Statistics*.

Mobile telephones are particularly attractive to rural populations because of their wide geographical coverage and relatively low costs, compared with installing fixed telephony and acquiring computers and Internet services. In Africa, the mobile cellular network covered about 52 per cent of the rural population (253 million people) in 2008, and it could exceed 90 per cent by 2015 (ITU et al., 2010).

Creative mobile phone applications have changed traditional means of service delivery. Mobile phones can support smallholders' farming enterprises by enabling them to access market information (e.g. price, potential buyers and input suppliers) and extension and financial services, which would otherwise be unavailable or unaffordable to them. Aker (2010) reviewed numerous agricultural extension programmes delivered via mobile phones in developing countries and found that most of them focus on market prices, weather and transportation information. Meanwhile, information on agricultural practices and inputs is often communicated via agricultural "hotlines", as that information is more nuanced and difficult to convey via standardized market information platforms. The reviewed also illustrated that it is much less costly to provide market information via SMS or a hotline than it is to arrange an in-person visit by an extension worker.

By reducing the cost of information searching, mobile telephones provide farmers with an opportunity to use spatial and temporal arbitrage, thus improving their bargaining power with buyers. In Niger, for example, thanks to mobile phones, the cost of obtaining price information from a market located 10 km away fell by 35 per cent between 2001 and 2008 (Aker and Fafchamps, 2010). However, several empirical studies have found that better access to market and price information does not necessarily translate into smallholders receiving higher prices (Fafchamps and Minten, 2012; Aker and Ksoll, 2012; Aker and Fafchamps, 2014).

Mobile phone applications have also been used to facilitate rural populations' access to innovative payment systems and basic financial services. For smallholders, domestic or international money transfers through mobile phones (e.g. M-PESA in Kenya) provide a reliable, secure and speedy service compared with informal channels. In East Africa, where money transfer services using mobile phones are quite advanced, the majority of such transfers take place between urban and rural areas; however, rural smallholders are also more and more relying on their mobile phones to carry out transactions with their clients. Following the success of such means of money transfer, an increasing number of financial institutions are offering integrated financial services (e.g. savings deposits, payments and credit) through mobile phones (UNCTAD, 2012a).

3. Smallholder farming and environmental sustainability

Agriculture is one of the biggest contributors to human-induced greenhouse gas (GHG) emissions. Deforestation related to agriculture extension and animal husbandry as well as unsustainable soil and nutrient management practices, account for about 25 per cent of net GHG (FAO, 2015). FAO data shows that in 2011, 44 per cent of agriculture-related GHG emissions occurred in Asia, 25 per cent in the Americas, 15 per cent in Africa, 12 per cent in Europe and 4 per cent in Oceania. As part of the agricultural sector, smallholders are also contributors to GHG, especially in cases where their restricted access to resources, particularly available arable land, has forced them to use harmful extension techniques. However, smallholders mostly depend on natural conditions for agricultural production, rely on traditional knowledge when predicting the weather even though some now have access to ICT-based weather information, use native varieties and diversified farming systems, and have a lower dependence on energy-linked inputs. As such, they are natural guardians of biodiversity. However, they are vulnerable to climate change and degraded ecological systems. For many of them, it has become increasingly difficult to farm, as seasons, floods and storms follow a more irregular pattern and the frequency of water stress, soil erosion and infestations has increased.

In addition to the evidence provided by agricultural institutions, the reality of the impact of climate change on agriculture and the importance of local, community-based knowledge have both been substantiated in IPCC's scientific reports (IPCC, 2013). Recent findings of the IPCC on climate change and agriculture, show that climate change and extreme weather events will have greater impacts on sectors linked to natural production, such as agriculture and forestry. Clear links have also been established between the adaptability of agricultural systems to these impacts and potential consequences for food security. The IPCC's Special Report further asserts that there is high confidence that climate change has the potential to seriously affect water management systems and that smallholders hold the key to reducing these negative impacts, so long as they are supported through innovative and holistic programming (IFAD, 2015). Recognizing their key role, some initiatives are under way to reward smallholder farmers who invest in environmentally friendly farming practices. For example, in the United Republic of Tanzania, after the completion in 2004 of a traditional forest restoration project, HASHI, farmers continued many of the eco-friendly activities initiated by the project, as they had come to value the resulting benefits. These included cash income, estimated at \$14 per person per month, generated from the use of a variety of products (e.g. fuelwood, timber and medicinal plants) (UNDP, 2012). However, such initiatives' objective of environmental sustainability may sometimes conflict with that of profit maximization. The following sections review environmentally friendly farming practices, and explore market-based mechanisms and policy incentives that would encourage profit-seeking smallholders to invest in technologies and farming systems that are pro-environment.

3.1 Environmentally friendly agricultural production

In recent years, agroecology has been identified as the most important approach to increasing the resilience and productivity of smallholder farming while conserving ecosystems. It builds on smallholders' indigenous knowledge, and at the same time incorporates modern agricultural technologies that are adapted to smallholders. In light of the ecosystem approach, external inputs, such as chemical fertilizers, should be used only when necessary, and in an appropriate and efficient way to minimize their adverse impacts on the environment (FAO, 2011b). . Table 3.2 lists some farming practices based on such an approach.

