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9 Agricultural Transformation and Rural Development

9.1 The Imperative of Agricultural Progress and Rural Development

If the migration of people with and without school certificates to the cities of Africa, Asia, and Latin America is proceeding at historically unprecedented rates, a large part of the explanation can be found in the economic stagnation of outlying rural areas. Despite real progress, nearly 2 billion people in the developing world grind out a meagre and often inadequate existence in agricultural pursuits. Over 3 billion people lived in rural areas in developing countries in 2018, about a quarter of them in extreme poverty. And despite the extraordinary urbanisation taking place throughout the world (examined in Chapter 7), people living in the countryside make up more than 60% of the population in both low- and lower-middle-income countries on average. Latin America is highly urbanised, having reached the same level of urbanisation as the high-income Organisation for Economic Cooperation and Development (OECD) countries by 2011. But in sub-Saharan Africa, rural dwellers constitute 64% of the total population; in South Asia, some 69% of the population live in rural areas as of 2011, with the result that more than half the workforce is concentrated in agriculture. Countries whose population is more than 80% rural include Ethiopia, Nepal, Niger, Papua New Guinea, Rwanda, South Sudan, Sri Lanka, and Uganda. India remains more than two-thirds rural.[1]

Of greater importance than sheer numbers is the fact that well over two-thirds of the world's poorest people are also located in rural areas and engaged primarily in subsistence agriculture. Their basic concern is survival. Many hundreds of millions of people have been bypassed by whatever economic progress their nations have attained. The United Nations Food and Agriculture Organisation estimated that in 2018, over 820 million people did not have enough food to meet their basic nutritional needs.[2] In the daily struggle to subsist, behaviour of poor farmers in developing countries often seemed irrational to many observers, who until recently had little comprehension of the precarious nature of subsistence living and the importance of avoiding risks. If development is to take place and become self-sustaining, it will have to include the rural areas, in general, and the agricultural sector, in particular. The core problems of widespread poverty, growing inequality, and rapid population growth all originate in the stagnation and often retrogression of economic life in rural areas, particularly in Africa.

Traditionally in economic development, agriculture has been assumed to play a passive and supportive role. Its primary purpose was to provide sufficient low-priced food and manpower to the expanding industrial economy, which is thought to be the dynamic "leading sector" in any overall strategy of economic development. Lewis's famous two-sector model, discussed in Chapter 3, is an example of a theory of development that places heavy emphasis on rapid industrial growth, with an agricultural sector fuelling this industrial expansion by means of its cheap food and surplus labour. Nobel laureate Simon Kuznets introduced an early schema, noting that agriculture made four "contributions to economic development": the product contribution of inputs for industry such as textiles and food processing; the foreign-exchange contribution of using agricultural export revenues to import capital equipment; the market contribution of rising rural incomes that create more demand for consumer products; and the factor market contribution, divided between the labour contribution (Lewis's manpower)—workers not needed on farms after agricultural productivity was raised could then work in industry—and the capital contribution (some farm profits could be reinvested in industry as agriculture became a steadily smaller fraction of national income). The capital contribution was misapplied as a "squeezing of the peasantry," but it meant investing first in agriculture and later reaping profits that would be partially reinvested in industry. As can be seen from this description, however, the framework implicitly—and ironically—still treats industrialisation rather than rural modernisation as the core development goal.[3]

Today, most development economists share the consensus that far from playing a passive, supporting role in the process of economic development, the agricultural sector, in particular, and the rural economy in general, must play an indispensable part in any overall strategy of economic progress, especially for the low-income developing countries.

An agriculture- and employment-based strategy of economic development requires three basic complementary elements: (1) accelerated output growth through technological, institutional, and price incentive changes designed to raise the productivity of small farmers; (2) rising domestic demand for agricultural output derived from an employment-oriented, urban development strategy; and (3) diversified, nonagricultural, labour-intensive rural development activities that directly and indirectly support and are supported by the farming community.[4] To a large extent, therefore, agricultural and rural development has come to be regarded by many economists as the *sine qua non* of national development. Without such **integrated rural development**, in most cases, industrial growth either would be stultified or, if it succeeded, would create severe internal imbalances in the economy.

Integrated rural development The broad spectrum of rural development activities, including small-farmer agricultural progress, the provision of physical and social infrastructure, the development of rural nonfarm industries, and the capacity of the rural sector to sustain and accelerate the pace of these improvements over time.

Eight main questions, therefore, need to be asked about agricultural and rural development as it relates to overall national development:

1. How can total agricultural output and productivity per capita be substantially increased in a manner that will directly benefit the average small farmer and the landless rural dweller while providing a sufficient food surplus to promote food security and support a growing urban, industrial sector?

2. What is the process by which traditional low-productivity (peasant) farms are transformed into high-productivity commercial enterprises?
3. When traditional family farmers and traditional (peasant) cultivators resist change, is their behaviour stubborn and irrational, or are they acting rationally within the context of their particular economic environment?
4. What are the effects of the high risks faced by farmers in low-income countries, how do farm families cope with these risks, and what policies are appropriate to lessen risk?
5. Are economic and price incentives sufficient to elicit output increases among traditional (peasant) agriculturalists, or are institutional and structural changes in rural farming systems also required?
6. Is raising agricultural productivity sufficient to improve rural life, or must there be concomitant off-farm employment creation along with improvements in educational, medical, and other social services? In other words, what do we mean by *rural development*, and how can it be achieved?
7. How can countries most effectively address problems of national food security?
8. What is the proper role for government in the agricultural sector? (What actions can lead to improvements through addressing market failure and what are likely to make things worse through government failure?)

In this chapter, after a look at broad trends, we will examine the basic characteristics of agrarian systems in Latin America, Asia, and Africa. Although there is considerable diversity among developing nations, as well as within developing countries, each region tends to have a number of characteristics in common. First, these regions typically reflect the agricultural patterns of agriculture-based economies (in Africa), agriculturally transforming economies (in Asia), and urbanised economies (in Latin America). Relatedly, agriculture in these regions often typifies the stages of subsistence, mixed, and commercial farming, with important regional exceptions and varying success at inclusion of the poor. With successful development, countries tend to move toward commercialised agriculture, though with different trajectories and differing economic, social, and technical problems to solve along the way. Regions that have high concentrations of poverty also often reflect patterns of traditional agriculture (in Africa), high population density and subdivided smallholdings (in Asia), and the sharp inequalities of very large and very small farms (in Latin America). We will identify the various challenges facing each group of countries and look at countries that are typical of their region and some countries and districts that deviate from the pattern.

Over two-thirds of the world's extreme poor are involved in agricultural activities. We will therefore examine the economics of traditional (or peasant) subsistence agriculture and discuss the stages of transition from subsistence to commercial farming in developing nations. Our focus is not only the economic factors but also on the social, institutional, and structural requirements of small-farm modernisation. We will then explore the meaning of *integrated*

rural development and review alternative policies designed to raise levels of living in rural areas. The chapter concludes with a case study of problems of agricultural extension for women farmers in Africa, with a focus on Kenya and Uganda.

9.2 Agricultural Growth: Past Progress and Current Challenges

9.2.1 Trends in Agricultural Productivity

The ability of agricultural production to keep pace with world population growth has been impressive, defying some neo-Malthusian predictions that global food shortages would have emerged by now. And it has actually been output gains in the developing world that have led the way. According to World Bank estimates, the developing world experienced faster growth in the value of agricultural output (2.6% per year) than the developed world (0.9% per year) during the period 1980–2004. Correspondingly, developing countries' share of global agricultural GDP rose from 56% to 65% in this period, far higher than their 21% share of world nonagricultural GDP. Since 2005, the growth gap has widened further. And research by the International Food Policy Research Institute points up that a wide range of successful programmes have reduced hunger while raising agricultural productivity over the last several decades, including **Green Revolution** successes in Asia; containment of wheat rusts; improved maize and pest-resistant cassavas in sub-Saharan Africa; shallow tubewells for rice and homestead food production in Bangladesh; hybrid rice and mung bean improvement in East Asia; pearl millet and sorghum and smallholder dairy marketing in India; improved tilapia in the Philippines; successful land tenure reform in China and Vietnam; cotton reforms in Burkina Faso; and improvements of markets in Kenya.[5]

Green Revolution The boost in grain production associated with the scientific discovery of new hybrid seed varieties of wheat, rice, and corn that has resulted in high farm yields in many developing countries.

The degree to which general agricultural output grew significantly faster in developing countries in the 40-year period from 1970 to 2010 is reflected in Table 9.1. Output also grew in OECD regions; the sole exception was the poor performance in the transition countries. But growth in the value of output has not kept pace with population growth in Africa.

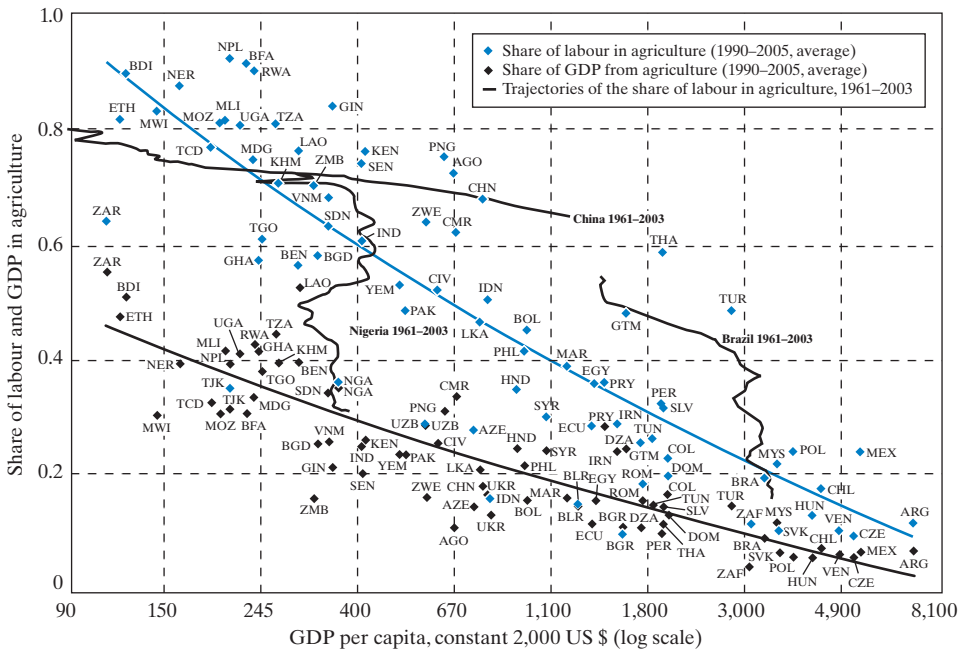
As Figure 9.1 shows, low-income countries tend to have the highest share of the labour force in agriculture, sometimes as much as 80 to 90%. The share of agriculture in GDP is lower but can represent as much as half of the value of output. These shares both tend to fall as GDP per capita rises: this is one of the broad patterns of economic development (see Chapter 3). But attention to the time paths of the share of agriculture in specific countries reveals a great deal of variation, which is also informative. In particular, sometimes the share of labour in agriculture declines greatly even when GDP per capita does not increase much, if at all; examples are seen in the time paths of Nigeria and Brazil, as traced out in Figure 9.1. This finding parallels the observation in Chapter 7, that urbanisation is proceeding in many countries even when per capita income is falling or not rising much. Problems in the agricultural sector can suppress incomes, encouraging more migration to the urban informal sector. We will

TABLE 9.1 Average Annual Growth Rates of Agriculture, by Region (%)

	1971–1980	1981–1990	1991–2000	2001–2010	1971–2010
High-income countries	1.83	0.97	1.25	0.47	1.14
Developing countries					
Latin America and Caribbean	2.93	2.35	3.09	3.21	2.89
Northeast Asia	3.23	5.04	5.04	3.39	4.19
South Asia	2.19	3.70	2.76	2.80	2.86
Southeast Asia	3.66	3.32	3.41	4.23	3.64
Sub-Saharan Africa	1.05	2.68	3.11	2.97	2.44
West Asia and North Africa	3.31	3.84	2.61	2.75	3.13
Transition countries	0.81	1.42	−4.03	2.28	0.04
World	2.08	2.42	2.09	2.42	2.25

Source: IFPRI (International Food Policy Research Institute) (2013), 'Global Food Policy Report,' Table 1, Washington, D.C.

FIGURE 9.1 As Countries Develop, the Shares of GDP and Labour in Agriculture Tend to Decline, But With Many Idiosyncrasies



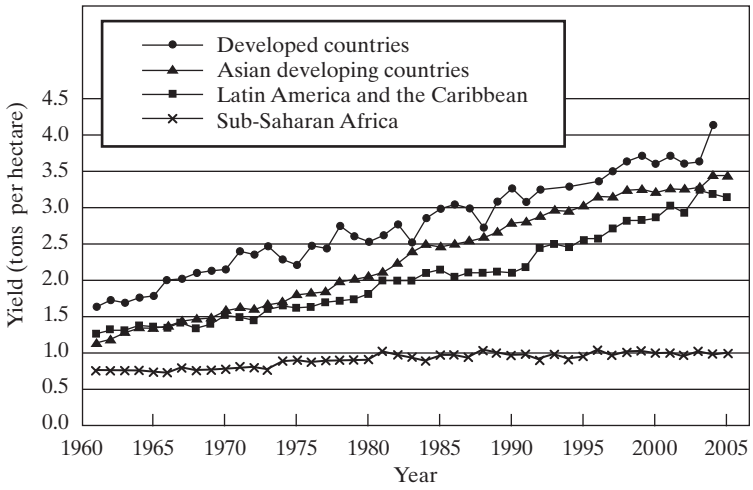
Note: The list of 3-letter codes and the countries they represent can be found in Table 2.1 on pp. 38–39 of this text.
Source: International Bank for Reconstruction and Development/World Bank, *World Development Report, 2008*. Reprinted with permission.

review the most important problems of developing-country agriculture in this chapter. Figure 9.1 also illustrates the time path of China, in which growth has been extremely rapid but the fall of the share of labour in agriculture has been unusually slow due in significant part to restrictions on rural–urban migration (though migration out of agriculture has greatly accelerated in the ensuing decade through to 2013).

In marked contrast to the historical experience of advanced countries' agricultural output in their early stages of growth, which always contributed at least as much to total output as the share of the labour force engaged in these activities, the fact that contemporary agricultural employment in developing countries is much higher than agricultural output reflects the relatively low levels of labour productivity compared with those in manufacturing and commerce.

Agricultural production continues to rise around the world, broadly keeping pace with the rising population. But progress has been very uneven, as seen in Figure 9.2. In Asian developing countries, cereal yields per hectare in 2005 were nearly triple their 1960 levels. Production in Latin America also posted strong gains. Hunger in China fell. Agriculture in South Asia performed well, although hunger is thought to have increased in India in recent years. And in sub-Saharan Africa, yields increased by only about one-third. One of the causes is that in many areas of Africa, the population has reached a size where traditional slash-and-burn agricultural practices are no longer feasible without reusing land after too little rest, resulting in significant deterioration of soil nutrients. But subsistence farmers cannot purchase improved seeds, fertilisers, and other essentials of modern agriculture; the result can be a poverty trap in which farmers must work harder and harder just to stay in place.

FIGURE 9.2 Cereal Yields by World Region, 1960–2005



Source: International Bank for Reconstruction and Development/The World Bank, *World Development Report, 2008.* Reprinted with permission.

Recurrent famine, regional famine, and catastrophic food shortages have repeatedly plagued many of the least-developed countries, particularly in Africa. The 2011 drought and famine in the Horn of Africa, which affected over 13 million people, brought renewed attention to the problem (see Box 9.1). Of Africa's 750 million people, more than 270 million suffer from some form of malnutrition associated with inadequate food supplies. The severe famine of 1973–1974 took the lives of hundreds of thousands and left many more with permanent damage from malnutrition across the continent in the Sahelian belt that stretches below the Sahara from Cape Verde, off the coast of Senegal in the west, all the way to Ethiopia in the east. Four times in the 1980s and 1990s, at least 22 African nations faced severe famine. In the 2000s, famine again seriously affected African countries as widely separated as Mauritania in the northwest, Ethiopia and Eritrea in the east, and Angola, Zambia, Zimbabwe, Malawi, and Mozambique across the south.[6]

Calls to mount a new Green Revolution in Africa like the successful one in Asia are now starting to get the hearing they deserve, with public, private, and nonprofit sector actors getting involved—including major support from the Alliance for a Green Revolution in Africa (AGRA), chaired by former UN secretary general Kofi Annan. Technical advances are clearly needed, and institutional and social transformation on the ground will also be needed to achieve the goals of rural development. The African Union's peer-review NEPAD initiative developed the Comprehensive Africa Agricultural Development Programme to emphasise investments and regional cooperation in agriculture-led growth as a main strategy to achieve the first Millennium Development Goal of halving hunger and poverty. It targets the allocation of 10% of national budgets to agriculture and a 6% rate of growth in the agriculture sector at the national level.[7]

One early success is in work at the Africa Rice Centre in Benin to develop varieties of New Rice for Africa (NERICA). These have so far proven beneficial in Benin, Uganda, and the Gambia, with apparently greater impact on women farmers than men farmers. It is not easy to replicate successes across Africa, however; for example, NERICA varieties have not helped in Guinea and Côte d'Ivoire. And food production will not automatically solve the problems of hunger among people living in poverty.