Table 3.2: Selected examples of agroecological farming practices

<i>Examples</i>	
Soil health	<p>In the Sahel, the African acacia, <i>Faidherbia albida</i>, loses its nitrogen-rich leaves during the rainy season, thus providing protective mulch, which also serves as a natural fertilizer for crops. In Malawi, maize yields near <i>Faidherbia</i> trees are almost three times higher than yields outside their range.</p> <p>In Bangladesh, from 2011 to 2013, 2.5 million farmers using fertilizer deep placement^a doubled their rice production. Their gross profit margin per hectare increased from \$431 in 2012 to \$587 in 2013 due to lower fertilizer costs and higher yields.</p>
Water management	<p>In semi-arid areas of Niger, small-scale farmers use planting pits to harvest rainwater and rehabilitate degraded land for cultivation of millet. Supplemental irrigation, which entails harvesting rainwater run-off by storing it in ponds, tanks or small dams and applying it during critical crop growth stages, permits earlier planting and improves productivity.</p>
Plant protection	<p>Integrated pest management provides a holistic and ecological strategy to manage pests and protect crops. In SSA, the cassava green mite and the cassava mealybug were brought under control by the introduction of natural enemies from Latin America.</p>
	<p>^a Fertilizer deep placement is an innovative fertilizer application technology that places fertilizer briquettes that are much larger than conventional fertilizer granules below the soil surface. These release nitrogen gradually, coinciding with the crop's requirements during the growing season. Fertilizer deep placement is more effective than the traditional method of applying fertilizer by surface broadcasting (usually by hand) across a field or paddy. Such a technology can help increase crop yields and incomes, reduce the amount of fertilizer used and lessen environmental damage to the atmosphere and water (source: http://ifdc.org/fertilizer-deep-placement/).</p>

Source: FAO, 2011a; International Fertilizer Development Centre, *IFDC Annual Report 2013*.

Smallholders are a significant source of knowledge for agroecological practices and are recognized as such by important bodies such as the IPCC (IPCC, 2013). Traditional agroecological farming systems are complex and require an understanding of the interactions between biodiversity, diversified agricultural systems and resilience to human-induced weather and environmental changes, among others. An increasing number of studies document that ecological farming is more resilient to adverse conditions. In southern Brazil, for instance, conventional maize producers suffered an average yield loss of 50 per cent when they were hit by a severe drought during the 2008/09 agricultural cycle. However, producers who had adopted agroecological practices (e.g. using local seeds, green manure, rock dust and minimum tillage) registered a much lower loss, of about 20 per cent (Altieri et al., 2012). As another example, the UK-funded Foresight Project on Global Food and Farming Futures helped farmers in Cameroon, Malawi, Mozambique, the United Republic of Tanzania and Zambia grow maize alongside fast-growing and nitrogen-fixing shrubs, which boosted yields to 8 tons/ha, from the 5 tons/ha they had realized with monoculture practices.

Agroecological technologies and practices have also proven dynamic and knowledge-intensive. In India, an ecological, large-scale sustainable intensification programme, Bhoochetana (land rejuvenation), was introduced in the state of Karnataka in 2009/10. The programme aims to improve rural livelihoods in 30 selected rainfed districts of Karnataka by increasing productivity through sustainable intensification and market-led diversification systems. The improved farming management practices (including application of micronutrients) implemented through the programme have already resulted in increases in the yields of cereals, pulses, oilseed crops and cash crops by 22–60 per cent, and of sugarcane by 10 per cent. During the 2011 rainy season alone, 3 million farmers in the state increased their combined gross income by \$129 million (Wani, 2013). The success of the Bhoochetana programme further highlights some major elements needed for scaling up agroecological practices. These include establishing an alliance of key partners, including governments, research institutions, service providers and NGOs; ensuring the active engagement of smallholders in R&D; capacity-building among stakeholders at all levels through innovative extension services (e.g. empowering farm facilitators and lead farmers to reach smallholders); organizing field

days and disseminating information through mass media; closely monitoring operational and technical issues; and ensuring a rapid response to emerging problems.

3.2 Niche markets for sustainable agricultural products

The potential for and the benefits of organic agriculture for smallholders have been well documented in recent years. Organic farming practices can help cut GHG emissions, thereby contributing to climate change mitigation (Niggli et al., 2009). Developed countries represent the main markets for organic produce. But recently a growing middle class in some developing countries has become increasingly aware of the benefits of organic products, opening up new opportunities for smallholder organic producers. In Latin America, for example, Brazil has successfully developed its domestic organic market, which was valued at approximately \$750 million in 2012. Organic markets are also steadily growing in Chile, Costa Rica, Mexico and Peru (Flores, 2013).

These markets can generate several benefits for smallholders. First, organic production can have a positive impact on yields. A study by UNCTAD and UNEP (2008) has shown that organic production can help improve smallholders' yields in less favourable regions. Following an analysis of 114 organic and near-organic agricultural projects in 24 African countries, the report finds that, on average, organic agriculture increased yields by 116 per cent. Second, evidence has grown on agriculture's role in generating GHG emissions, enriching public awareness of the economic, social and environmental benefits of agricultural production. This awareness has allowed organic farmers to earn higher prices for their products and has increased incentives for smallholders to produce in an environmentally sustainable manner.

Third, the market for organic products has proven resilient in the face of economic shocks. Even during the worldwide economic slowdown from 2008 onwards, the global market for organic products continued to expand, reaching \$72 billion in 2013, a five-fold increase relative to 1999 (Helga and Lernoud, 2013). The demand was highly concentrated in North America and Europe, which together accounted for an estimated 95 per cent of sales of organic food and drinks in 2012 (Sahota, 2014). There were almost 2 million organic producers in the world in 2013, farming on 43.1 million hectares of land. The largest areas of organic agricultural land are in Oceania (40 per cent), and Europe (27 per cent). However, the area of land devoted to organic agriculture is still very small, at only about 1 per cent of the total agricultural land in 2013 (Helga and Lernoud, 2013), implying that there is huge potential for development. The expansion of demand for organic products, as predicted in some consumer surveys, and falling costs of organic certification are likely to influence the extent to which smallholders can benefit from this profitable niche market.

3.3 Sustainable agricultural supply chains and the private sector

Helping smallholders to transform their activities into viable agricultural enterprises could foster their integration into agricultural supply chains where they would benefit from better prices and other business conditions, strengthening the private sector. For smallholders, participation in supply chains could provide incentives for them to adopt sustainable agricultural practices and improve their incomes and livelihoods. For private sector players, being socially and environmentally responsible could bring new opportunities to increase investments and profits, as consumers today are increasingly concerned with environmental protection and the social welfare of poorer producers. Higher participation of smallholders in supply chains and fair prices for their inputs also contribute to a "relational business", the objective of which is to maximize the benefits of all the stakeholders, instead of narrowly focusing on maximizing one stakeholder's profit. Unilever, for instance, is promoting sustainable agricultural sourcing, including sourcing from smallholders. It aims to buy 100 per cent of its agricultural raw materials from sustainable sources by 2020. For example, the company's work in sustainable tea sourcing brings benefits to smallholders as they have a guaranteed market at a relatively high price. This interaction between multinationals and smallholders brings other benefits such as technology, access to quality inputs, access to finance and the adoption of sustainable production practices.

3.4 Payment for ecosystem services

There have been various attempts to provide incentives for farmers to engage in eco-friendly agricultural activities. Payment for ecosystem services is one of them. The relatively few experiences with flexible and incentive-driven ecosystem conservation mechanisms in developing countries such as China, Costa Rica, Ecuador, Kenya and Mexico during the past few decades have shown mixed results. The Grain for Green Programme launched by the Chinese Government in 1999 is the largest of such programmes among developing countries. It aims to increase forest coverage and prevent soil erosion on sloped croplands. In the eligible communities, farmers set aside all or part of certain types of land to grow trees. In return, the Government compensates participants with in-kind grain allocations, cash payments and free seedlings (Xu et al., 2006). These incentive-based mechanisms are often called payments for ecosystem services. They usually combine objectives related to nature conservation and rural development and involve methods such as: biodiversity conservation, carbon sequestration and watershed protection, as well as natural reserves and recreation areas (Milder et al., 2010).

There are two major challenges in the design of these schemes. The first is the need to identify sustainable funding to support them, and the second is to ensure that smallholders participating in these schemes can improve their livelihoods in a sustainable way, whether through direct funding or new income-generating activities. In the case of the Grain for Green Programme, although the Government provided cash subsidies for commercial forests for only five years, as compared with eight years for ecological forests, farmers preferred to plant commercial trees as these will guarantee their livelihoods in the long term (Ye et al., 2003). The performance of this and other incentive-based programmes illustrates the difficulties in guaranteeing that, faced with the lure of commercial farming, smallholders will remain engaged in environmentally sustainable agriculture in the long term. This further underlines the importance of aligning environmental sustainability requirements with smallholders' business objectives.

4. Conclusion

A large number of smallholders in developing countries depend on subsistence farming for their livelihoods. Moving from subsistence farming to commercial farming can increase their incomes and help create a virtuous cycle of sustainable and inclusive farming enterprises. A business approach is critical for the success of such a transition. However, while market-oriented and profit-seeking farming can potentially increase the incomes of smallholders, this should not be achieved at the expense of environmental sustainability. This chapter has highlighted some of the key conditions for a sustainable smallholder farming business model that can increase the profitability of farming while minimizing its adverse environmental impacts. It has identified several obstacles confronting smallholder farmers, including inadequate investment in agricultural research and extension services, insufficient extension services that often fail to address the specific needs of the beneficiaries, a low level of basic education, and a lack of business training for smallholders. The chapter has also drawn attention to the policy bias in favour of large-scale investments. In contrast, there are many promising innovations in addressing smallholders' incomes and financial needs, such as: index-based weather insurance, contract farming and mobile telephone-based agricultural and financial services. Similarly, despite a persistent digital gap, the expansion of global and domestic supply chains and the rapid development of ICTs over the past two decades provide new opportunities for smallholders seeking to develop farming businesses.

The chapter has also discussed the key role played by smallholders in environmentally friendly agriculture. Considering the interdependencies between agricultural activities and environmental processes, the chapter stresses the need to better integrate environmental sustainability in smallholders' sustainable farming business model. Doing so requires establishing an enabling environment as well as devising the right incentives.

Chapter 4: Smallholders and sustainable development in a changing global environment: Policy proposals

This chapter builds on the analysis presented in the previous chapters to identify key messages and recommendations that should be considered at the national, regional and international levels in the quest for a more economically, socially and environmentally sustainable small farm model. The chapter reaffirms the premise that it will be important to reverse the policy neglect of issues related to the profitability and sustainability of the smallholder model if, for the reasons highlighted in chapter 1, smallholders are to be given the attention they deserve. Some examples of successful delivery of smallholder-friendly policies and measures are offered, with a special emphasis on LDCs, so as to illustrate the feasibility of such policies. Many of these measures are the result of multi-stakeholder partnerships, with strong private sector involvement.

1. Selected policies and measures at the national level

Countries with strong potential for agricultural development need to give high priority to smallholder issues, as emphasized in this section. Indeed, looking at case studies spanning the last 50 years, although there are many paths towards successful agricultural development, and ultimately towards eliminating hunger, there is a common thread running throughout: the confluence of science, policy and leadership (Spielman and Pandya-Lorch, 2009). These three elements should be at the core of a policy package for new initiatives in favour of smallholders as discussed in this Report. Major policy recommendations aimed at overcoming the enduring challenges confronting small-scale farming are presented below.