The food price spike of 2007–2008 and an additional spike in 2011 highlighted the continuing vulnerabilities. During the food price crisis, progress in reducing hunger ground to a halt and showed little improvement in the ensuing years. Some of the causes were temporary factors. But expert predictions are for high food prices in the longer term. Throughout the twentieth century, food prices fell at an average rate of 1% per year; but so far in the twenty-first century, food prices have risen on average. Figure 9.3 shows price trends for several key agricultural commodities; prices have generally returned to levels not seen since the late 1970s.[8] From 2011 to 2016, prices trended downward, by which point they were nearing pre-crisis levels. Then, from 2016 to 2019 prices increased, but has not approached the highs of the crisis period. This is not a reason for complacency, however.

As Nora Lustig has summarised, some of the causes of the 2007–2008 food price spike also reflect longer-term forces that will lead to high future food prices, including diversion of food to biofuels production, increase in the demand for

BOX 9.1 Development Policy: Development Policy Issues: Famine in the Horn of Africa

In 2019, Somalia faced an emergency after what were termed some of the worst rains on record and continued instability and violence pushed the country to the verge of famine. This was hardly a new situation for Somalia, which came close to a famine in 2016, and suffered a severe famine in 2010–12, when more than 250,000 people died—a majority of them children under the age of 5.

Facts about the Famine

In 2011, Somalia and its neighbouring countries faced a terrible drought, probably the worst in a half-century. More importantly, it took place in one of the world's worst governance situations, which created a catastrophe for many women, children, and other noncombatants caught in the crossfire—metaphorically and sometimes literally. The situation was further compounded by rapidly increasing food prices. Tens of thousands of people died as a result of this famine according to UN estimates. The appalling images of the famine compare with similar catastrophes, and over 100,000 residents reportedly fled to refugee camps to seek shelter and food. Health and nutrition conditions in the camps were reportedly very dangerous. Malnutrition rates in southern Somalia are among the highest in the world, over 50% in some regions, with 6 deaths per 10,000 people per day. After famine was declared, some commentators said starvation in Somalia seemed like a never-ending story, but this was the first time in close to 20 years that conditions reached the point of a declared famine.

Drought afflicts not just Somalia but also parts of Ethiopia, Kenya, and South Sudan, and agencies report that about 11.5 million people are severely affected. A key to the drought was an unusually strong Pacific La Niña, which has interrupted seasonal rains for two seasons. About half of all livestock died in some areas. Staple food prices soared in affected areas, making the situation dire for the poor. Globally, food prices had risen greatly over the previous few years with a new spike in 2011, which saw average global prices nearly double. Some causes are temporary, including bad weather, but longer-term forces at work include diversion of food to biofuels production, increase in demand, including grain, for meat production for China, general population growth, higher energy prices affecting agricultural costs, lack of new farmland, and impacts of climate change. Food prices shot up more than the global average in this region, most dramatically in Somalia, where prices reportedly have tripled—just when the earnings capacity of most households has been falling. There are severe hardships in the other drought-stricken areas, such as northern Kenya, and people living there are at serious risk and need help. At the same time, more aid is getting to those who need it, and the suffering is not on the same scale, reflecting Somalia's "man-made" famine conditions.

Perspective on the Region

The East African "Horn" region is sometimes given a broad definition to include large parts of Ethiopia, Eritrea, Kenya, Djibouti, southern Sudan, and Uganda as well as Somalia. Taken as a region, the Horn is the poorest area in sub-Saharan Africa, though at least nine individual countries elsewhere in Africa are even poorer. Conditions in the region historically have been difficult; the record shows drought has intermittently afflicted the area. No doubt the region was seriously harmed by colonialism, with regions agglomerated arbitrarily, notably Eritrea to Ethiopia, and South Sudan to northern Sudan. This is a major reason the region has been plagued by conflict in the postcolonial era. The assumption in much of the press is that there must be something fundamentally different and special about the geography and climate of this region and the culture of its peoples to explain its recurrent plight. But, in fact, similar root problems are found in this area as in other regions that have failed to develop: poor institutions, ethnolinguistic fractionalisation, and "fault lines" of regional inequality corresponding with ethnic or religious areas. Undoubtedly, the area has some quite unfavourable

geography; but other regions with unfavourable endowments have substantially overcome their disadvantages over time. However, adapting to future impacts of climate change projected for this region will be a challenge the international community will have to respond to. Other conditions have compounded the problems; for example, Somalia's population was well under 3 million in 1960 but reached 15 million people in 2018, and this is a factor putting strain on the food supply. However, as explained in Chapter 6, the poor have children as a survival necessity; rapid population growth is far more a symptom of poverty than its cause.

International Response

This famine reached a huge scale, and it would be difficult to reach all the affected people without a large, consolidated effort even under low-conflict conditions. But as with the last famine in Somalia in 1992, it will be one thing to rush food into the country and another to see that it reaches many of the people most in need. Al-Shabaab, a militant Islamist group linked to Al-Qaeda, controls large parts of the declared famine areas. Some relief groups got through, but the militants have thwarted efforts by the UN'S World Food Programme (WFP)—one of the most efficient food deliverers—from coming into these regions, claiming the WFP is biased and has a hidden agenda. The militants claimed drought conditions have been exaggerated into famine proportions for political purposes, but the facts on the ground are too obvious to ignore. The problem is complex, because low incomes resulting from drought mean people cannot afford food, but dumping food on markets may keep prices so low that local growers find it unfavourable to produce for the market. In response, an important strategy is to purchase the food for those suffering from local producers whenever possible.

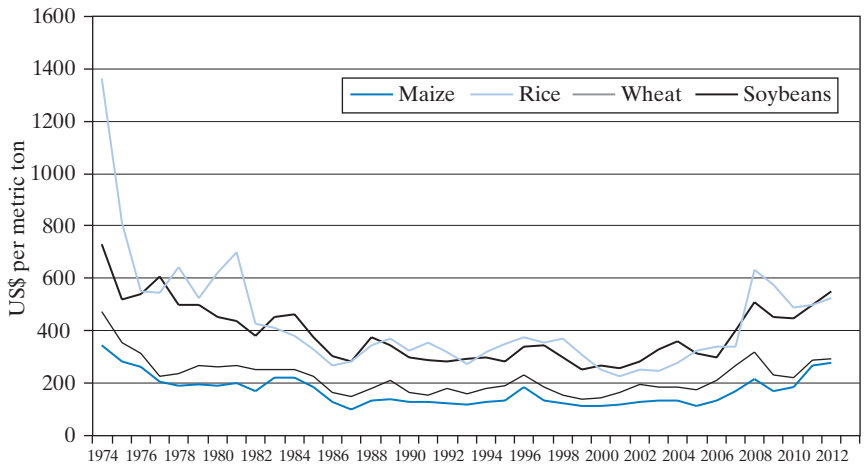
The Entitlement Problem

Historically, a large majority of famines have been "man-made." Amartya Sen frames "the acquirement problem" as one of establishing "command over commodities." *Famine* is defined for international humanitarian and UN purposes as a combination of child malnutrition, deaths from hunger, and low food access, specifically: (1) more than 30% of children suffering from acute malnutrition; (2) more than two adults or four children dying of hunger each day per 10,000 people; and (3) the population overall having access to less than 2,100 kilocalories of food and 4 litres of water per day on average. This definition is not quite the same as Webster's "extreme scarcity of food; a great shortage." For example, in the Bangladesh famine in 1974, food output was actually there; it just wasn't getting to hungry people. According to Amartya Sen's research, also in Bengal in 1943, incomes were actually up as an average, which increased those more fortunate peoples' purchasing power, thus pushing food prices up, and then others such as labourers could not afford it in sufficient amounts.

In Somalia, and elsewhere in the region, output is drastically lower due to the severe drought. Commonly in famines, when many people are unable to buy as much locally grown food as they usually do, it becomes more attractive for sellers to export food out of the area. But if people had earning power, they could afford to buy food and traders would bring it to villages where they lived. The problem is that markets may not provide command over commodities, or entitlements, which people living in poverty need in order to survive in such conditions. This problem is one of the reasons why public action is generally needed in a famine when entitlement is not established. There may be droughts and drastic declines in food output, but there never needs to be a famine. National and international policymakers and NGOs require improved mechanisms to respond quickly as this region, or others, are threatened with famine again.

Sources: Deze, Jean and Sen, Amartya (1989), *Hunger and Public Action*, New York: Oxford University Press; Sen, Amartya (1981), *Poverty and Famines: An Essay on Entitlement and Deprivation*, New York: Oxford University Pres. For more details on the economics of conflict and development, see Section 14.6, pages 708–717. For analysis of the importance of institutions and the historical legacy, see Section 2.7, pages 83–91. On impact of and adaptation to climate change in developing countries, see Section 10.3, pages 476–480

FIGURE 9.3 World Prices for Agricultural Commodities, 1974–2012



Note: Prices are in real 2005 US dollars.
Source: Based on International Food Policy Research Institute, 2012 Global Food Policy Report, p. 90 (Washington, D.C.: IFPRI, 2013); downloaded at: http://www.ifpri.org/sites/default/files/publications/gfpr2012.pdf (accessed November 2019). Prices for 2012 are through to August 2012.

food (particularly meat, which uses far more land than grain production) due to higher incomes in China and elsewhere, the slowdown in productivity growth of agricultural commodities, higher energy prices affecting agricultural input costs, running out of new land to be brought into farming, and the negative impact of climate change on developing-country food production. These are exacerbated by a number of unfavourable policies, including various forms of interference with food prices.[9]

Furthermore, there is not a large global market for food in relation to total demand. Most countries strive for food self-sufficiency, largely for national security reasons. Embargoes of food exports by such countries as Egypt, Vietnam, and Russia reflect this reluctance. In the late 2040s, the world will find itself having to manage to feed over 9 billion people. While highlighting impressive successes, we must also keep in mind looming challenges. One useful strategy debated during the last food price spike was to develop and ratify an international treaty to refrain from responding to food price spikes with import and export restrictions. Such an agreement could prevent an outcome in which all countries are worse off; but interest proved difficult to sustain.

9.2.2 Market Failures and the Need for Government Policy

A major reason for the relatively poor performance of agriculture in low-income regions has been the neglect of this sector in the development priorities of their governments, which the initiatives just described are intended to overcome.

This neglect of agriculture and the accompanying bias toward investment in the urban industrial economy can in turn be traced historically to the misplaced emphasis on rapid industrialisation via import substitution and exchange rate overvaluation (see Chapter 12) that permeated development thinking and strategy during the postwar decades.[10]

If agricultural development is to receive a renewed emphasis, what is the proper role for government? In fact, one of the most important challenges for agriculture in development is to get the role of government right. A major theme of development agencies in the 1980s was to reduce government intervention in agriculture. Indeed, many of the early interventions did more harm than good; an extreme example is government requirements for farmers to sell at a low price to state marketing boards—an attempt to keep urban food prices low. Production subsidies, now spreading like a contagion from high-income to middle-income countries, are costly and inefficient.

Agriculture is often imagined to be a perfectly competitive activity, but this does not mean that there are no market failures and no important roles for government. In fact, market failures in the sector are quite common and include environmental externalities, the public good character of agricultural research and development and extension (farmer training) services, economies of scale in marketing, information asymmetries in product quality, missing markets, monopoly power in input supply, and monopsony power in purchasing farmer output. It may also be necessary to address the monopsonistic power where large farmers have wage-setting power over landless labourers in local labour markets. Moreover, a government role may be necessary for creating markets where they are missing—for weather insurance, credit, for example. All this is in addition to the more general government roles of providing institutions and infrastructure. Despite many failures, sometimes government has been relatively effective in these roles, as in Asia during its Green Revolution.[11]

But government also has a role in agriculture simply because of its necessary role in poverty alleviation—and a large majority of the world's poor are still farmers. Poverty itself prevents farmers from taking advantage of opportunities that could help pull them out of poverty. Lacking collateral, they cannot get credit. Lacking credit, they may have to take their children out of school to work, transmitting poverty across generations. Lacking health and nutrition, they may be unable to work well enough to afford better health and nutrition. With a lack of information and missing markets, they cannot get insurance. Lacking insurance, they cannot take what might seem favourable risks for fear of falling below subsistence. Without middlemen, they cannot specialise (and without specialisation, middlemen lack incentives to enter). Being socially excluded because of ethnicity, caste, language, or gender, they are denied opportunities, which keep them excluded. These poverty traps are often all but impossible to escape without assistance. In all of these areas, NGOs can and do step in to help (Chapter 11), but government is needed to at least play a facilitating role and to create the needed supporting environment.[12]

Policies to improve efficiency and alleviate poverty are closely related. Many market failures, such as missing markets and capital market failures,

sharply limit the ability of poor farmers to take advantage of opportunities of globalisation when governments liberalise trade, for example. If these problems are not addressed prior to deregulation or making other structural changes, the poor can remain excluded and even end up worse off. A key role for government, then, is to ensure that growth in agriculture is shared by the poor. In some countries, impressive agricultural growth has occurred without the poor receiving proportional benefits. Examples include Brazil, with its extremely unequal land distribution, and Pakistan, with its social injustices and inequality of access to key resources such as irrigation. But by including the poor, the human and natural resources of a developing nation are more fully employed, and that can result in an increased rate of growth as well as poverty reduction.[13]

9.2.3 Agricultural Extension

Agricultural extension
Demonstration and training services for improving agricultural practices and raising farm productivity.

Demonstration and training services for improving agricultural practices and raising farm productivity are known as **agricultural extension** (sometimes simply "extension"). These systems are usually government-supported, frequently working with or through universities. For example, each US state has a designated "land-grant university" where, since 1887, government-supported agricultural experiment stations have developed improved inputs and techniques; since 1914, their extension (outreach) agents have taught farmers about new developments. These programmes sometimes go beyond agriculture to inform and train rural people in other activities including natural resources, health, nutrition, and sanitation practices. Involvement of universities, with government support, is a typical feature of such programmes, though many are standalone government agencies, or in some cases NGOs. Though there is always room for improved research methods, many such extension services are credited with making possible major positive effects on productivity, notably through introducing high-yielding crop varieties. However, in many developing countries, the extension services record is mixed, at best.

A common approach in developing countries, which originated in Indonesia in the late 1980s, is to provide participatory, learning-by-doing adult education, through Farmer Field Schools (FFSs). An interesting variation is the Junior FFS, which adapts the general FFS approach specifically for farm children and youth, focusing on knowledge, skills, productivity, and food security for farm children along with their families. An aspect of such programmes is that children and youth may adopt techniques and learn more readily in some cases, so there could be an intra-household spillover: in this case, up from children's knowledge to learning by adults in the household. For both approaches, some programmes have been found effective but others seem to have had little, if any, impact.

Recent development economics and agricultural extension research has focused on the need to address multiple constraints to improving performance of low-productivity smallholder agriculture while enhancing food security. Many proven technologies and improved farming practices hold great promise for boosting agricultural production and reducing poverty in low-income countries. But the adoption of such technologies by smallholder farmers, in sub-Saharan

Africa particularly, has been slow, and is a major explanation of the very slow growth of agricultural productivity. There is an even broader lack of adoption of relatively expensive agricultural inputs, such as high-yield-variety (HYV) seeds and chemical fertilisers. Causes of low adoption include lack of knowledge; lack of access to markets; farmers' inability to distinguish genuine from counterfeit seeds, fertiliser and other products on the market; credit constraints and uninsured risks; and problems of coordination with neighbours.

Often, there is limited adoption of even basic improved cultivation methods, including crop rotation and use of green manure. Yet these are likely to be extremely important for the poor, particularly marginalised smallholder women farmers, who are also those less likely to have the knowledge and opportunities to adopt improved cultivation techniques on their own.