1.1 Create an enabling environment at the national level

Sustainable development of smallholder farming is not possible without a strong enabling national environment. Such an environment should include sound and predictable economic policies, a macroeconomic framework supportive of agricultural development, strong and effective institutions, and adequate infrastructure. In addition, the following set of selected measures should be part of the policy mix in developing countries that have a high potential for agricultural production.

Smallholder agriculture and food security objectives should be championed by leaders at all levels

A number of actions could be undertaken in this regard. First, high-level leadership is critical for bringing about substantial results, as illustrated by the impressive results following Brazil's mainstreaming of the fight against hunger into the Government's strategy. The Zero Hunger Project began as a collective effort among NGOs, research institutions, grassroots organizations and social movements throughout Brazil that deal with food security-related issues. The Project became a central component of government strategy, with policy measures and actions spread across most of the government's thematic areas of work, paying specific attention to family farming (see chapter 1).

Second, budgetary pledges should be translated into actions of relevance to the development of smallholder agriculture. In Africa, where policy neglect was the most apparent, 40 African Union member States signed compacts under the Comprehensive Africa Agriculture Development Programme (CAADP), and, on average, public expenditures on agriculture have risen by over 7 per cent per year across Africa since 2003. Countries such as Burkina Faso, Ghana and Ethiopia have also been identified by a consortium of civil society organizations as having leadership and reforms that fostered an enabling environment for successful agricultural development (ONE, 2014). As part of this group of trailblazers, the Ethiopian Government recognizes the centrality of agricultural development to promoting inclusive growth. Its 2011 Climate-Resilient Green Economy (CRGE)

strategy makes specific reference to achieving a climate-resilient green economy as a matter of priority.

Third, since agricultural activities involve local communities, they require the full attention of local authorities, which can play an important role in the facilitation of agricultural development and the mobilization of rural populations. Therefore, local governments need to be empowered to play this role by providing them with adequate human and financial resources, among others. For example, in Nigeria, the National Programme for Food Security (NPFS) receives funding from multiple sources, part of which is allocated to local governments. Although the latter need additional support and capacity-building in fulfilling their role, the 1999 Constitution and the 1976 Guidelines of the Federal Republic spell out local governments' responsibilities for agricultural and rural development in their areas of jurisdiction, thus lending legitimacy to their actions in support of agricultural development.

Investment in physical infrastructure should be accorded high priority

Commodity-dependent developing countries need to scale up investment in all forms of physical infrastructure: roads, irrigation facilities, warehouses, processing facilities, energy generation and ICT. In this regard, countries can learn from a number of good practices. For example, as part of the Chinese Government's strategy to construct a "new socialist countryside", 95 per cent of Chinese administrative villages had roads, electricity, water, telephone and internet connections by 2012 (Wen, quoted in Sit and Wong, 2013). Better infrastructure has improved living standards in rural areas and induced many former migrants to return to the countryside as more profitable business opportunities emerge.

The provision of irrigation facilities and post-harvest storage should also be among priorities for investment. In Kenya, for instance, the Village Cereal Aggregation Centres, a private sector initiative, successfully help smallholders reduce post-harvest losses of maize through hermetic storage. Using this as a starting point, the programme also provides opportunities for market linkages with the World Food Programme (WFP) and a local brewery, and facilitates access to financial services, including microcredit from banks.

Similarly, investment in transport networks in agricultural areas that have a large percentage of smallholder farmers is important. For instance, Ghana's total public expenditure on feeder roads increased more than fivefold between 2002 and 2007, and a relatively large proportion of those roads (68 per cent) are in good or fair condition, resulting in a positive impact on agricultural profitability.

Investments in infrastructure projects of low commercial value need to be supported by public sector finance through grants, concessional loans and guarantees, provided the projects have the potential for financial viability in the long run. Public-private-partnership (PPP) schemes are also a key element of such programmes, and often bundle together interlocking productive agricultural infrastructure to reach a size that makes it attractive to both equity investors and commercial lenders. The Kalangala Integrated Infrastructure Programme in Uganda, for example, brings together the development of roads, ferry operations, power and water supply.

Agricultural and agribusiness policies should adopt a gender-based approach

Agricultural policies should adopt a gender-based approach from design to implementation. Specific measures include proactive promotion of women's inclusion and participation in producer groups and training activities. Similarly, women's specific needs must be taken into account in financing initiatives, for example by synchronizing the timing of the availability of funding with farming cycles and school terms. Programmes should also support women through business mentoring and networking. Notwithstanding the demonstrated centrality of the role of women in smallholder farming in many countries, there are few examples of thorough assessments and inclusion of the gender dimension in agricultural programmes.

The WFP's Purchase for Progress (P4P) initiative which has had a positive impact on the lives of 300,000 women in Africa is an illustration of what can be achieved by adopting gender-sensitive agricultural policies. P4P recognized the difficulty of targeting women and the limitations of using only numerical participation in projects as the way to make a positive impact on their lives. This

approach leads neither to substantial benefits for women nor to securing them the same financial gains as their male counterparts. P4P commissioned a thorough diagnostic study, which led to the adoption of a gender strategy with the following core objectives: (i) increase understanding of the importance of gender relations based on equity within beneficiaries' households, farmers' organizations and among supply-side partners; (ii) improve opportunities for women to participate in groups and decision-making; (iii) facilitate and increase the ability of rural women to access, control and manage resources and agricultural services; and (iv) diversify livelihood opportunities for women in income-generating agro-activities. While acknowledging the context specificity of countries, P4P applied this strategy across 21 countries. The latest information available shows that the new gender strategy is already showing signs of progress.

Secure and protect land rights of smallholder farmers

The establishment and the protection of land rights are central to the successful achievement of agricultural development objectives. Recent best practices in this regard include Rwanda's Land Tenure Regularisation Programme. The programme registered all the land in Rwanda (10.3 million parcels) using a one-off, low-cost, community-based process. Most examples of land reform successes in the developing world are from Asia. Between 1978 and 1984, China undertook a series of policy reforms that included returning more than 95 per cent of farmland to some 160 million farm households. The reforms were credited with contributing to an increase in rural incomes by 137 per cent, a reduction in rural poverty by 22 per cent, and an increase in grain production by 34 per cent. However, there were some negative spillovers, such as land fragmentation, with an estimated average of 0.08 ha of cultivable land per person in 2008, which is now raising concern. Viet Nam also undertook similar land reforms between 1987 and 1993 and shifted from being a net food-importing country to becoming the world's third-largest rice exporter in 1989.

Facilitate smallholder farmers' access to traditional finance and to innovative financing

Policies targeting access to finance should foster public-private partnerships in financing and training while also promoting the expansion of access to non-traditional financing adapted to the needs of small-scale farming. There are a number of good practices in this regard. For example, in 2009, Alliance for Green Revolution in Africa (AGRA), Equity Bank, IFAD and the Kenya Ministry of Agriculture established a loan facility of \$50 million to accelerate access to affordable financing for 2.5 million farmers and 15,000 agricultural value chain members in Kenya. Scaling up such initiatives could go a long way in providing many smallholders' much-needed access to financial resources.

Moreover, although external finance has played a key role in developing the agricultural sector in developing countries, an agricultural development strategy that is solely dependent on foreign resources is likely to be unsustainable given the high volatility of external financial flows and existing unfulfilled aid commitments. The total investment gaps for agriculture and food security for all developing countries is estimated to be about \$260 billion (UNCTAD, 2014b). This underlines the need for stronger mobilization of both private sector investment and domestic resources for agricultural development.

Support the development of cheaper alternative certification schemes in order to help smallholders gain more access to organic markets

Alternative certification schemes, such as low-cost, locally focused participatory guarantee systems (PGS) could help smallholders' access markets, particularly domestic markets. In a PGS scheme, standards are conceived and adopted by the stakeholders (i.e. producers and consumers) through a participatory process that keeps costs low and involves little paperwork. In Brazil, for example, farmers and consumers work together in a PGS to agree on a fair price for bananas. As bananas are sold directly to consumers, farmers realize a higher price than selling to distributors, and consumers pay less than they would if they purchased from retailers.

Foster environment-friendly farming practices

As with gender, environmental sustainability requirements should be integrated into agricultural policies. There are a number of possible policy measures in this regard. The first consists of removing subsidies on environmentally harmful inputs. In Indonesia, for instance, the removal of pesticide subsidies in 1986, combined with the implementation of an integrated pest management programme, had positive effects on the environment, human health, rice production and the national budget. Pesticide applications halved, which helped to improve biodiversity and human health. Furthermore, rice production grew by three million tons over four years, and the Government saved over \$100 million per year in spending on pesticides.

The second consists of providing support to the development of green labels for organically produced food products. In China, the Government provided guidance and support in developing a domestic market for “Green Food”. Thanks to the Government’s efforts in creating standards for quality and safety and in pushing for packaging and labelling of “Green Food”, farmers were able to sell their produce at a premium in local markets, which in turn served as a strong incentive for them to produce more green food. The expansion of the green food market has provided smallholders with an opportunity to earn higher incomes through more sustainable production. Initially, farmers were encouraged by county or village leaders to adopt green food production techniques. Subsequently, the prospect of earning more money by selling green food to enterprises that provided guaranteed markets rapidly became the primary incentive.

More generally, increased concerns about climate change warrant the shift to climate smart agriculture (CSA). However, reviews of experiences in this regard highlight the need to ensure that conditions on the ground allow the development of CSA. These usually entail a combination of policy, technology and financing. CSA implies direct incorporation of climate change adaptation and mitigation into agricultural development planning and investment strategies. It also requires a national strategy that provides incentives to encourage farmers’ to shift to this new form of farming.

A number of countries have already begun to make the necessary changes. For instance, the Government of Viet Nam created a National Target Programme to Respond to Climate Change and issued an action plan for 2011–2015 for the agricultural and rural development sectors to take measures to mitigate climate change. This is supported by long- and short-term plans, and specific projects on agriculture and rural development for the period 2011–2020. Specific targets include reducing GHG emissions by 20 per cent by 2020 in the agricultural and rural development sectors. To this end, a number of policy measures were proposed, including improving the efficiency of fertilizer use, changing input and output pricing policies, changing the content of extension services as well as the implementation of safety net programmes, improving rice farming techniques, using integrated solutions to save energy and fuel in land preparation, increasing the use of composting, and the reforestation and restoration of forests for sustainable utilization.

Provide public support to producer associations focusing on smallholder farming

Developing a strong agricultural sector requires supporting the professionalization of smallholder farming. Farmers’ organizations can play a positive role in this regard through a number of good practices. They are credited with playing a key role not only in improving access to credit, inputs and other services but also in increasing the political influence of farmers, thus leading to increased government support to agriculture. Specific measures in supporting farmers’ organizations (FOs) include building the management capacity of their leaders and supporting contacts of national FOs with international FOs so as to identify, by themselves, what would work best in their home countries. For example, Via Campesina, a transnational organization initiated in Latin America, gathers 164 local and national organizations in 73 countries from Africa, Asia, Europe and the Americas, representing about 200 million farmers. Its transnational membership has enabled Via Campesina to lead international campaigns in favour of the rights of smallholders.