For decades, research has made clear that women farmers are underserved by agricultural extension. In the 1970s and 1980s, economists, including Carmen Diana Deere and Kathleen Staudt, were already documenting the gross unfairness, household imbalance, and, in some cases, potential harm that these inequities caused. Recent research in several countries has reached similar conclusions. The end-of-chapter case study explores problems facing women farmers and the response of agricultural extension in both government and NGO programmes in Kenya and Uganda.[14]

9.3 The Structure of Agrarian Systems in the Developing World

9.3.1 Three Systems of Agriculture

A first step toward understanding what is needed for further agricultural and rural development progress is a clear perspective of the nature of agricultural systems in diverse developing regions and, in particular, of the economic aspects of the transition from subsistence to commercial agriculture.

First, in what the report terms *agriculture-based countries*, agriculture is still a major source of economic growth—although mainly because agriculture makes up such a large share of GDP. The World Bank estimates that agriculture accounts for some 32% of GDP growth on average in these countries, in which 417 million people live. More than two-thirds of the poor of these countries live in rural areas. Some 82% of the rural population of sub-Saharan Africa lives in these countries. It also includes a few countries outside the region, such as Laos. And a few African countries, such as Senegal, are undergoing transformation.

Second, most of the world's rural people—some 2.2 billion—live in what the report categorises as *transforming countries*, in which the share of the poor who are rural is very high (almost 80% on average) but agriculture now contributes only a small share to GDP growth (7% on average). Most of the population of South and East Asia, North Africa, and the Middle East lives in these countries, along with some outliers such as Guatemala.

Third, in what the report calls *urbanised countries*, rural–urban migration has reached the point at which nearly half, or more, of the poor are found in the cities, and agriculture tends to contribute even less to output growth. The

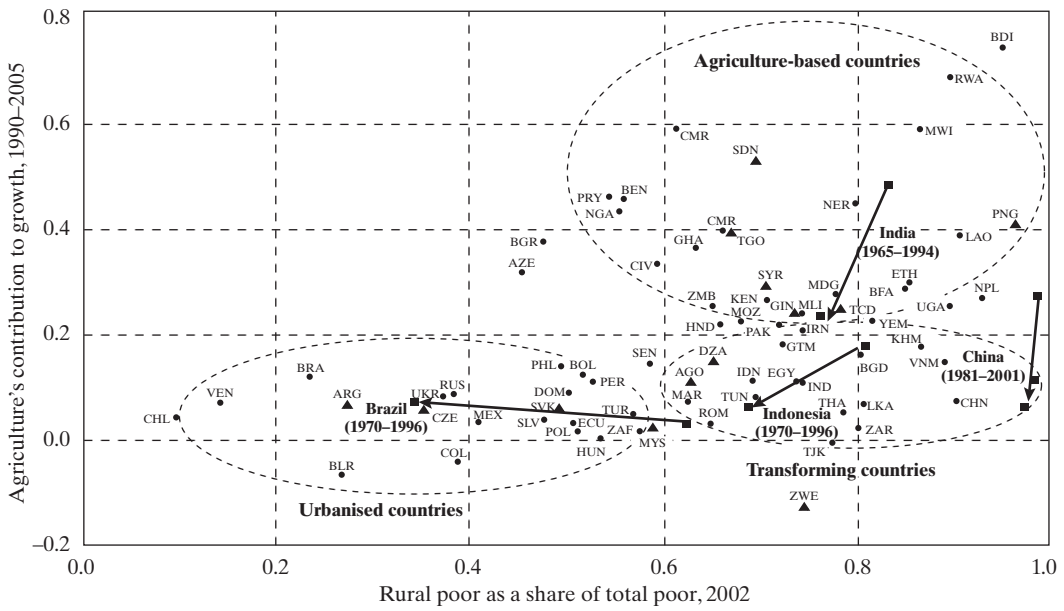
urbanised countries are largely found in Latin America and the Caribbean, along with developing eastern Europe and Central Asia, and contain about 255 million rural dwellers.

In many cases, the position of countries within these groups is not stagnant. Many countries that were in the agriculture-based category moved to the transforming category in recent decades—most prominently India and China.

Figure 9.4 shows some of the country positions in each group, along with the movement over time for four major countries over an approximately three-decade period: China, India, Indonesia, and Brazil. For example, Brazil has moved from being a borderline transforming country to a solidly urbanised one according to the World Bank classification.

Agricultural productivity varies dramatically across countries. Table 9.2 shows variations in land productivity (measured as kilograms of grain harvested per hectare of agricultural land) between three developed countries (Canada, Japan, and the United States) and 12 developing countries, along with the averages for low-, middle-, and high-income countries. Despite the far smaller number of farmworkers per hectare in the United States, its grain yield per hectare was about 2.6 times that of India and well over 10 times that

FIGURE 9.4 Agriculture's Contribution to Growth and the Rural Share in Poverty in Three Types of Countries



Note: Arrows show paths for Brazil, China, India, and Indonesia in previous periods. A triangle denotes predicted poverty data used. Country letter codes are found in Table 2.1 on pp. 43–44 of this text.
Source: International Bank for Reconstruction and Development/The World Bank, *World Development Report, 2008.* Reprinted with permission.

TABLE 9.2 Labour and Land Productivity in Developed and Developing Countries

Country Group	Agricultural Productivity (Value added per worker, US$, 2017)	Average Grain Yield (Kilograms per hectare, 2017)
Low income	609	1542
Middle income	3140	3889
High income	40462	6062
Country		
Burundi	205	1414
Congo, Dem. Rep.	322	770
Bangladesh	946	4411
Kenya	1245	1474
India	1669	3161
Bolivia	1961	1869
Senegal	2612	1275
Ghana	2866	1873
Indonesia	3632	5166
China	3653	6029
Mexico	5694	3800
Brazil	13230	5209
Japan	23954	6049
United States	79108	8281
Canada	93110	4043

of the DRC (Congo). The value added per worker in US agriculture was over 47 times that of India and over 246 times that of Congo. Table 9.2 shows that developed countries are far more productive in value added per worker; this is, in large part, because they have far more physical and human capital to combine with labour inputs (and land). At the same time, developed countries are more productive in output per hectare—but less so; a difference is that there are many more labourers working per hectare in developing countries, raising total yield—even if individual workers have low productivity.

It is also important to note that regional disparities can be quite large *within* countries. India has regions that fall within each of the three classifications, from modernised Punjab to semi-feudal Bihar. Even upper-middle-income, urbanised Mexico has regions in the south with substantial poverty and high dependence on agriculture. Moreover, within regions, large and small, rich and poor often exist side by side—though large does not necessarily mean efficient. Let us look at agricultural issues facing countries in Latin America, Asia, and sub-Saharan Africa in more detail.

9.3.2 Traditional and Peasant Agriculture in Latin America, Asia, and Africa

In many developing countries, various historical circumstances have led to a concentration of large areas of land in the hands of a small class of powerful landowners. This is especially true in Latin America and parts of the Asian subcontinent. In Africa, both historical circumstances and the availability of relatively more unused land have resulted in a different pattern and structure of agricultural activity.

Although the day-to-day struggle for survival permeates the lives and attitudes of impoverished peasants in both Latin America and Asia (and also Africa, although the rural structure and institutions are considerably different), the nature of their **agrarian systems** differs markedly. In Latin America, in a number of poorer and more backward areas, the peasants' plight is rooted in the *latifundio–minifundio* system (to be explained shortly). In Asia, it lies primarily in fragmented and heavily congested dwarf parcels of land. The average farm size in Latin America is far larger than in Asia; the countries included in Table 9.3 are typical. The average farm size for Latin American countries such as Ecuador, Chile, Panama, and Brazil are several *times* larger than farm size in Asian countries such as Bangladesh, Pakistan, Thailand, and India. But the variance of farm size is much higher in Latin America, with huge farmlands controlled by the largest farms in Latin America. As the table reveals, patterns are anything but uniform, with farms in some countries splitting into smaller sizes and in other countries consolidating to larger sizes, and some experiencing increasing inequality and others showing decreasing inequality over time.

Agrarian system
The pattern of land distribution, ownership, and management, and also the social and institutional structure of the agrarian economy.

Just as we can draw income Lorenz curves from data on the distribution of income (see Figure 5.1), we can draw land Lorenz curves from data on the distribution of farmholds among farmers. In this case, the x-axis reports the proportion of total holdings, and the y-axis reports the proportion of total area. A land Gini may be calculated in a manner analogous to that of the income Gini: it is the ratio of the area between the land Lorenz curve and the 45-degree line, and the whole triangle. Table 9.3 presents land Gini coefficients and their change over time for representative developing countries.

One of the broadest trends is for farm sizes to become smaller over time in Asia as land is subdivided, and this trend is also seen increasingly in Africa.

9.3.3 Agrarian Patterns in Latin America: Progress and Remaining Poverty Challenges

In Latin America, as in Asia and Africa, agrarian structures are not only part of the production system but also a basic feature of the entire economic, social, and political organisation of rural life. The agrarian structure that has existed in Latin America since colonial times and is still widespread in a substantial part of the region is a pattern of agricultural dualism known as *latifundio-minifundio*.[15] Basically, ***latifundios*** are very large landholdings. They are usually defined as farms large enough to provide employment for more than 12 people, though some employ thousands. In contrast, ***minifundios*** are the smallest farms. They are defined as farms too small to provide employment for a single family (two workers) with the typical incomes, markets, and levels of technology and capital prevailing in each country or region.

Latifundio A very large landholding found particularly in the Latin American agrarian system, capable of providing employment for more than 12 people, owned by a small number of landlords, and comprising a disproportionate share of total agricultural land.

Minifundio A landholding found particularly in the Latin American agrarian system considered too small to provide adequate employment for a single family.

TABLE 9.3 Changes in Farm Size and Land Distribution

Country	Period	Land Distribution Gini (percent) Start	Land Distribution Gini (percent) End	Average Farm Size (hectares) Start	Average Farm Size (hectares) End	Change (%) Total Number of Farms	Change (%) Total Area	Farm Size Definition Used
Smaller Farm Size, More Inequality								
Bangladesh	1977–1996	43.1	48.3	1.4	0.6	103	–13	Total land area
Pakistan	1990–2000	53.5	54.0	3.8	3.1	31	6	Total land area
Thailand	1978–1993	43.5	46.7	3.8	3.4	42	27	Total land area
Ecuador	1974–2000	69.3	71.2	15.4	14.7	63	56	Total land area
Smaller Farm Size, Less Inequality								
India	1990–1995	46.6	44.8	1.6	1.4	8	–5	Total land area
Egypt	1990–2000	46.5	37.8	1.0	0.8	31	5	Total land area
Malawi	1981–1993	34.4	33.2[a]	1.2	0.8	37	–8	Cultivated crop area
Tanzania	1971–1996	40.5	37.6	1.3	1.0	64	26	Cultivated crop area
Chile	1975–1997	60.7	58.2	10.7	7.0	6	–31	Arable land area
Panama	1990–2001	77.1	74.5	13.8	11.7	11	–6	Total land area
Larger Farm Size, More Inequality								
Botswana	1982–1993	39.3	40.5	3.3	4.8	−1	43	Cultivated crop area
Brazil	1985–1996	76.5	76.6	64.6	72.8	−16	–6	Total land area
Larger Farm Size, Less Inequality								
Togo	1983–1996	47.8	42.1	1.6	2.0	64	105	Cultivated crop area
Algeria	1973–2001	64.9	60.2	5.8	8.3	14	63	Arable land area

[a]Figure for 2004–2005

Source: World Development Report, 2008: Agriculture and Development by World Bank. Copyright © 2008 by World Bank. Reproduced with permission.

Using Gini coefficients to measure the degree of land concentration, as seen in Table 9.3, researchers report that the coefficient for Brazil is 0.77, for Panama is 0.75, and for Ecuador is 0.71. Although estimates vary, changes in land inequality are limited in the case of Latin America (for example, see the data for Brazil and Ecuador in Table 9.3). Other countries are even more unequal; the Gini for Paraguay has been estimated to be an astoundingly unequal 0.94, and very high inequality has been estimated for Colombia and Uruguay, among others.[16] These are the highest regional Gini coefficients in the world, and they dramatically reflect the degree of land ownership inequality (and thus, in part, income inequality) throughout Latin America.

But *latifundios* and *minifundios* do not constitute the entirety of Latin American agricultural holdings. A considerable amount of production occurs on **family farms** and **medium-size farms**. The former provide work for two to four people (recall that the *minifundio* can provide work for fewer than two people), and the latter employ 4 to 12 workers (just below the *latifundio*). In Venezuela,

Family farm A farm plot owned and operated by a single household.

Medium-size farm A farm employing up to 12 workers.

Brazil, and Uruguay, these intermediate farm organisations account for almost 50% of total agricultural output and employ similar proportions of agricultural labour. These farms use a more efficient balance between labour and land, and studies show that they have a much higher total factor productivity than either *latifundios* or *minifundios*, as the law of diminishing returns would suggest. Indeed, evidence from a wide range of developing countries demonstrates that smaller farms are more efficient (lower-cost) producers of most agricultural commodities.[17]

A major explanation for the relative economic inefficiency of farming the fertile land on the *latifundios* is simply that the wealthy landowners often value these holdings not for their potential contributions to national agricultural output but rather for the considerable power and prestige that they bring. Much of the land is left idle or farmed less intensively than on smaller farms. Also, *latifundio* **transaction costs**, especially the cost of supervising hired labour, are much higher than the low effective cost of using family labour on family farms or *minifundios*. It follows that raising agricultural production and improving the efficiency of Latin American agrarian systems in traditional areas will require much more than direct economic policies that lead to the provision of better seeds, more fertiliser, less distorted factor prices, higher output prices, and improved marketing facilities.[18] It will also require a reorganisation of rural social and institutional structures to provide Latin American peasants, particularly indigenous people who find it more challenging to migrate, a real opportunity to lift themselves out of their present state of economic subsistence and social subservience.[19]

Transaction costs Costs of doing business related to gathering information, monitoring, establishing reliable suppliers, formulating contracts, obtaining credit, and so on.

Despite the fact that many *minifundio* owners remain in poverty, especially among indigenous and mixed-race populations, and many *latifundios* continue to operate well below their productivity potential, a more dynamic sector, including some larger farms, has emerged. Efficient family and medium-size farms are found throughout the region.

At an aggregate level, the agricultural sector in Latin America appears to be doing fairly well. Chile has led the way in "nontraditional exports," notably fresh fruits for the northern hemisphere winter markets and also aquaculture, vegetables, and wines; performance in Chile has benefited from an active and relatively efficient agricultural extension system that has included efforts to promote new exports. Diversification has reduced variance in export earnings. Productivity growth in cereals has been quite solid. Sugarcane-based biofuels and soybeans have played important roles in agricultural growth in Brazil. And in traditional exports, particularly coffee, Latin America has led the way in taking advantage of niche opportunities for higher-value-added activities such as organic and Fair Trade markets.[20]

Some Latin American countries, such as Guatemala and Honduras, are still in the mixed transition phase, and in such countries, the *latifundio-minifundio* pattern tends to remain particularly dominant. But much of this pattern still prevails in many other areas. As noted in Chapter 2, the extreme rural inequalities in Latin America typically stem from the Spanish and Portuguese colonial period, in which indigenous peoples were exploited in what often amounted to slavery (see Box 2.2 on continuing effects of the *mita* system in Peru) and African slaves were forcibly brought to the region. Overcoming this legacy has been a long and painful process, with much remaining to be

achieved. Social discrimination continues, and improved access for the poor to agricultural land in countries such as Colombia is still in all too many cases suppressed.[21]

Areas with less favourable agricultural conditions, often with a concentration of minority populations, such as northeast Brazil, the Andean region, and parts of Mexico and Central America, tend to have persistently high poverty levels. Extreme rural inequality inhibits progress in these areas, both because of reduced access by the poor to credit and other inputs and because elites effectively continue to block political participation by the poor, who often receive low levels of government services. Moreover, rural-to-urban migration has been disproportionately among more educated people, and the result is that rural populations are becoming older, more female, and more indigenous. These are factors in poverty rates that remain high for middle-income countries and will require sustained action by government and civil society.[22]

9.3.4 Transforming Economies: Problems of Fragmentation and Subdivision of Peasant Land in Asia

If the major agrarian problem of Latin America, at least in traditional areas, can be identified as too much land under the control of too few people, the basic problem in Asia is one of too many people crowded onto too little land. For example, the average farm size is just 3.4 hectares in Thailand, 3.1 hectares in Pakistan, 1.4 hectares in India, and 0.6 hectares in Bangladesh; in each of these cases, farm sizes have been getting even smaller over time (see Table 9.3). The land is distributed more equally in Asia than in Latin America but still with substantial levels of inequality. As seen in Table 9.3, the estimated Gini coefficients for land distribution in Asia range from 0.448 in India, to 0.483 in Bangladesh and 0.467 in Thailand, to 0.540 in Pakistan.

Throughout much of the twentieth century, rural conditions in Asia typically deteriorated. Nobel laureate Gunnar Myrdal identified three major interrelated forces that moulded the traditional pattern of land ownership into its present fragmented condition: (1) the intervention of European rule, (2) the progressive introduction of monetised transactions and the rise in power of the moneylender, and (3) the rapid growth of Asian populations.[23]

Before European colonisation, the traditional Asian agrarian structure was organised around the village. Local chiefs and peasant families each provided goods and services—produce and labour from the peasants to the chief in return for protection, rights to use community land, and the provision of public services. Decisions on the allocation, disposition, and use of the village's most valuable resource, land, belonged to the tribe or community, either as a body or through its chief. Land could be redistributed among village members as a result of either population increase or natural calamities such as drought, flood, famine, war, or disease. Within the community, families had a basic right to cultivate land for their own use, and they could be evicted from their land only after a decision was made by the whole village.

The arrival of the Europeans (mainly the British, French, and Dutch) led to major changes in the traditional agrarian structure, some of which had already begun. As Myrdal points out, "Colonial rule acted as an important catalyst to change, both directly through its effects on property rights and indirectly

through its effects on the pace of monetisation of the indigenous economy and on the growth of population."[24] In the area of property rights, European land tenure systems of private property ownership were both encouraged and reinforced by law. One of the major social consequences of the imposition of these systems was, as Myrdal explains, the

> breakdown of much of the earlier cohesion of village life with its often elaborate, though informal, structure of rights and obligations. The landlord was given unrestricted rights to dispose of the land and to raise the tribute from its customary level to whatever amount he was able to extract. He was usually relieved of the obligation to supply security and public amenities because these functions were taken over by the government. Thus his status was transformed from that of a tribute receiver with responsibilities to the community to that of an absolute owner unencumbered by obligations toward the peasants and the public, other than the payment of land taxes.[25]

Landlord The proprietor of a freehold interest in land with rights to lease out to tenants in return for some form of compensation for the use of the land.

Sharecropper A tenant farmer whose crop has to be shared with the landlord, as the basis for the rental contract.

Tenant farmer One who farms on land held by a landlord and therefore lacks ownership rights and has to pay for the use of that land, for example, by giving a share of output to the owner.

Moneylender A person who lends money at high rates of interest, for example to peasant farmers to meet their needs for seeds, fertilisers, and other inputs.

Contemporary **landlords** in India and Pakistan are able to avoid much of the taxation on income derived from their ownership of land. There are variations, but landlords in South Asia are often absentee owners who live in the town and turn over the working of the land to **sharecroppers** and other **tenant farmers**. Sharecropping is widespread in both Asia and Latin America but more pervasive in Asia. It has been estimated that of all tenanted land, some 84.5% is sharecropped in Asia but only 16.1% in Latin America. The institution is almost unknown in Africa, where the typical arrangement continues to be farms operated under tribal or communal tenures. For example, it has been estimated that about 48% of all tenanted land is sharecropped in India, 60% in Indonesia, and 79% in the Philippines. Though common in Colombia, sharecropping is unusual elsewhere in Latin America; for example, it has all but disappeared in Peru.[26]

The creation of individual titles to land made possible the rise to power of another dubious agent of change in Asian rural socioeconomic structures, the **moneylender**. Once private property came into effect, land became a negotiable asset that could be offered by peasants as security for loans and, in the case of default, could be forfeited and transferred to the often unscrupulous moneylender. At the same time, Asian agriculture was being transformed from a subsistence to a commercial orientation, both as a result of rising local demand in new towns and, more importantly, in response to external food demands of colonial European powers. With this transition from subsistence to commercial production, the role of the moneylender changed drastically. In the subsistence economy, his activities had been restricted to supplying the peasant with money to tide him over a crop failure or to cover extraordinary ceremonial expenditures such as family weddings or funerals. Most of these loans were paid in kind (in the form of food) at very high rates of interest. With the development of commercial farming, however, the peasant's cash needs grew significantly. Money was needed for seeds, fertiliser, and other inputs. It was also needed to cover his food requirements if he shifted to the production of cash crops such as tea, rubber, or jute. Often moneylenders were more interested in acquiring peasant lands as a result of loan defaults than they were in extracting high rates of interest. By charging exorbitant interest rates or inducing peasants to secure larger credits than they could manage, moneylenders were often able to drive the peasants off

their land. They could then reap the profits of land speculation by selling this farmland to rich and acquisitive landlords. Largely as a consequence of the moneylenders' influence, Asian traditional peasant cultivators saw their economic status deteriorate.[27] And rapid population growth often led to fragmentation and impoverishment.[28]

To understand the deterioration of rural conditions in some Asian countries during the twentieth century, consider the cases of India, Indonesia, and the Philippines. In 1901, there were 286 million Indians; by 2013, there were more than quadruple that number. The Indonesian population grew from 28.4 million in 1900 to 210 million in 2000. The population of central Luzon in the Philippines increased more than tenfold from its level of 1 million from 1903 to 2003. In each case, severe fragmentation of landholdings inevitably followed, so that today average peasant holdings in many areas of these countries are less than 1 hectare. As seen in Table 9.3, average farm size has fallen throughout South Asia and in Thailand.

For many impoverished families, as these holdings shrink even further, production falls below the subsistence level, and chronic poverty becomes a way of life for many. Peasants are forced to borrow even more from the moneylender at interest rates ranging from 50 to 200%. Most cannot repay these loans. They are then compelled to sell their land and become tenants with large debts. Because land is scarce, they are forced to pay high rents or sharecrop on unfavourable terms. And because labour is abundant, wages are extremely low. Peasants can thus get trapped in a vice of chronic poverty from which, in the absence of major rural reconstruction and reform, there is no escape. Thus, many rural Asians are gradually being transformed from small proprietors to tenant farmers and sharecroppers, then landless rural labourers, then jobless vagrants, and finally migrant slum dwellers on the fringes of modern urban areas.[29] At the same time, many other farmers have benefited from the enormous productivity gains resulting from the Green Revolution; yet for an increasing number of them, environmental problems such as rapidly falling water tables represent new and looming challenges.

Even as traditional moneylenders have been replaced to varying extents by banks, microfinance lenders (some for profit and some not for profit), and semi-formal nonbank financial companies, the plight of indebtedness has continued.

In India, smallholder distress is particularly visible in the high rate of farmer suicides. From 2000–18, a reported 400,000 male and female farmers have taken their own lives, often by drinking pesticides. (The phenomenon is not necessarily more pronounced in India than in other countries; rather, the unusually vibrant press in the country keeps it in the spotlight, while suicide and mental illness is more of a taboo topic in many other countries.) No one factor is responsible, but reports highlight how unmanageable indebtedness leads to suffering from harassment, shame, and fear of losing the family land. Worsening climate conditions, including higher temperatures and more unpredictable rains, are also cited as leading not only to more bad farming season results, but possibly to accompanying stress, which could lead to suicide in addition to milder psychological disorders. With global warming and climate change proceeding at its rapid current rate (see Chapter 10), it is likely that, regardless of their current role, climate factors will grow in importance over time. Whether the root cause

is the ruthlessness of lenders or uncontrollable market and climate shocks, or some combination, smallholders in India, as in many other countries, face tragic conditions. (We address the impact of climate change on rural livelihoods further in Chapters 10 and 14.)[30]

These problems help explain why rural distress (sometimes used synonymously with "rural push") is generally cited as an important driver of urban migration. But with better government and cooperative support and a concerted effort to improve rural institutions, much of the distress and possibly premature urban migration could be alleviated.

Again, as noted in Chapter 2, colonial practices often had long-lasting influences. In the case of India, regions in which property rights to land were given to landlords had significantly lower productivity and agricultural investments—and significantly lower investments in health and education—in the postindependence period than regions in which property rights were given to cultivators.[31]

9.3.5 Subsistence Agriculture and Extensive Cultivation in Africa

Subsistence farming
Farming in which crop production, stock rearing, and other activities are conducted mainly for personal consumption.

Subsistence farming on small plots of land is the way of life for the majority of African people living in agriculture-based economies. The great majority of farm families in tropical Africa still plan their output primarily for their own subsistence. There are important exceptions, including the sugar, cocoa, coffee, tea, and other plantations in East and West Africa; and farms devoted to such export crops as green beans in Niger, cut flowers in Kenya and Ethiopia, legumes in Tanzania, and other contract farming arrangements.

Since the basic variable input in traditional African agriculture is farm family and village labour, African agriculture systems are dominated by three major characteristics: (1) the importance of subsistence farming in the village community; (2) the existence of some (though rapidly diminishing) land in excess of immediate requirements, which permits a general practice of shifting cultivation and reduces the value of land ownership as an instrument of economic and political power; and (3) the rights of each family (both nuclear and extended) in a village to have access to land and water in the immediate territorial vicinity, excluding from such access use by families that do not belong to the community, even though they may be of the same tribe. Where traditional systems are breaking down, inequality is often increasing.

The low-productivity subsistence farming characteristic of most traditional African agriculture results from a combination of three historical forces restricting the growth of output:

1. In spite of the existence of some unused and potentially cultivable land, only small areas can be planted and weeded by the farm family when it uses only traditional tools such as the short-handled hoe, the axe, and the long-handled knife, or *panga*. In some countries, use of animals is impossible because of the tsetse fly or a lack of fodder in the long, dry seasons, and traditional farming practices must rely primarily on the application of human labour to small parcels of land.

2. Given the limited amount of land that a farm family can cultivate in the context of a traditional technology, these small areas tend to be intensively cultivated. As a result, they are subject to rapidly diminishing returns to increased labour inputs. In such conditions, **shifting cultivation** is the most economic method of using limited supplies of labour on extensive tracts of land. Under shifting cultivation, once the minerals are drawn out of the soil as a result of numerous croppings, new land is cleared, and the process of planting and weeding is repeated. In the meantime, formerly cropped land is allowed to recover fertility until it can be used again. Under such a process, manure and chemical fertilisers have been unnecessary, although in most African villages, some form of manure (mostly animal waste) is applied to nearby plots that are intensively cultivated in order to extend their period of fertility.
3. Labour is scarce during the busiest part of the growing season—planting and weeding times. At other times, much of the labour is underemployed. Because the time of planting is determined by the onset of the rains and because much of Africa experiences only one extended rainy season, the demand for workers during the early weeks of this rainy season usually exceeds all available rural labour supplies.

Shifting cultivation
Tilling land until it has been exhausted of fertility and then moving to a new parcel of land, leaving the former one to regain fertility until it can be cultivated again.

The net result of these three forces had been slow growth in agricultural labour productivity throughout much of Africa. As long as population size remained relatively stable, this historical pattern of low productivity and shifting cultivation enabled most African tribes to meet their subsistence food requirements. But the feasibility of shifting cultivation has now broken down as population densities increase. It has largely been replaced by sedentary cultivation on small owner-occupied plots. As a result, the need for other nonhuman productive inputs and new technologies grows, especially in the more densely populated agricultural regions of Kenya, Nigeria, Ghana, and Uganda. Farm size has also fallen in countries such as Malawi and Tanzania, as seen in Table 9.3. Moreover, with the growth of towns, the penetration of the monetary economy, soil erosion and deforestation of marginal lands, and the introduction of land taxes, pure subsistence-agricultural practices are no longer viable. And as land becomes increasingly scarce, land degradation is increasing in scope.[32]

Moreover, by 2007, only 4% of the cropland in sub-Saharan Africa was irrigated, in sharp contrast to 39% in South Asia and 29% in the East Asia and Pacific region. Despite some recent progress, just 22% of the cereal-growing farmland in sub-Saharan Africa is sown with improved varieties, which are used on a large majority of the land in all other developing regions. Dependence on unimproved seeds sown on unfertilised, rain-fed fields is a worsening problem for the region, given both the depletion of soils and the unreliability of rainfall.

Of all the major regions of the world, Africa has suffered the most from its inability to expand food production at a sufficient pace to keep up with its rapid population growth.[33] As a result of declining production, African per capita food consumption fell dramatically during the 1980s and 1990s, while dependence on imports—particularly wheat and rice—increased.[34]

9.4 The Important Role of Women

A major and, until recently, often overlooked feature of agrarian systems in the developing world, particularly in Africa and Asia, is the crucial role played by women in agricultural production.[35] In Africa, where subsistence farming is predominant and shifting cultivation remains important, nearly all tasks associated with subsistence food production are performed by women. Although men who remain home generally perform the initial task of cutting trees and bushes on a potentially cultivable plot of land, women are typically responsible for all subsequent operations, including removing and burning felled trees, sowing or planting the plot, weeding, harvesting, and preparing the crop for storage or immediate consumption. In her pioneering work on women and development, Ester Boserup examined many studies on African women's participation in agriculture and found that in nearly all cases recorded, women did most of the agricultural work. In some cases, they were found to do around 70% and in one case, nearly 80% of the total. Typically, these tasks are performed only with primitive tools and require many days of long, hard labour simply to produce enough output to meet the family's subsistence requirements, while the men often attempt to generate cash income through work on nearby plantations or in the cities.[36] Recent research confirms women's "time poverty" predicament.

Women do much of the labour for cash crop production, cultivate food for household consumption, raise and market livestock, generate additional income through cottage industries, collect firewood and water, and perform household chores, including the processing and cooking of food. Due to the time-consuming nature of their diverse responsibilities—and no doubt to their limited household bargaining power—women tend to work longer hours than their male counterparts. Studies concerning the allocation of women's time among different activities have greatly increased recognition of the importance of rural women's economic contribution. It has become clear that since women produce a large share of agricultural output and supply a large share of the labour—a share that has actually been increasing over time—successful agricultural reform will require raising women's productivity and ensuring that gender-specific policies are at the core of rural development strategy. The necessity of starting with women's activity when agricultural policy is designed is captured by the maxim of feminist economists that "you cannot just add women and stir."

The diversity of women's duties makes it difficult to determine their share of agricultural production, much less place an economic value on their work. However, current estimates underscore the importance of women's agricultural labour. It is estimated that in addition to work in the household, women provide 60 to 80% of agricultural labour in Africa and Asia and about 40% in Latin America. Much of this work, however, is statistically "invisible" in that women often receive no payment for the work they perform.

Cash crops Crops produced entirely for the market.

Women make an important contribution to the agricultural economy through the labour they supply in the cultivation of **cash crops**. Though the production and profits from commercial crops are generally controlled by men, women are usually responsible for the strenuous jobs of weeding and transplanting. As

population density increases and land becomes more fragmented, the length of time that women must spend walking to and from the fields increases, often in very hot climates that make strenuous work exceedingly difficult. In addition to commercial crops, women frequently cultivate small vegetable gardens that provide food for family consumption. Though the cash value of produce from these gardens may be small, it often represents an important component of the total resources available to women.

Women's work in the low-income household involves a range of demanding tasks, including processing and pounding raw grains, tending livestock, cooking, and caring for children. Collecting increasingly scarce firewood and water from distant sources may add several hours to the workday. To raise additional income, it is common for women to engage in household production of goods for sale in village markets. These items are specific to each region, but a few examples are homemade beer, processed foods, handicrafts, and textiles.

Perhaps the most important role of women is providing food security for the household. This is accomplished through the supplementation of household earnings, diversification of household income sources, and raising of livestock to augment household assets. The production of vegetables for household consumption helps insulate households from swings in food prices and reduces cash outlays for the purchase of household necessities. Women's investments in revenue-generating projects and livestock are crucial to stabilising household income, especially but not only in female-headed households, where resource constraints are the most severe.

However, financial investments are inherently risky, and the poorer the household, the more averse its members are to taking any kind of risk. When credit and resources are unavailable, reducing the variability of household earnings generally entails choosing less efficient methods of production and, thus, lower average income. This trade-off occurs most frequently in female-headed households, where resource constraints are greatest. Thus, as a consequence of their restricted range of choices, women tend to retain traditional modes of economic activity. The upshot is that their productivity has stagnated while that of men has continued to improve.