1.2 Increase resources for science, technology and ICTs tailored to the needs of smallholders

Establish an R&D agenda focusing on smallholder farming

Research and development is a necessary condition for agricultural development, leading to tangible impact on productivity and on the quality of agricultural inputs. It therefore necessitates appropriate budgetary commitments. In China, for instance, investment in government-sponsored R&D increased by 5.5 per cent annually between 1995 and 2000 and by 15 per cent annually after 2000. This investment led to the adoption of more advanced technologies by poor farmers.

Promoting environmental sustainability, including by tapping the traditional knowledge of smallholder farmers should also be part of an R&D agenda. For this, it is necessary to promote inclusive R&D innovation platforms that take into account the local context. It is also necessary to increase long-term State financing of investment in green technologies adapted to the needs of small-scale farming. To this end, following the Maputo Declaration in 2006, African leaders pledged to allocate 1 per cent of agricultural GDP to agricultural R&D. Ghana is among the countries that are close to meeting this target, with an annual average of 0.7 per cent devoted to R&D since 2003. Other measures include supporting the development of high-yield, resistant seeds through sustainable crop intensification and the provision of universal access to extension services.

Increase the availability of ICT-based agricultural services

ICT has become a central tenet of modern agricultural development strategies. To capitalize on the cost-effectiveness of mobile telephony as a delivery channel for agricultural information services, policies should support expanding the coverage and upgrading the bandwidth of mobile networks in rural areas, particularly those areas with a large proportion of smallholder farmers. They should also promote bundling tailored, easy-to-use market information and extension services into affordable, fee-based services. There are a number of examples where mobile telephony platforms have transformed lives in rural areas. For instance, the pilot project “Avaaj Otal”, which is a mobile-phone-based agricultural advisory service for cotton farmers in Gujarat, India, cut the distribution cost of such a service from \$8.5 to only \$1.13 per farmer per month, making the service more affordable to a much larger group of farmers.

With regard to fee-based services, ESOKO and M-Farm illustrate the potential for competition to develop content that responds to rural farmers’ needs. Beginning as a donor-funded programme, ESOKO is a for-profit company based in Ghana and active in 10 countries, whereas M-Farm is based in Kenya. They each offer demand-driven bundles of information services: market and prices information, weather forecasts, pest bulletins and agronomic advice, as well as transaction platforms. These innovations have improved farmers’ lives. Although these initiatives are market-led, the presence of a well-designed policy and regulatory framework has been key to their success. In this regard, Ghana’s 2003 ICT for Accelerated Development Policy offers a good example of a policy framework: it contains detailed plans for the strategic adoption of ICT aimed at the modernization of agriculture.

1.3 Give priority to the needs of smallholders in investment policy for sustainable development

UNCTAD’s Investment Policy Framework for Sustainable Development states that “Governments should pay particular care in putting in place and enforcing regulations to protect the long-term national interest and not compromise it for short-term gains by special interest groups” (UNCTAD, 2012b). Clearly, the specifics of an investment policy framework that supports smallholders’ transformation into commercially viable enterprises will vary according to different countries, but the following basic principles of policymaking deserve to be highlighted.

Establish clusters for investments in agricultural value chains

Most of the measures required for promoting investments in agricultural value chains are similar to those of other sectors, including the establishment of clusters. For example, Nigeria's Agricultural Transformation Agenda included establishing staple crop processing zones (SCPZs) across 14 sites with significant cost reductions, and internal rates of return estimated at 25–50 per cent for both farmers and processors. The largest number of jobs created in the targeted agricultural commodities was in rice value chains. Overall, the Agenda led to \$2.6 billion accumulated new investments in rice production by 2015.

Introduce safeguards for smallholders in investment law and in investment contracts

Investment laws should incorporate safeguards for smallholders. This practice was adopted, for example, when the EU was expanded to many poorer East European countries. The EU's expansion to include Eastern Europe in 2004 led to fears that richer West Europeans would buy much of the land in poorer Eastern Europe. These fears were taken into consideration in reform of the Common Agricultural Policy, which included temporary prohibition on West European farmers and investors buying agricultural land in Eastern Europe. The duration of the prohibition ranged from 7 to 13 years in the case of Poland.

Design specific legal and regulatory tools for the development of inclusive business models that cater to the particular requirements and conditions of small actors along the value chain

Tax regulations should also explicitly support smallholder-oriented business models at the production level. In Côte d'Ivoire, for example, private sector investments in rural areas benefit from specific tax advantages that are better than those in urban areas. Investments in the capital city benefit from 5 years' exemption from income tax compared with 8 years in rural areas and 15 years in very remote areas. Similarly, measures should be specifically designed for supporting the upgrading and diversification of smallholders into processing, trading and exporting of products. The Ghana Commercial Agriculture Project (2012–2017) constitutes another example of including smallholders' interests in national policy documents. Supported by USAID and the World Bank, it has a special focus on linking smallholders to commercial businesses through contract farming.

1.4 Make small-scale farming attractive to the younger generation

Making agriculture attractive to youth should be one of the cornerstones of agriculture policymaking in the coming years. Countries could maximize the potential attraction of ICTs and modern technologies in agriculture. They should also develop regulatory tools that support entrepreneurship in climate-friendly initiatives among youth, and support capacity-building, investment facilitation and marketing specifically targeting young smallholder farmers. Nigeria's SCPZs, for instance, include provisions for the inclusion of young graduates in farming and agribusiness through the creation of Kibbutz-type farming settlements in the SCPZs.