Where the structure of agriculture is becoming more commercialised, women's roles and hence their economic status are changing. In many developing regions, women are still unremunerated for the long hours they contribute to the tending of commercial crops. As revenue-generating cash cropping rises in importance, the proportion of resources controlled by women tends to diminish. This is largely due to the fact that household resources, such as land and inputs, are transferred away from women's crops in order to promote the production of cash crops. Nonfarm activities are growing in importance and represent an important path for rural women's economic and social advancement.

Government extension programmes that provide resources exclusively to men tend to exacerbate existing disparities between men's and women's access to resources (see the case study at the end of this chapter). If credit is provided solely or preferentially to men for the purpose of cash cropping, commercial production will increase at the expense of women's vegetable gardens. Since homegrown vegetables must be replaced by purchased substitutes, significant increases in a male spouse's cash contribution are necessary to offset a woman's

losses. If the market price of vegetables increases markedly (there are now fewer producers) and the increase in the husband's contribution is not sufficient to compensate for the increased need for cash, the welfare of the woman and her children will decline.

This drop in the well-being of family members is due to the fact that a considerably higher proportion of women's income than men's is used for nutrition and basic necessities. Thus, if men's incomes rise at the expense of women's resources, as many studies have indicated, an increase in household income will not necessarily lead to improvements in health and nutrition. Changes in land use that increase household income but reduce women's economic status can be detrimental to the welfare of both women and children. Consequently, it is important that the design of government extension programmes reflects the interests of all household members.

Recent economic studies have improved our understanding of these problems. A traditional economics assumption following Nobel laureate Gary Becker has been that households cooperate to maximise effectively shared objectives: the "unitary household" model. But development economics research has found that households engage in extensive bargaining, sometimes to the point where higher incomes would be possible if husbands and wives could cooperate more extensively. First, households spend differently, depending on whether the wealth or income is contributed to the family or otherwise controlled by the wife or the husband. Apparently, providing resources to the household increases bargaining power over how they will be used, contrary to what would be expected in a unitary household. When men control income from cash crops after development leads to new marketing opportunities, the perverse result can be to increase men's already high bargaining power.

The differing use of funds affects not only adults but also the children. Again, the evidence is clear that in most contexts, a larger fraction of income provided and controlled by the wife tends to be used for children's health and education than that by husbands. Moreover, evidence is growing that agricultural households could earn more by reallocating inputs such as manure from husbands' to wives' plots, for example. Thus, gender inequality also leads to significant losses in efficiency. Further gains could be had by shifting from subsistence crops to cash crops on wives' plots, though given different preferences for how cash income would be used, this could turn out to be at the expense of food for the wife and children. For example, in a detailed study of Burkina Faso, Christopher Udry found that "plots controlled by women have significantly lower yields than similar plots within the household planted with the same crop in the same year, but controlled by men." His detailed data enabled him to clearly identify the difference as due to "significantly higher labour and fertiliser inputs per acre on plots controlled by men." Udry's estimates showed that "about six percent of output is lost due to the misallocation of variable factors across plots within the household." In addition to the obvious social justice concerns, this efficiency argument forms part of the economic case for supporting programmes that empower rural women.[37]

Yet many government-sponsored programmes effectively continue to exclude women, often because women lack collateral for loans or are barred from owning property or conducting financial transactions without their husbands' permission. Agricultural inputs and training are rarely provided to female applicants.

Even efforts to reduce poverty through land reforms have been found to reduce female income and economic status because they distribute land titles only to male heads of household. Cultural and social barriers to women's integration into agricultural programmes remain strong because, in many countries, women's income is perceived as a threat to men's authority. While men are taught new agricultural techniques to increase their productivity, women, if involved at all, are trained to perform low-productivity tasks that are considered compatible with their traditional roles, such as sewing, cooking, and basic hygiene. Women's components of development projects are frequently little more than welfare programmes that fail to improve economic well-being. Furthermore, these projects tend to depend on the unpaid work of women, while men are remunerated for their efforts.

Although efforts to increase the income of women by providing direct access to credit and inputs have experienced considerable success, programmes that work indirectly with women have frequently fallen short of their stated goals. Studies have found that projects are most likely to elicit the engagement of women when resources are placed directly under their control. Clearly, projects that depend on the unremunerated labour of women are likely to obtain only minimal support. Adoption of new crops and technologies will be more effective where patterns of production are consistent with the interests of female household members. Because the active participation of women is critical to agricultural prosperity, policy design should ensure that women benefit equally from development efforts (this is examined further in the case study at the end of this chapter).

9.5 The Microeconomics of Farmer Behaviour and Agricultural Development

9.5.1 The Transition from Traditional Subsistence to Specialised Commercial Farming

For expository convenience, we can identify three broad stages in the evolution of agricultural production.[38] The first stage is the pure, low-productivity, mostly subsistence-level traditional (peasant) farm, still prevalent in Africa. The second stage is what might be called *diversified* or *mixed family agriculture*, where a small part of the produce is grown for consumption and a significant part for sale to the commercial sector, as in much of Asia. The third stage represents the modern farm, exclusively engaged in high-productivity, specialised agriculture geared to the commercial market, as in developed countries, and often found in the highly urbanised developing countries.

Agricultural modernisation in mixed-market developing economies may be described in terms of the gradual but sustained transition from subsistence to diversified and specialised production. But such a transition involves much more than reorganising the structure of the farm economy or applying new agricultural technologies. Transforming traditional agriculture often requires, in addition to adapting the farm structure to meet the demand for increased production, profound changes affecting the entire social, political, and institutional structure of rural societies. Without such changes, agricultural development will

either continue to lag greatly behind or, more likely, simply widen the already sizeable gap between the few wealthy large landholders and the masses of impoverished tenant farmers, smallholders, and landless labourers.

We first consider the evolution of the agricultural system of a developing nation over time from a predominantly traditional, subsistence-level and small-scale peasant orientation to more diversified operations and eventually to the rise of fully commercial enterprises, though still often family based.

9.5.2 Subsistence Farming: Risk Aversion, Uncertainty, and Survival

Staple food A main food consumed by a large portion of a country's population.

On the classic traditional (peasant) subsistence farm, most output is produced for family consumption (although some may be sold or traded in local markets), and a few **staple foods** (usually including cassava, wheat, barley, sorghum, rice, potatoes, or corn) are the chief sources of nutrition. Output and productivity are low, and only the simplest traditional methods and tools are used. Capital investment is minimal; land and labour are the principal factors of production. The law of diminishing returns is in operation as more labour is applied to shrinking (or shifting) parcels of land. The failure of the rains, the appropriation of the land, and the appearance of the moneylender to collect outstanding debts are the banes of the peasant's existence. Labour is underemployed for most of the year, although workers may be fully occupied at seasonal peak periods such as planting and harvest. The traditional farmer (peasant) usually cultivates only as much land as his family can manage without the need for hired labour, although many traditional farmers intermittently employ one or two landless labourers. Much of the cash income that is generated comes from nonfarm wage labour.[39]

In much of sub-Saharan Africa, agriculture is still largely in this subsistence stage, as it is in pockets in Asia and even Latin America. The Green Revolution has bypassed much of Africa. But in spite of the relative backwardness of production technologies and the misguided convictions of some foreigners who attribute the peasants' resistance to change as a sign of incompetence or irrationality, the fact remains that given the nature of the peasants' environment, the uncertainties that surround them, the need to meet minimum survival levels of output, and the rigid social institutions into which many peasants, but particularly women, are locked, most farmers do behave in an economically rational manner when confronted with alternative opportunities.

Some insight into the economics of subsistence agriculture is provided by the traditional two-factor neoclassical theory of production in which land (and perhaps capital) is fixed, labour is the only variable input, and profit is maximised. Specifically, the theory provides an economic rationale for the observed low productivity of traditional agriculture in the form of the law of diminishing marginal productivity.

Unfortunately, this theory does not satisfactorily explain why small-scale farmers are often resistant to technological innovation in farming techniques or to the introduction of new seeds or different cash crops. According to the standard theory, a rational income or profit-maximising farm or firm will always choose a method of production that will increase output for a given cost (in this case, the available labour time) or lower costs for a given output level. But the

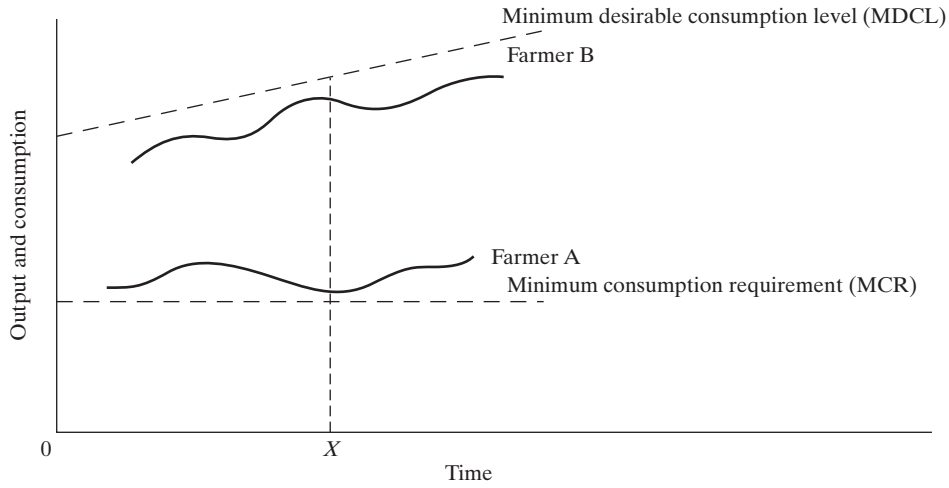
theory is based on the crucial assumption that farmers possess "perfect knowledge" of all technological input–output relationships as well as current information about prevailing factor and product prices. This is the point at which the simple theory loses a good deal of its validity when applied to the environment of subsistence agriculture. Furthermore, when access to information is highly imperfect, the transaction costs of obtaining this information are usually very high. Given price uncertainty, traditional (peasant) farmers often face a wide range of possible prices rather than a single input price. Along with limited access to credit and insurance, such an environment is not conducive to the type of behaviour posited by neoclassical theory and goes a long way toward explaining the actual risk-averse behaviour of peasant farmers, including their caution in the use of purchased inputs such as fertiliser.[40]

Subsistence agriculture is thus a highly risky and uncertain venture. It is made even more so by the fact that human lives are at stake. In regions where farms are extremely small and cultivation is dependent on the uncertainties of variable rainfall, average output will be low, and in poor years the peasant family will be exposed to the very real danger of starvation. In such circumstances, the main motivating force in the peasant's life may be the maximisation, not of income, but of the family's chances of survival. Accordingly, when risk and uncertainty are high, small farmers may be very reluctant to shift from a traditional technology and crop pattern that over the years they have come to know and understand to a new one that promises higher yields but may entail greater risks of crop failure. When sheer survival is at stake, it is more important to avoid a bad year (total crop failure) than to maximise the output in better years. Risk-avoiding traditional farmers are likely to prefer a technology of food production that combines a low *mean* per-hectare yield with low *variance* (fluctuations around the average) to alternative technologies and crops that may promise a higher mean yield but also present the risk of a greater variance.

Figure 9.5 provides a simple illustration of how attitudes toward risk among small farmers may militate against apparently economically justified innovations.[41] In the figure, levels of output and consumption are measured on the vertical axis and different points in time on the horizontal axis, and two straight lines are drawn. The lower horizontal line measures the minimum consumption requirements (MCR) necessary for the farm family's physical survival. This may be taken as the starvation minimum fixed by nature. Any output below this level would be catastrophic for the peasant or subsistence farming family. The upper, positively sloped straight line represents the minimum level of food consumption that would be desirable, given the prevailing cultural or potential productivity factors affecting village consumption standards. It is assumed that this line rises over time.

Looking at Figure 9.5, we see that at time *X*, farmer A's output levels have been very close to the MCR. She is barely getting by and cannot take a chance of any crop failure. She will have a greater incentive to minimise risk than farmer B, whose output performance has been well above the minimum subsistence level and is close to the minimum desired consumption level (MDCL). Farmer B will therefore be more likely than farmer A to innovate and change. The result may be that farmer A remains in a self-perpetuating poverty trap.[42] Moreover, inequality is growing.

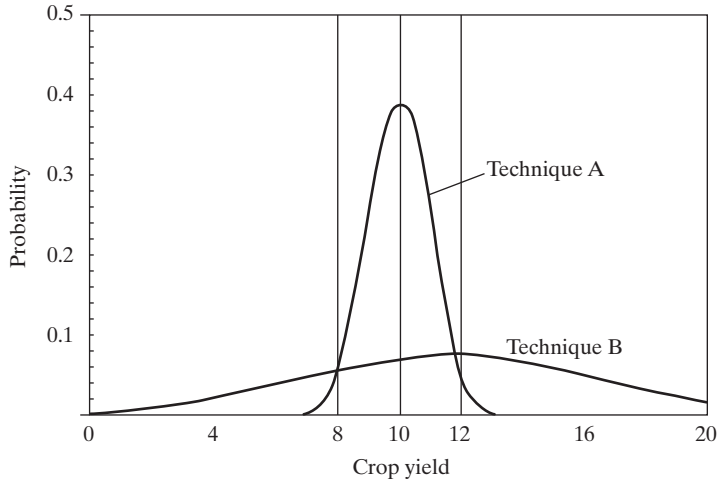
FIGURE 9.5 Small-Farmer Attitudes Toward Risk: Why It Is Sometimes Rational to Resist Innovation and Change



There is an alternative way to look at risk-aversion decisions of peasant farmers. In Figure 9.6, two curves portray hypothetical probabilities for crop yields. The higher curve (technique A) shows a production technology with a lower mean crop yield (10) than that of technique B (12), shown by the lower curve. But it also has a lower variance around that mean yield than technique B. Clearly, the chances of starving are much greater with technique B, so risk-averse peasant farmers would naturally choose technique A, the one with the lower mean yield.[43] Evidence is clear that farmers pay for "self-insurance" of this type with much lower average returns.[44]

Many programmes to raise agricultural productivity among small farmers in Africa and elsewhere have suffered because of failure to provide adequate insurance (both financial credit and physical "buffer" stocks) against the risks of crop shortfalls, whether these risks are real or imagined. An understanding of the major role that risk and uncertainty play in the economics of subsistence agriculture would have prevented early and unfortunate characterisations of subsistence or traditional farmers as technologically backward, irrational producers with limited aspirations or just plain "lazy natives," as in the colonial stereotype. Moreover, in parts of Asia and Latin America where agriculture has performed poorly, a closer examination of why traditional (peasant) farmers have apparently not responded to an "obvious" economic opportunity will often reveal that (1) the landlord secured much if not all of the gain, (2) the moneylender captured the profits, (3) the government's "guaranteed" price was never paid, or (4) complementary inputs (fertilisers, pesticides, assured supplies of water, adequate nonusurious credit, etc.) were never made available or their use was otherwise more problematic than outsiders understood. In particular, when peasants have reason to be concerned about the risk of eviction or expropriation—whether by

FIGURE 9.6 Crop Yield Probability Densities of Two Different Farming Techniques



landlords or by the state—incentives for those who work the land to invest in it will be proportionately reduced.

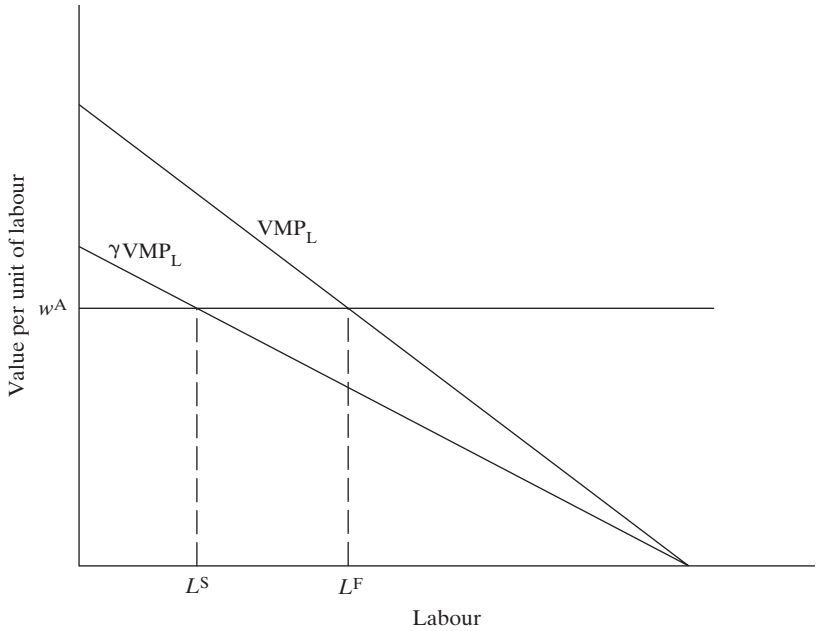
Farmers will consider the expected value of the marginal product of any inputs they apply, such as fertiliser, which will be lowered in relation to the probability they place on expropriation. For example, if fertiliser lasts for two growing seasons but the peasant is sure her land will be expropriated as soon as someone with the power to do so sees that the land has already been fertilised, then too little fertiliser will be used from the social point of view, because the peasant will consider the benefits of the fertiliser as if it disappeared after just one season (while its price is not lowered). This type of effect has been confirmed by careful econometric evidence from China.[45]

9.5.3 The Economics of Sharecropping and Interlocking Factor Markets

The phenomenon of risk aversion among peasant farmers in the presence of high land inequality also helps explain the prevalence of sharecropping throughout much of Asia and parts of Latin America.[46] Although different types of relationships may arise between the owners of land and the people who work on them (e.g., the farmers could rent, or act as wage labourers), sharecropping is widespread. Sharecropping occurs when a peasant farmer uses the landowner's farmland in exchange for a share of food output, such as half of the rice or wheat grown. The landlord's share may vary from less than a third to more than two-thirds of output, depending on local labour availability and the other inputs (such as credit, seeds, and tools) that the landlord provides.

The poor incentive structure of sharecropping lends itself to inefficiency. Alfred Marshall observed that the farmer was, in effect, paid only part, rather

FIGURE 9.7 Incentives Under Sharecropping



than all, of his marginal product and would rationally reduce work effort accordingly.[47] This effect can be seen graphically in Figure 9.7. Labour input is found along the *x*-axis, which may be interpreted as number of hours of work or of total effort; value of output per unit of labour is found along the *y*-axis. A farmer who owned his own farm would work until his value marginal product of labour (VMP_L) was equal to his alternative wage, or opportunity cost of labour, w^A, and so would put in an efficient amount of labour effort, L^F. However, a sharecropper receives only a fraction, γ, of his effort; for example, under 50–50 sharecropping, the sharecropper's share would be $\gamma = 0.5$. Thus, the sharecropper would receive only γ of his value marginal product, or γVMP_L. As a result, the sharecropper would have an incentive to put in an inefficiently low level of effort, L^S, as seen in Figure 9.7.

This view was challenged in the 1960s by Steven Cheung, who argued that profit-maximising landlords would establish contracts requiring adequate work effort from the tenant as well as stipulating each party's share of the output. If, as Cheung argued, effort was not too difficult to monitor, then if one tenant failed to live up to his part of the bargain, he would be replaced by another tenant who was willing to work harder; as a result, sharecropping would be as efficient as any other contractual form. Cheung's theory is known as the *monitoring approach*, in contrast to the *Marshallian approach* to the analysis of sharecropping illustrated in Figure 9.7; Cheung argued that labour effort, L^F, would also obtain under sharecropping.[48]

The monitoring approach was popular for two decades, and it was difficult to test because of endogeneity. For example, only low-productivity people may

choose to enter into sharecropping contracts. In fact, some scholars believe that landlords may offer tenants an option of either sharecropping or pure rental contracts precisely because higher-ability people more often choose pure rental arrangements: high-ability farmers are able to get the full value of their high marginal product, while this is not as attractive to lower-ability farmers. If landlords are not sure which farmers have high ability, they may find out by observing which ones choose the pure rental contract. The motivation may be to enable landlords to squeeze more profits out of the renters, charging higher effective rents for pure rental contracts than for sharecropping contracts—but not *too* high or even high-ability farmers would choose sharecropping. This approach is known as the *screening hypothesis* of sharecropping.[49]

However, Radwan Ali Shaban identified farmers who farmed plots that they owned and who also leased out additional farmland under a sharecropping contract. By comparing the *same* farmers' behaviour under different contractual arrangements, Ali Shaban controlled for factors specific to individual farmers that cannot be easily observed. He found that farmers used fewer inputs and produced less output on the sharecropped land than on their own land, all else being equal. These results provide evidence that sharecropping is less efficient than farming one's own land, just as Marshall predicted.[50]

A final approach suggests that sharecropping is relatively efficient after all, in that it makes the best out of an inherently uncertain and risky situation for both parties.[51] If the landlord paid the tenant a straight wage, which would be efficient if the tenant always gave his full effort and it didn't cost the landlord anything to make sure of this, the tenant would have every incentive to accept the money and not work hard. If the tenant paid a straight rent for the land, he would face the appalling risk that there would be a particularly lean year, such as a drought, and there would not be enough food left after the rent was paid to prevent starvation. Thus, sharecropping represents a compromise between the risk to the landlord that the tenant will not do much work and the risk to the tenant that a fixed rent will in some years leave him no income. So even though sharecropping, with its poor work incentives, would be inefficient in a world of perfect certainty, in the real world, with inequality in land ownership as well as uncertainty, it is "as efficient as we can get." However, this arrangement is necessary only because of extreme inequality of land ownership. Farmers who own their own farms do not generally choose sharecropping contracts for themselves. As a result, the enormous efficiency loss, as seen in Figure 9.7, is not negated by this important explanation of why sharecropping arises.[52]

Where tenancy reform is well designed and enforced, giving sharecroppers a larger share of the produce and security of tenure on the land, the result can be not only higher income for the tenants but also greater overall efficiency. A clear example is the tenancy reform policy implemented in the Indian state of West Bengal in the late 1970s.[53] The explanation is clear from what we have just established: that a higher product share gives greater work effort incentives, and greater security of tenure gives greater investment incentives. Land reform that distributes ownership of "land to the tiller" can provide similar and superior improvements in incentives, if needed complementary inputs are provided.

More broadly, the economic and social framework in which sharecropping takes place is one of extraordinary social inequality and far-reaching market failure. When the peasant faces his landlord, he often faces not only the individual

whom he must persuade to rent him productive land but at the same time his prospective employer, his loan officer, and even his ultimate customer for any crops he wishes to sell. Such conditions, an example of **interlocking factor markets**, provide the rural landlord with abundant sources of monopoly and monopsony power. Under some conditions—in particular, the availability of a perfectly elastic supply of tenants and the ability of the landlord to subdivide his land into as many plots as he chooses—the peasant is forced to his *reservation utility level*, or next-best income opportunity. (In practice, on one hand, peasants are sometimes prevented from learning about some of the alternatives available to them; on the other hand, subdivision may be restricted.) Interlocked-factor-market sharecropping does have the resource allocation advantage that it is in the landlord's interest to see to it that his sharecropper receives credit from the lowest-cost source. At the same time, the personal nature of interlinkage gives the dominant party far-ranging leverage and acts as a barrier to entry that restricts competition that might ultimately benefit the peasant. In this regard, as an observation applying to interlinkage and to other rural institutions, Pranab Bardhan and Christopher Udry make the important point that "the thin line between *understanding* an institution and *justifying* it is often blurred, particularly by careless interpreters of the theory."[54]

Interlocking factor markets Factor markets whose supply functions are interdependent, frequently because different inputs are provided by the same suppliers who exercise monopolistic or oligopolistic control over resources.

For many analysts, a study of interlinkage involving a dominant landlord often concludes that nothing short of land reform will reliably affect the tenant's welfare. We discuss land reform more fully later in the chapter.[55]

9.5.4 Intermediate Steps to Mixed or Diversified Farming

It is neither realistic nor necessarily desirable to think of instantly transforming a traditional agrarian system that has prevailed for many generations into a highly specialised commercial farming system. Attempts to introduce cash crops indiscriminately in subsistence farms have often resulted in the peasants' loss of land to moneylenders or landlords. Subsistence living is merely substituted for subsistence production. For small farmers, exclusive reliance on cash crops can be even more precarious than pure subsistence agriculture because the risks of price fluctuations are added to the uncertainty of nature.

Diversified (mixed) farming The production of both staple crops and cash crops and simple animal husbandry typical of the first stage in the transition from subsistence to specialised farming.

Diversified or **mixed farming** therefore represents a logical intermediate step in the transition from subsistence to specialised production. In this stage, the staple crop no longer dominates farm output, and new cash crops such as fruits, vegetables, coffee, tea, and pyrethrum are established, together with simple animal husbandry. These new activities can take up slack in farm workloads during times of the year when disguised unemployment is prevalent.

For example, if the staple crop occupies the land only during parts of the year, new crops can be introduced in the slack season to take advantage of both idle land and family labour. And where labour is in short supply during peak planting seasons, simple laboursaving devices (such as small tractors, mechanical seeders, or animal-operated steel ploughs) can be introduced to free-up labour for other farm activities. Finally, the use of better seeds, fertilisers, and simple irrigation to increase yields of staple crops such as wheat, maize, and rice can free part of the land for cash crop cultivation while ensuring an adequate supply of the staple food. The farm operator can thus have a marketable surplus, which she can sell to raise her family's consumption standards or invest in farm

improvements. Diversified farming can also minimise the impact of staple crop failure and provide a security of income previously unavailable.

The success or failure of such efforts to transform traditional agriculture will depend not only on the farmer's ability and skill in raising his productivity but also, even more important, on the social, commercial, and institutional conditions under which he must function. Specifically, if he can have reasonable and reliable access to credit, fertiliser, water, crop information, and marketing facilities; if he receives a fair market price for his output; and if he can feel secure that he and his family will be the primary beneficiaries of any improvements, there is no reason to assume that the traditional farmer will not respond to economic incentives and new opportunities to improve his standard of living. Evidence from such diverse countries as Colombia, Mexico, Nigeria, Ghana, Kenya, India, Pakistan, Thailand, and the Philippines shows that under the proper conditions, small farmers are responsive to price incentives and economic opportunities and will make radical changes in what they produce and how they produce it.[56] Lack of innovation in agriculture, as noted earlier, is usually due not to poor motivation or fear of change but to inadequate or unprofitable opportunities. In Africa, lack of information is often a constraint, but farmers learn from each other when valuable new crops and techniques are introduced locally. This facilitates dissemination of new technologies, as a study in Ghana revealed (see Box 9.2).

9.5.5 From Divergence to Specialisation: Modern Commercial Farming

The specialised farm represents the final and most advanced stage of individual holding in a mixed-market economy. It is the most prevalent type of farming in advanced industrial nations. It has evolved in response to and parallel with development in other areas of the national economy. General rises in living standards, biological and technical progress, and the expansion of national and international markets have provided the main impetus for its emergence and growth.

In **specialised farming**, the provision of food for the family with some marketable surplus is no longer the basic goal. Instead, pure commercial profit becomes the criterion of success, and maximum per-hectare yields derived from synthetic (irrigation, fertiliser, pesticides, hybrid seeds, etc.) and natural resources become the object of farm activity. Production, in short, is entirely for the market. Economic concepts such as fixed and variable costs, saving, investment and rates of return, optimal factor combinations, maximum production possibilities, market prices, and price supports take on quantitative and qualitative significance. The emphasis in resource utilisation is on capital formation, technological progress, and scientific research and development in stimulating higher levels of output and productivity.

Specialised farming The final and most advanced stage of the evolution of agricultural production in which farm output is produced wholly for the market.

Specialised farms vary in both size and function. They range from intensively cultivated fruit and vegetable farms to the vast wheat and corn fields of North America. In most cases, sophisticated laboursaving mechanical equipment, ranging from huge tractors and combine harvesters to airborne spraying techniques, permits a single family to cultivate many thousands of hectares of land.

BOX 9.2 Findings: Learning About Farming: The Diffusion of Pineapple Growing in Ghana

Agricultural experts cannot train millions of farmers—who sometimes also know constraints and opportunities that trainers do not. So farmers must partly learn new products and techniques from each other, and social learning is very difficult to identify. But Timothy Conley and Christopher Udry collected detailed information from farmers in the Akwapim South district of Ghana, asking them whom they know and talk to about farming, to better understand and test for "social learning in the diffusion of a new agricultural technology."

In Akwapim South, farmers traditionally grew maize and cassava, which they sold to urban consumers. But a transformation was under way toward farmers cultivating pineapples for export to Europe. Doing so required intensive fertiliser use—adoption of a new technology. Pineapple technologies were spreading geographically through the region. But a farmer might adopt a new technology soon after his neighbour, not from learning, but just because neighbours tend to be similar in other ways. Conley and Udry collected information on geography, soil and agronomics, credit, and family relationships to control for similarities that previous studies had been unable to observe. Then the researchers tested "whether farmers adjust their inputs to align with those of their information neighbors who were surprisingly successful in previous periods," and they found robust evidence to support this idea: "We find strong effects of news about input productivity in the information neighborhood of a farmer on his innovations in input use."

Data on inputs used and output harvested by each farmer let Conley and Udry infer the information conveyed by each "experiment" with pineapples and fertiliser by any of their respondents. They utilised data on "information flow between farmers to trace the impact of the information revealed by each experiment on the future input decisions of other farmers who are in the information neighborhood of the cultivator who conducted the experiment."

Important findings include the following:

- A farmer is "more likely to change his fertiliser use after his information neighbors who use similar amounts of fertiliser achieve lower than expected profits."
- A farmer "increases (decreases) his use of fertiliser after his information neighbors achieve unexpectedly high profits when using more (less) fertiliser than he did."
- A farmer's "responsiveness to news about the productivity of fertiliser in his information neighborhood is much greater if he has only recently begun cultivating pineapple."
- A farmer "responds more to news about the productivity of fertiliser on plots cultivated by veteran farmers and farmers with wealth similar to his."

Since novice farmers "are most responsive to news in their information neighborhoods," the results probably reflect learning. This conclusion is reinforced because there is no evidence of learning when the authors' research methods are "applied to a known maize-cassava technology." Sometimes a neighbour's surprising lower profit leads a farmer to make the wrong decision by lowering his own fertiliser use. But this is also part of the ongoing learning process.

The evidence implies that information "has value in these villages, as do the network connections through which that information flows." But forming and maintaining a connection has real costs; and such costs—as well as benefits—generally depend on factors such as religion, gender, wealth, or family ties. This implies that "measurement of the extent of social learning is not sufficient for adequate evaluation of policy regarding the diffusion of technology." Moreover, the paper highlights that network connections are endogenous; this is a very important consideration for policy analysis.

Source: Based on Timothy G. Conley and Christopher R. Udry, "Learning about a new technology: Pineapple in Ghana," *American Economic Review* 100 (2010): 35–69. Copyright © 2010 by the American Economic Association. Used with permission.

The common features of all specialised farms, therefore, are their emphasis on the cultivation of one particular crop, their use of capital-intensive and in many cases laboursaving techniques of production, and their reliance on economies of scale to reduce unit costs and maximise profits. In some ways, specialised farming is no different in concept or operation from large industrial enterprises. In fact, some of the largest specialised farming operations in both the developed and the less-developed nations are owned and managed by large, multinational, corporate agribusiness enterprises. Large, modern farms are now found in many middle-income countries such as Brazil. But for smallholder farmers where subsistence farming predominates, strategies for dealing with risk, and in some cases overcoming coordination failures in specialisation as described in Chapter 4, remain prerequisites for successful specialisation.

Although we can find all three types of farms—subsistence, mixed, and specialised commercial—coexisting in almost all developing countries at any given time, for the majority of low-income countries, particularly in Africa, contemporary agricultural systems are still dominated by small-scale mixed and even subsistence-based family farms. The further transition to a preponderance of commercial enterprises may be difficult to achieve, depending as it does on the solution to many other short- and intermediate-term problems. But there is wide agreement that the improvement of small- and medium-scale mixed farming practices that will not only raise farm incomes and average yields but, if labour-intensive, also effectively absorb underutilised rural labour offers the major immediate avenue toward the achievement of real people-oriented rural development.

9.6 Core Requirements of a Strategy of Agricultural and Rural Development

If the major objective of agricultural and rural development in developing nations is the progressive improvement in rural levels of living achieved primarily through increases in small-farm incomes, output, and productivity, along with genuine food security, it is important to identify the principal sources of agricultural progress and the basic conditions essential to its achievement.

9.6.1 Improving Small-Scale Agriculture

Technology and Innovation In most developing countries, new agricultural technologies and innovations in farm practices are preconditions for sustained improvements in levels of output and productivity. In many parts of Africa, however, increased output in earlier years was achieved without the need for new technology simply by extending cultivation into unused but potentially productive lands. Almost all of these opportunities have by now been exploited, and there is little scope for further significant or sustainable expansion.