2. Selected policies at the regional level

Achieving the goal of a world without hunger requires that regional economic communities give high priority to tackling food and nutrition insecurity as well as addressing smallholder farmers' issues. Food and nutrition security should be at the centre of regional blocs' initiatives. In this context, countries should collectively undertake to implement existing regional trade agreements, particularly elements relating to trade in food and agricultural products. Regional policies should be supportive of national food and agricultural policy measures. The regional action plan for food security of the West African Economic and Monetary Union (WAEMU) is a good example of the high priority given to food security. In March 2015, its high-level committee on food security adopted a 10-year Community Programme for Agricultural Transformation for Food and Nutrition Security. It takes into

account the importance of intra-community trade in strengthening food security, considers the impact of trade within WAEMU and recognizes the need for access to affordable energy for agricultural development.

The immediate and medium-term impacts of the 2008 food crisis on vulnerable groups underscore the need for supranational grain reserves. UNCTAD (2012a) provides a detailed review of food reserve initiatives and their potential to improve food security. The review shows that food reserves created after 1945, both in developed and developing countries, with price stabilization objectives, failed within a decade or two of their creation. On the other hand, available evidence shows that the reserve programmes established more recently as emergency measures have shown higher survival rates. Based on this evidence, regional groupings should establish regional grain reserves as emergency food stocks for countries that are still prone to recurrent food crises. Experiences across Asia and Latin America show that the management of such stocks is most effective at the regional level. Although such reserves usually include physical stocks earmarked for specific countries, their exact nature would depend on regional and country specificities with regard to the scale and nature of food shortages.

Other possible policy measures at the regional level include establishing regional financing facilities for agricultural entrepreneurship, providing intraregional infrastructure and supportive institutions for smallholder farming, and establishing aggregation centres where growers can pool their harvest to meet the demands of large institutional buyers operating in the region. Such centres could be established at a national level but geared for regional operations. Despite the limitations described in chapter 2, regional exchanges such as the Rwanda-based East African Exchange can offer the right platform to link small-scale farmers to agricultural and financial markets.

Regional entities are best placed to invest in intraregional and interregional technology transfer and pool resources for innovation-oriented research aimed at increasing the productivity and sustainability of smallholders. They could also consider establishing a regional strategy for agricultural value chains, by supporting intraregional country specialization based on each country's comparative advantage.

Similarly, the design of a regional strategy for attracting FDI could result in substantial benefits and greater efficiency gains across value chains. The investment policy of the Association of Southeast Asian Nations (ASEAN), for instance, has led to increased intra-ASEAN FDI, including in the palm oil sector. Its experience showcases investment promotion measures for market-seeking intraregional FDI in agricultural value chains. In Africa, even in the absence of a common investment framework, there are firms that are actively investing in different parts of the continent. The largest rice farm in Nigeria, a 30,000-ha Community Rice Project in Taraba State is the result of a joint venture between Dominion Farms, the largest rice producer and processor in Kenya, and a local Nigerian investor.

3. Selected policies and measures at the international level

Policies and measures at the international level are the most challenging as they generally require lengthy negotiations among countries. Some key prerequisites for the establishment of an enabling environment for smallholder farming at the international level are discussed below.

3.1 Ensure that outcomes of international trade negotiations benefit smallholders and promote food security

Smallholders' interests in the Doha Round of trade negotiations should be defended. With regard to the elimination of trade subsidies, which is a difficult issue in international trade negotiations, a few examples from developed countries show that the elimination of trade-distorting subsidies in the agricultural sector can be welfare-enhancing. Australia and New Zealand, for example, removed almost all their production subsidies in the 1970s and 1980s, respectively, and the farming sector in both countries has flourished ever since. In the case of cotton, Australia has the best production technology in the world, and yields per hectare are the highest in the world, and yet Australian farmers receive no subsidies.

The issue of public stockholdings of food crops should also be carefully considered in international trade negotiations. Arguments for supporting their establishment highlight their positive impact on smallholders through channels such as public procurement systems. Furthermore, beyond economic arguments, proponents of food sovereignty are increasingly vocal in asserting that countries should be given policy space to initiate public procurement of key staple crops at given prices if their national circumstances require them to do so.

The “expeditious and ambitious” treatment of the cotton issue at the WTO should be finalized, with all parties involved in the negotiations showing a willingness to move forward. Developed countries should focus more on the management of trade-distorting subsidies, whereas developing countries, especially LDCs, should pay greater attention to allocating resources to improving the productivity, value addition and marketing of cotton in their countries.

3.2 Regulatory reform of international commodity markets should focus on the well-being of smallholders

As noted earlier in this Report, highly volatile international food prices over the past few decades have been a major threat to food security, particularly in Africa, but also in other developing regions. The international community therefore needs to collectively consider the evidence on the impact of the financialization of food markets on global food security. While weather conditions and policy choices continue to be the main determinants of food markets, the role of international commodity markets should not be underestimated. UNCTAD (UNCTAD 2011, 2012c, 2012d) has repeatedly called for strong and prompt policy and regulatory responses with regard to the financial markets, coupled with measures relating to physical markets. Some policy proposals are of direct relevance to smallholders, such as requiring greater transparency and providing better and timely data on fundamentals in physical markets. The specifics of such reforms are beyond the scope of this Report, and should be debated in intergovernmental forums.

3.2 Ensure that development finance and climate finance for the agricultural sector target small-scale farming in particular

Considering the large proportion of smallholders among the poor, greater attention should be devoted to the financing needs of small-scale farmers. First, the recent revival of interest in agriculture should translate into an increased share of ODA directed to smallholder farming. Initiatives that are under way and have demonstrated a positive impact should be scaled up. The EU, for instance, has placed agriculture at the heart of its international development programme. In 2008, in response to soaring food prices in developing countries, it set up a €1 billion food facility fund aimed at protecting vulnerable populations from food price volatility by increasing food supplies, investing in agricultural capacity and improving governance in the agricultural sector. The EU also pledged a further €2.7 billion at the G8 meeting in 2009 to help increase global food security. Similarly, the United States Government’s Feed the Future Initiative has contributed to the decline of stunting in Ethiopia, Ghana and parts of Kenya by between 9 and 33 per cent in recent years.