Two major sources of technological innovation can increase farm yields. Unfortunately, both have somewhat problematic implications for agricultural development. The first is the introduction of mechanised agriculture to replace human labour. The introduction of laboursaving machinery can have a dramatic effect on the volume of output per worker, especially where land is extensively

cultivated and labour is scarce. For example, one man operating a huge combine harvester can accomplish in a single hour what would require hundreds of workers using traditional methods.

But, in the rural areas of many developing nations, where land parcels are small, capital is scarce, and labour is abundant, the introduction of heavily mechanised techniques is often ill suited to the physical environment and has the effect of creating more rural unemployment without necessarily lowering per-unit costs of food production.[57] Importation of such machinery can require large tracts of land (and thus the consolidation of small holdings) and tends to exacerbate the already serious problems of rural poverty and underemployment. And if mechanised techniques exclude women, the male–female productivity gap could widen further, with serious repercussions.[58]

Biological (hybrid seeds and biotechnology), water control (irrigation), and chemical (fertiliser, pesticides, insecticides, etc.) innovations—the second major source—are not without their own problems. They are land-augmenting—that is, they improve the quality of existing land by raising yields per hectare. Only indirectly do they increase output per worker. Improved seeds, advanced techniques of irrigation and crop rotation, the increasing use of fertilisers, pesticides, and herbicides, and new developments in veterinary medicine and animal nutrition represent major scientific advances in modern agriculture. These measures are often technologically **scale-neutral**; theoretically, they can be applied equally effectively on large and small farms. They do not necessarily require large capital inputs or mechanised equipment. They are therefore particularly well suited for tropical and subtropical regions, offer enormous potential for raising agricultural output in developing nations, and have been highly effective in doing so, particularly in Asia. Again, the major challenge is to extend this success to sub-Saharan Africa, which will in some cases need new innovations. There are also important environmental challenges in many parts of the developing world, including risks posed by a falling water table, salination, and other resource degradation for which well-designed government policy and in some cases restored collective action mechanisms are usually necessary.

Scale-neutral Unaffected by size; applied to technological progress that can lead to the achievement of higher output levels irrespective of the size (scale) of a firm or farm.

9.6.2 Institutional and Pricing Policies: Providing the Necessary Economic Incentives

Unfortunately, although the Green Revolution varieties of wheat, corn, and rice, together with needed irrigation and chemicals, are scale-neutral and thus offer the potential for continued small-farm progress, the social institutions and government economic policies that accompany their introduction into the rural economy are often *not* scale-neutral.[59] On the contrary, they often merely serve the needs and vested interests of the wealthy landowners. Because the new hybrid seeds require access to complementary inputs such as irrigation, fertiliser, insecticides, credit, and agricultural extension services, if these are provided only to a small minority of large landowners, one impact of the Green Revolution can be (as in parts of South Asia and Mexico) the further impoverishment of many peasants. Large landowners, with their disproportionate access to these complementary inputs and support services, are able to gain a competitive advantage over smallholders and eventually drive them out of the market. Large-scale farmers obtain access to low-interest government credit, while smallholders are

forced to turn to moneylenders. The result has all too often been the further widening of the gap between rich and poor and the increased consolidation of agricultural land in the hands of a very few so-called progressive farmers. A developmental innovation with great potential for alleviating rural poverty and raising agricultural output can thus turn out to be antidevelopmental if public policies and social institutions militate against the active participation of the small farmer in the evolving agrarian structure.[60]

Another critical area of many past and some continued failures in government policies relates to the pricing of agricultural commodities, especially food grains and other staples produced for local markets. Many governments in developing nations, in their headlong pursuit of rapid industrial and urban development, maintained low agricultural prices in an attempt to provide cheap food for the urban modern sector. Farmers were paid prices below either world competitive or free-market internal prices. The relative internal price ratio between food and manufactured goods (the domestic terms of trade) thus turned against farmers and in favour of urban manufacturers. With farm prices so low—in some cases below the costs of production—there was no incentive for farmers to expand output or invest in new productivity-raising technology. As a result, local food supplies continually fell short of demand, and many developing nations, especially in sub-Saharan Africa, that were once self-sufficient in food production had to import food.

Many development economists therefore argue that if governments are to promote further increases in agricultural production that make a larger impact on poverty reduction through Green Revolution technologies, they must make not only the appropriate institutional and credit market adjustments but also continued progress to provide incentives for small and medium-size farmers by implementing pricing policies that truly reflect internal market conditions.[61]

Adapting to New Opportunities and New Constraints As a route out of poverty and toward genuine rural development, enhanced cereal productivity (the classic Green Revolution characteristic) represents only a small part of the agricultural opportunities. The best opportunities for sales to growing urban areas are generally found in higher-value-added activities, particularly horticulture (fruits, vegetables, and cut flowers) and aquaculture. These products, along with organic and perhaps Fair Trade versions of some otherwise traditional developing-country exports such as coffee and spices, also provide good opportunities for higher-value exports. But small farmers will need special organisation and assistance to take advantage of new opportunities. As the 2008 *World Development Report* concludes, "Smallholders can bargain better as a group than as individuals. So a high priority is to facilitate collective action through producer organisations to reach scale in marketing and bargain for better prices."[62] Otherwise, the risk is large that these developments will benefit mainly the larger farmers.

An opportunity—which also poses a potential threat—is the growing activity of foreign investment in developing-country farmland, also known as *land grabbing*. An IFPRI report estimated that from 2006 to 2009, 15 to 20 million hectares of developing-country farmland had been transferred. An example is the 2008 deal of South Korea to acquire 690,000 hectares in Sudan. Foreign

ownership and long-term leasing of farmland can lead to some better-paying job creation, training, access to better techniques, and new export markets. But there is a real threat that many farmers will lose access to their traditional rights to use land, that there may be net job losses, and that water shortages and environmental degradation of adjacent lands may accelerate, at least without adequate oversight. These and other potential risks are greater when there are governance shortcomings, including corruption, and when women and other poor and vulnerable claimants are not empowered. This is a topic that will be followed closely.[63]

One of the biggest constraints looking ahead is the looming environmental problems driven by global warming and climate change, which are expected to most negatively affect sub-Saharan Africa and South Asia. Smaller and poorer farmers are likely to be affected severely, because of their lower access to irrigation and other inputs and generally lesser capacity to adapt—although, ironically, with their smaller use of irrigation and different crop mix, their absolute income declines may be less than those of richer farmers. Although the majority of global warming problems are caused by developed countries, to the extent that cultivated areas in developing countries continue to increase by means of eliminating remaining forested areas, climate change problems will only worsen. This "agricultural extensification," not only in forests but also in drier and other sensitive lands, further brings the risk of local soil degradation and lost environmental services such as maintaining water and air quality. The losses of wetlands and of biodiversity also lead to substantial national (as well as international) costs. Moreover, intensification of agriculture has often brought with it the misuse of agrochemicals, which can entail large human and ecosystem costs.[64] We return to these problems of environmental sustainability in the next chapter.

9.6.3 Conditions for Rural Development

We can draw three conclusions regarding the necessary conditions for the realisation of a people-oriented agricultural and rural development strategy.[65]

Land Reform

> *Conclusion 1: Farm structures and land tenure patterns must be adapted to the dual objectives of increasing food production and promoting a wider distribution of the benefits of agrarian progress, allowing further progress against poverty.*

Agricultural and rural development that benefits the poor can succeed only through a joint effort by the government and *all* farmers, not just the large farmers. A first step in any such effort, especially in Latin America and Asia, is the provision of secured tenure rights to the individual farmer. The small farm family's attachment to their land is profound. It is closely bound up with their innermost sense of self-esteem and freedom from coercion. When they are driven off their land or they are gradually impoverished through accumulated debts, not only is their material well-being damaged, but so is their sense of self-worth.

It is for these humane reasons, as well as for reasons of higher agricultural output and the simultaneous achievement of both greater efficiency and more

equity, that **land reform** is often proposed as a necessary first condition for agricultural development in many developing countries. In most countries, the highly unequal structure of land ownership is a key determinant of the existing highly inequitable distribution of rural income and wealth. It is also the basis for the character of agricultural development. When land is very unevenly distributed, in quality as well as in quantity, rural peasants can have little hope for economic advancement through agriculture.

Land reform A deliberate attempt to reorganise and transform agrarian systems with the intention of fostering a more equal distribution of agricultural incomes and facilitating rural development.

Land reform usually entails a redistribution of the rights of ownership or use of land away from large landowners in favour of cultivators with very limited or no landholdings. It can take many forms: the transfer of ownership to tenants who already work the land to create family farms (Japan, South Korea, Taiwan); transfer of land from large estates to small farms or rural cooperatives (Mexico); or the appropriation of large estates for new settlement (Kenya). All go under the heading of "land reform" and are designed to fulfil one central function: the transfer of land ownership or control directly or indirectly to the people who actually work the land. Tenancy reform, as in West Bengal, can also yield favourable efficiency and distributional benefits.

There is widespread agreement among economists and other development specialists on the need for land reform. Inequality is increasing in Africa. The Economic Commission for Latin America (ECLA) has repeatedly identified land reform as a necessary precondition for poverty-reducing agricultural and rural progress. A Food and Agriculture Organisation (FAO) report concluded that in many developing regions, land reform remains a prerequisite for development. The report argued that such reform was more urgent today than ever before, primarily because (1) income inequalities and unemployment in rural areas have worsened, (2) rapid population growth threatens to exacerbate existing inequalities, and (3) recent and potential technological breakthroughs in agriculture (the Green Revolution) can be exploited primarily by large and powerful rural landholders and hence can result in an increase in their power, wealth, and capacity to resist future reform.[66] Finally, as noted earlier, from a strict view of economic efficiency and growth, there is ample empirical evidence that land redistribution not only increases rural employment and raises rural incomes but also leads to greater agricultural production and more efficient resource utilisation. Significant though often limited land reforms have already been implemented in many countries, but some countries have still seen little reform.

Unfortunately, very small or landless farmers cannot directly purchase land from the big landowners because of market failures. Credit markets do not function well enough to provide a potentially efficient family farmer with a loan; even if they did, the price of *latifundio* and other estate and plantation land is too high because land ownership confers many benefits beyond the income from farming activities, such as disproportionate political influence.

If programmes of land reform can be legislated and effectively implemented by the government, the basis for improved output levels and higher standards of living for rural peasants will be established. Unfortunately, many land reform efforts have failed because governments (especially those in Latin America) bowed to political pressures from powerful landowning groups and failed to implement the intended reforms.[67] But even an egalitarian land reform programme alone is no guarantee of successful agricultural and rural development.[68] This leads to our second conclusion.

Supportive Policies

Conclusion 2: The full benefits of small-scale agricultural development cannot be realised unless government support systems are created that provide the necessary incentives, economic opportunities, and access to needed credit and inputs to enable small cultivators to expand their output and raise their productivity.

Though land reform is essential in many parts of Asia and Latin America, it is likely to be ineffective and perhaps even counterproductive unless there are corresponding changes in rural institutions that control production (e.g., banks, moneylenders, seed and fertiliser distributors), in supporting government aid services (e.g., technical and educational extension services, public credit agencies, storage and marketing facilities, rural transport and feeder roads), and in government pricing policies with regard to both inputs (e.g., removing factor price distortions) and outputs (ensuring market-value prices for farmers). Even where land reform is less necessary but where productivity and incomes are low (as in parts of Africa and Southeast Asia), this broad network of external support services, along with appropriate governmental pricing policies related to both farm inputs and outputs, is an essential condition for sustained agricultural progress.[69]

Integrated Development Objectives

Conclusion 3: Rural development, though dependent primarily on small-farmer agricultural progress, implies much more. It encompasses: (a) efforts to raise both farm and nonfarm rural real incomes through job creation, rural industrialisation, and other nonfarm opportunities and the increased provision of education, health and nutrition, housing, and a variety of related social and welfare services; (b) a decreasing inequality in the distribution of rural incomes and a lessening of urban–rural imbalances in incomes and economic opportunities; (c) successful attention to the need for environmental sustainability—limiting the extension of farmland into remaining forests and other fragile areas, promoting conservation, and preventing the harmful misuse of agrochemicals and other inputs; and (d) the capacity of the rural sector to sustain and accelerate the pace of these improvements over time.

The achievement of these four objectives is vital to national development. More than half of the population of the developing world is still located in rural areas. By restoring a proper balance between urban and rural economic opportunities and by creating the conditions for broad popular participation in national development efforts and rewards, developing nations will have taken a giant step toward the realisation of the true meaning of development.

Case Study 9

The Need to Improve Agricultural Extension for Women Farmers: Kenya and Uganda

As noted in Chapter 5, absolute poverty is disproportionately concentrated among women, in rural areas, and in the agricultural sector. Improvements in the productivity and incomes of women farmers are therefore key to a strategy for poverty reduction. The role of women in agriculture is particularly important in sub-Saharan Africa. But this is also the region that has benefited least from the Green Revolution of high-yielding crop varieties and other modern farming practices that have had such a large productivity impact in many parts of Asia over the past half-century.

The crucial importance of a solid agricultural extension programme for successful rural development and increased yields has been appreciated by development specialists for decades. Support for agricultural extension has played a central role in the activities of most multilateral and bilateral development agencies. Historically, agricultural extension programmes have played a vital development role in the United States, one of the world's great agricultural productivity success stories.

Traditionally, agricultural extension programmes in developing countries were aimed almost exclusively at training men, even though women do most of the agricultural work. In sub-Saharan Africa, women are responsible for well over two-thirds of staple food production. They are also active in growing and marketing cash crops, in food processing, and in animal husbandry. But women's roles have expanded in recent years as men have increasingly migrated to urban areas and taken nonagricultural jobs. Where men and women both do agricultural work, there still tends to be a gender-based division of labour. As a result, techniques relevant to the work of men are often not relevant to the work of women. Where they are relevant, men in the region have, for various reasons, tended to pass on to their wives ("trickle across") surprisingly little of what they have learned.

The focus on training men has generally been more by default than by design. For example, training has been copied from developed countries such as the United States, where men do the majority of agricultural work. There may be religious or cultural constraints on men training women, and male extension agents may simply be more comfortable talking to men. A World Bank study showed that most male African extension agents have perceived women as "wives of farmers" rather than as farmers in their own right. And almost all extension agents have been male. Female agents must be trained. A major problem is the segregation and exclusion of women in large parts of Africa and Asia.

The success of women in agriculture in sub-Saharan Africa is at the very core of prospects for genuine development and poverty reduction. But the agricultural extension programme response to the problem has been slow. And in some countries, programme design is said to reflect a bias against providing women with too much independence.

One important strategy of the past 30 years has been to make use of radio, audiotapes, television, videotapes, DVDs, and more recently SMS (texting). Women may listen to or watch the materials in groups in homes or village centres. Katrin Saito and her colleagues reported that female farmers question extension agents in Ghana about subjects they have heard discussed on the radio.

Agricultural extension programmes for women are interconnected with a number of other important rural development and women-in-development issues. Five key issues are the following:

1. *Human capital.* Women have less education than men on average in most rural developing areas. The bias in agricultural extension programmes may in some part be a bias to train the more educated spouse, but the practice has also exacerbated this relative deficiency.
2. *Appropriate technology.* Because women tend to be involved in different farm activities than men, they will often have different technology requirements. Most technology development has been focused on activities of men.
3. *Land reform and agrarian design.* On average, women farm on much smaller, more fragmented plots than men, are less likely to have secure ownership, and often cultivate less fertile soil. This distribution is likely to be inefficient as well as distributionally inequitable.
4. *Credit.* Women have little access, if any, to financial credit—a key input in efficient agriculture.
5. *Work requirements.* Many women who work as many or more hours per day as men in agricultural pursuits also have to perform several hours of domestic work that men do not do. The workday of a poor woman farmer in Africa has been estimated at 16 to 19 hours. The attention mothers can give to their children is limited by long agricultural working hours. The implication may be that women should receive an even higher priority for technical education and technology development and access.

As Rekha Mehra has noted, one intent of structural adjustment programmes in many African countries has been to encourage the shift to exportable cash crops. But these are the crops over which men tend to exercise control. A woman's profit share after working with these crops may be as little as 5%. But she is still responsible for growing consumption crops and feeding her children. Mehra concludes that structural adjustment programmes tend to place even more time requirements on women already burdened with 16-hour workdays. The irony is that as the husband controls the cash, his "say" in the family may actually *increase* as a result.