In addition to the allocation of funds to agriculture in general, there is also need for specific support to the cotton sector. Cotton is the main source of income for millions of poor smallholders in cotton-producing LDCs, and thus is a major test of the capacity of the Doha Round to deliver on its promise of boosting development. The specific measures highlighted in the Pan African Cotton Road Map with regard to production, marketing and value addition remain relevant and require funding to move from a consensus on diagnosis of problems and identification of policy measures to implementation. To this end, a coalition of national governments and farmers’ organizations could play a role in demanding action and support from regional institutions and development partners.

Technology transfer to smallholder agriculture in developing countries could also be promoted through the establishment of a platform for pooling existing resources for financing trade and technologies that are of relevance to smallholders. The EU has invested €22 million in a four-year regional programme, entitled “Technology Transfer for Food Security in Asia” (TTFSA), which focuses on facilitating the adoption of productive and environmentally green technologies to boost

agricultural productivity and improve farmers' access to markets specifically in countries with the highest food insecurity, such as Afghanistan, Bangladesh, Cambodia, India, the Lao People's Democratic Republic, Myanmar, Nepal, and Pakistan. Such initiatives should be extended to cover more countries.

With regard to funding, long-term public funds, typically from development banks should be made available for innovations in green technologies for smallholder farming. Similarly, smallholder agriculture should be a priority in the allocation of climate finance. As much of such finance comes from private sources, there is a need to devise incentives for institutional investors in climate-friendly technologies to invest in relevant technologies for smallholder farming.

4. Align policies, pledges and actions at international, regional and national levels

To achieve a more positive impact on the well-being of smallholders, better policy alignment in international policymaking circles is needed of all areas related to smallholder farming and food security. Particular attention should be given to ensuring consistency between the forthcoming climate negotiations and the SDGs, aligning bilateral investment treaties with national development priorities, and honouring the time frame for the creation of the Technology Bank that was proposed in the 2011 Istanbul Plan of Action. It is also crucial to honour past commitments on policy alignment and aid effectiveness, such as those stated in the 2008 Paris Declaration on Aid Effectiveness.

5. Establish mechanisms for greater accountability and monitoring

There is an urgent need for greater accountability and monitoring of progress on key commitments related to fostering the development of smallholders. Indeed, in spite of commitments made at the international level, high levels of poverty among smallholder farmers persist. The international community should therefore design a framework for monitoring and reporting on issues relevant to smallholders, particularly those relating to productivity, market access, finance, investment and technology. The accountability framework should include governments, farmers' organizations, civil society organizations, private sector and development partners, including relevant international organizations.

To make such an accountability framework a reality, a first step could be the strengthening of statistical systems at national, regional and global levels, and establishing appropriate statistical tools to measure the extent to which commitments are being met and how they benefit smallholders. This would include indicators showing government expenditures and ODA directed to smallholder farming. In addition, a framework for monitoring and reporting on issues relevant to smallholders in the areas of trade, finance, investment and technology should be established with improved links between international, regional and national accountability mechanisms.

6. Conclusion

It is now well acknowledged that smallholder farmers are major contributors to food security throughout the world. In countries with high levels of poverty, smallholders have the potential to play a key role in making the agricultural sector an engine of economic growth and poverty reduction. Moreover, the size of smallholder landholdings and their resilience in spite of the policy neglect from which they have suffered make them important vehicles for environmental sustainability efforts. Yet, despite their potential, they are more affected by poverty than other groups of the population in the developing world. Against this background, this Report has attempted to look closely at the issue of smallholders in sustainable commodity production and trade.

Smallholders face a long list of enduring challenges, including a wide range of input and output market failures, little or no negotiating power in trade transactions, other imperfections in national,

regional and international markets, little – if any – capacity to safeguard their interests in large agricultural investment deals, inadequate investment in agricultural research and extension services, particularly those geared towards smallholders, a low level of basic education, and a lack of business training. They are also affected by negative shocks from international commodity markets but benefit little from positive shocks. The paucity of risk management tools, especially since the dismantling of most of the support provided by public institutions, such as commodity boards, in the context of trade liberalization in many developing countries has caused lasting damage to smallholder farming. The void created by the discontinuation of public support to smallholders has not been filled by the private sector, as expected, due to the lack of an enabling environment.

In spite of the difficult conditions under which smallholders in developing countries operate, this Report presents a positive outlook about their future, provided a number of conditions are put in place. There is no doubt that a large number of smallholdings can be profitable and sustainable business enterprises. And the transition from subsistence to commercial farming has the potential to improve smallholders' well-being and their countries' economic development. This Report has reviewed many instances where factors such as innovative financing mechanisms, access to contract farming, better and increased extension services, and ICT-based agricultural and financial services, to name a few, have gradually increased smallholders' productivity and integration into markets. The potential for scaling up their role in environmentally friendly agriculture is also gaining momentum. As a way of reducing the negative effects of smallholders' existence as atomized units in terms of profitability and sustainability, it is widely accepted that support is needed to help them group together into farmers' organizations and cooperatives. Moreover, as members of large groups, smallholders would carry greater weight when participating in consultative processes at the national, regional and global levels, helping to reverse the policy neglect they have endured in many countries. The ability of smallholders to harness their full potential and maximize their contribution to environmental conservation and socio-economic development will also depend, in large part, on the willingness and capacity of the international community and developing countries, through their policies, to consider smallholders as key agents of development.

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