Removal of agricultural price controls in Africa, allowing the prices that farmers receive for their crops to move toward world market levels, has provided more accurate price signals to farmers and encouraged a switch to more economically productive crops. But an IFPRI study showed that after diversification to commercial crops, Kenyan women still try to grow the same amount of consumption crops. Thus, more is needed than price adjustments featured under structural adjustment programmes; reform must address structural problems faced by women that will prevent them from responding to price signals efficiently. A good example is the larger profit share taken by the husband and often not shared with his wife or wives.

None of these problems is limited to Africa. For example, Carmen Diana Deere, in a review of 13 Latin American agrarian reform experiences, found that most have benefited only men. This was mostly because farmers were thought of as men and the reforms were designed to target only men as beneficiaries. Her review found that women benefit only in the rare instances when their well-being is a specific objective of the reform and rural women are made an explicit part of the design of programmes from the outset.

Taken as a whole, these points show why women farmers need the help of extension programmes. It is also efficient to do this because of an application of the law of diminishing returns to training for men. The evidence suggests that the trickle-across theory—that trained husbands will in turn train their wives—all too rarely occurs in practice, at least in sub-Saharan Africa.

Kenya

In Kenya, the ministry of agriculture operates a national extension system (NES) in concert with its agricultural research efforts. Before 1983, the NES worked almost exclusively with male farmers, while a separate "home economics branch" advised women on household and cottage industry management and domestic hygiene, but only peripherally on farming matters. Research by the Institute of Development Studies in Nairobi and other agencies confirmed that extension programmes were much more likely to have reached men than women farmers. In 1983, Kenya's training and visit (T&V) system was established with the express purpose of training women as well as men in efficient agricultural practices. The case provides an example of the necessary ingredients of progress and also of how very much remains to be accomplished.

The design of the T&V system is based on providing "technical messages" to selected "contact farmers," who are regularly visited on their farms. Unfortunately, resources are insufficient to reach all farmers, and even if the T&V system did try to reach all farmers, the quality of training would be poor. As a result, only 10% of all farmers are chosen to adopt advice brought to them in these messages and then to help spread this new technical knowledge by persuading other farmers in the villages to adopt them as well. A number of "follower farmers" are expected to attend meetings with T&V officials on the contact farmer's land. In this way, it is hoped that technical "diffusion" is maximised in a cost-effective manner. The selection process is vital. Farmers must be selected who are capable, likely to diligently follow through on new information, and locally respected so as to encourage emulation. In choosing contact farmers, T&V officials meet with farmers and consult with local communities and their leaders. In recent years, T&V outreach has focused more on working with traditional community farmer self-help groups, which can provide greater flexibility, better diffusion, and group reinforcement.

At first, messages focused on procedures offering the prospect of significant productivity gains but not requiring cash expenditure, such as ground preparation, spacing, seed varieties, and pruning. The messages being diffused in any one month are linked to farm activities underway in the annual crop cycle, such as planting or harvesting the crops being cultivated at any given point in the course of the year. The training process builds step by step: simpler messages are imparted in early stages, and more complex messages later in the programme. Moreover, only after farmers see results from this initial advice and so come to trust the T&V messages, are measures requiring modest cash outlays introduced, such as fertiliser use and crop spraying. In a later stage, measures requiring purchase of capital goods may be introduced. Increasing numbers of women function officially as contact farmers. Even more serve unofficially in this role, as their husbands farm only part time or not at all.

The messages of the T&V programme, ideally, are supposed to be transmitted in both directions. T&V agents are supposed to gather information about how well previous advice has worked in practice and about continued problems in order to guide research efforts. This is in the spirit of the often touted but seldom fulfilled development participation ideal.

T&V-type programmes received substantial encouragement and financial support from the World Bank from the mid-1970s through to the 1990s. But in most countries, performance was disappointing.

In 1997, Vishva Bindlish and Robert Evenson reported that T&V-type extension programmes operated in more than 30 countries in sub-Saharan Africa. They concluded from their statistical evidence that the experience of "Kenya and Burkina Faso shows that T&V management enhances the effectiveness of extension and that such programmes support agricultural growth and produce high returns on investments." They found that "areas served by extension have higher yields and that within these areas the highest yields are achieved by farmers who participate directly in extension activities. As a result, extension helps to close the gap between the yields attainable with existing technologies and those actually realised by farmers." But they found that while this makes improvements in the short run, there are limits to what the programme can achieve without "the development of improved technologies that are relevant to local conditions."

A study by Robert Evenson and Germano Mwabu found that the impact of T&V in Kenya on productivity was positive but, interestingly, strongest among farmers of highest and lowest ability (measured by the portion of productivity unexplained by the use of farm inputs). They hypothesised that high ability overcame diminishing returns to inputs. Perhaps extension is complementary with high (unobserved) management ability. But the relatively high impact on the lower-ability farmers is noteworthy, even if data drawing conclusions about possible impacts on, for example, poverty are not available.

Economic advancement of women farmers is also important for promoting environmentally sustainable development. In addition to their responsibility for agriculture, especially on more marginal and often ecologically fragile lands, women have a customary role in traditional societies as the guardians of natural resources such as the water supply. This is also an important domain for agricultural extension work with women. In Kenya, the T&V system is not yet strongly involved in environmental problems.

Christina Gladwin and Della McMillan argue that much more must be done; for example, women

should be consulted at the design stage of technology development, extension specialists should receive training on how to approach a male farmer about training his wife or wives, and governments should target funds to women's organisations and clubs.

Another shortcoming of the T&V system is that it has made too little progress in the field of women's credit. A study by Kathleen Staudt found that of 84 female farm managers interviewed in the Kakamega District in Kenya's Western Province, only one knew about the credit programme, and no female manager had received any credit. Informal indications are that this is the area that has improved least over the subsequent years. But rural credit, often run by local NGOs, has recently been expanding in Kenya at a rapid rate that has surprised many long-term observers.

The strategy of involving women in public agriculture initiatives has shown some results in environment and credit as well as agricultural productivity. For example, the United Nations Population Fund reports that "women are now the principal participants in Kenya's National Soil Conservation Program. Since the mid-1980s, women have terraced more than 360,000 small farms, or 40 per cent of the country's total. Rural collectives, run by women, are now getting bank loans and agricultural extension services tailored to their specific needs and interests."

The Women in Development Service of the FAO reports that "in Kenya, following a national information campaign targeted at women under a National Extension Project, yields of corn increased by 28 percent, beans by 80 percent and potatoes by 84 percent." The way forward also includes a greater emphasis on more general knowledge. The FAO also reports on a study in Kenya that showed that farm "yields among rural women could be increased by 24 percent if all women farmers completed primary school."

Nevertheless, the agricultural extension programme in Kenya has remained weak by international standards. The World Bank audited its programmes in this field in 1999 and found it severely wanting in many respects, including low cost-effectiveness. The audit called for more efficient targeting of extension services where the impact is likely to be greatest, using improved information systems, and empowering farmer clients by giving them a greater voice in the design of the services. The World Bank also called for more cost recovery, but this is likely to prove controversial. Kenya eliminated user fees on primary education in 2002, making it at least nominally free for all, despite 1980s-era encouragement by the World Bank and other agencies to seek "cost recovery" from impoverished parents of primary pupils. As a vital part of poverty alleviation, cost recovery from impoverished women farmers is a dubious strategy. It may also be noted that structural adjustment in Kenya is cited by other critics as a cause of declining T&V budgets in the late 1980s and 1990s—severely crippling the capacities of this programme.

In Kenya and elsewhere in sub-Saharan Africa, public extension programmes have also been supplemented in recent years by a growing presence of nongovernmental organisations (see Chapter 11). For example, in western Kenya, the NGO Africa Now is actively recruiting and training farmers to participate in beekeeping as an alternative means of income generation. Broad participation of many civil society actors with diverse knowledge bases and connections with various ethnic and other social groupings is essential to success in an ecologically and socially diverse region such as sub-Saharan Africa.

Regarding government extension, a World Bank evaluation concluded that "progress on gender issues has been mixed. The earlier bias against women farmers has been rectified, but some bias persists in the selection of contact farmers. The proportion of female field-extension agents has remained largely unchanged since 1982." Though a better performance than many African and Asian countries and than Kenya exhibited in the past, it leaves much to be desired. Real progress has been made, but there is a pressing need for systematic follow-up and expansion.

A hopeful sign is that in decentralising extension to more local levels, opportunities for active participation are increasing. Kenya's National Agricultural and Livestock Programme has established stakeholder forums to decide on extension service priorities at the district and subdistrict levels, in which farmers are to be given a substantial say. But it is too early to determine how much more responsive the new system will be to the needs of women farmers,

or whether the long-term impact will be greater than past efforts.

In another development, Esther Duflo, Michael Kremer, and Jonathan Robinson presented intriguing evidence, from the Busia district in Kenya, that farmers also have a "commitment problem" in using returns from produce sales to purchase fertiliser for next season. Although still at an early stage, this pioneering research may open up new avenues for more effective agricultural programme design.

Farmers' apparent inability to commit to a long-range plan, despite its benefits, could be addressed in turn by a "commitment device." They find that a rather simple contract can address this problem, resulting in a huge increase in the level of fertiliser adoption. This is another example of the growing applications of behavioural economics within the field of development economics.

But the role of women is strengthening throughout Kenya. Thousands of women are taking part in the Green Belt Movement (GBM), established in 1977 by the National Council of Women in Kenya at the behest of the late visionary leader Wangari Maathai. Its simple objective, in Maathai's words, is to "halt desertification by encouraging tree planting and soil and water conservation in rural communities." The GBM also works to promote sustainable development and poverty alleviation in parallel projects. Although the programme is run through the NGO or citizen sector, seedlings are provided by the government at low prices, and GBM volunteers receive advice and support from government forestry officials. For her work in supporting sustainable agriculture and forestry that benefits women and children, Maathai was awarded the 2004 Nobel Prize for Peace.

The GBM emphasises grassroots participation and self-help and strives to educate people on the link between deforestation, erosion, poor soil quality, and subsequent low crop yields. With the help of outside funding, women are paid to work at about 1,000 nurseries. Seedlings grown at these nurseries are given to small farmers, schools, and churches, which have planted tens of millions of trees. The estimated survival rate is 70 to 80%. The GBM has had striking success in scalability—that is, bringing the model throughout Kenya and then disseminating it widely in Africa. This success was noted by the Nobel committee when awarding the prize to Maathai.

Uganda

Uganda provides an interesting comparison with Kenya. Agriculture plays a major role in the Ugandan economy, accounting for 73% of employment, 50% of household income, and 21% of gross domestic product (GDP). Despite the importance of agriculture in Uganda, its growth has been slow and subsistence farming is still prevalent in the country—subsistence farmers account for 71% of the total farmers in the country. The adoption rates of advanced agricultural inputs and cultivation methods remain relatively low.

The extension services in Uganda have chronically underperformed, despite a series of attempted reforms. In 2001, the National Agricultural Advisory Services programme was launched with much fanfare via a newly created Secretariat and considerable foreign aid. Its goals were laudable: "raising overall agricultural yields and productivity and diversifying smallholder production patterns into a mix of higher-value, export-oriented commodities, along with lower-value food staples." One of its reform features was "decentralisation of activities" and "greater participation of potential users." But, when it came to implementation, the programme failed to prioritise reaching the small farmers who most needed assistance. Many farmers said they had never seen an extension agent, let alone talked with one. In an all-too-familiar pattern, most female-headed households received no extension services.

The Uganda system has been described as being disorganised, understaffed, and allegedly at times corrupt, utilising a nearly patternless mosaic of semi-formalised nonprofit and private agents who received little or no guidance. With no systematic policy or adaptable model programmes, agents had to improvise. After a number of smaller subsequent initiatives seemed to lead to little change, a new programme announced in 2019, emphasising even more local decentralisation and a focus on improvements throughout the "value chain," could turn out to be more effective; its performance will be watched closely.

Meanwhile, the civil society sector, from informal farmer associations to NGOs, has played a significant role in attempting to fill the gap for women farmers. In Uganda, a grassroots programme designed and

implemented in 2009–14 by the nongovernmental organisation (NGO) BRAC, featured two main components to promote improved technology use—training, and easier and less costly access to inputs and HYV seeds—and it has been found to have substantial impacts. The programme operated in all parts of the country except for Northern Uganda, which was recovering from a long violent conflict. Research by Yao Pan and coauthors, and Ram Fishman and coauthors, shows that the programme led to substantial benefits, including productivity increases, better basic farming practices, greater use of improved seeds, enhanced family food security, and reduced malaria incidence. Moreover, the gains in practices and improved inputs were shown to be sustainable over time, even after the programme ended. (BRAC's overall organisation and activities as an NGO are examined in the end-of-chapter case study for Chapter 11.)

In 2011, the NGO AVSI began to operate Junior Farmer Field Schools (FFSs) in Northern Uganda. Research by Jacopo Bonan and Laura Pagani found positive impacts on agricultural knowledge and use of good farming practices by the students. They also identified broader household spillover effects of increased household agricultural knowledge and food security.

In summary, both countries have struggled to improve their government extension programmes. There have been some improvements, even in their service to women farmers, but there remains a long way to go to approach international standards. Meanwhile, in both countries, civil society including indigenous civil society organisations and some international NGOs has helped to fill the gap. Most likely, even after successful improvements in government programmes, there will be a continued role for both sectors, as there does seem a natural overlap; while today, civil society has had to extend from its normal comparative advantage to fields in which government normally leads. These questions of sector overlap and extension are explored in detail in Chapter 11 and its case study. NGOs can make a great contribution—but some programmes are far more cost-effective and sustainable than others. Even the best NGO programmes will be most effective when working with effective government programmes and universities. Each of these actors has a vital role in agricultural extension; and improving their effectiveness is a development priority.

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Concepts for Review

Agrarian system
Agricultural extension
Cash crops
Diversified farming
Diversified (mixed) farming
Family farm
Green revolution
Integrated rural development
Interlocking factor markets
Landlord
Land reform
Latifundio
Medium-size farm
Minifundio
Moneylender
Scale-neutral
Sharecropper
Shifting cultivation
Specialised farming
Staple food
Subsistence farming
Tenant farmer
Transaction costs

Questions and Discussion

1. Why should any analysis of development problems place heavy emphasis on the study of agricultural systems, especially peasant agriculture, and the rural sector?
2. What are the principal reasons for the relative stagnation of developing-country agriculture in Africa? How can this disappointing performance be improved on in the future? Explain your answer.
3. Discuss three main systems of agriculture found in the developing world. To what extent are these systems concentrated in three major developing regions?
4. Compare and contrast the nature of peasant or small-scale traditional agriculture in Asia, Africa, and Latin America. How do overall agricultural systems differ among these regions? What are the common characteristics?
5. Several decades ago, Gunnar Myrdal stated: "It is in the agricultural sector that the battle for long-term economic development will be won or lost." Consider the meaning of this statement, and the extent of its current validity and relevance.
6. It is sometimes asserted that small, traditional (peasant) farmers are backward and ignorant because they seem to resist agricultural innovations that could raise farm yields substantially. Does this resistance stem from an inherent irrationality on their part, or might it be attributable to some other factors often overlooked by traditional economic analysis? Explain your answer.
7. We described three stages in the transition from subsistence to specialised agriculture. What are the principal characteristics of each of these stages?
8. There appears to be widespread agreement that in regions where the distribution of land ownership is highly unequal (mainly Latin America but also parts of Asia), land reform is a necessary but not sufficient condition for promoting and improving small-scale agriculture. What is meant by this statement and by the concept of land reform? Give some examples of supportive policy measures that might accompany land reform.
9. What is meant by comprehensive or integrated rural development? What criteria would you use to decide whether or not such integrated rural development was or was not taking place?
10. What explains sharecropping? To what extent do you think your explanation justifies the practice?
11. If land reform is efficient, why do you think it is not more commonly implemented?
12. Why is a proper understanding of risks faced by smallholder farmers of such fundamental importance to agricultural development policy?
13. Explain the argument that effective agricultural policies centre around the role of women.
14. The poorest farmers tend to work on farms with the poorest soil and water conditions. Do you think this is the cause, the effect, or both?
15. What basic problems does the case study evoke on agricultural extension for women in Kenya and Uganda? What special strategies may be used to address these problems?

Notes

1. Regional and national figures are drawn from World Bank, *World Development Indicators*.
2. See United Nations Food and Agriculture Organisation, 2019 Global Hunger Index, at https://www.globalhungerindex.org/results.html, Hunger and Security, and http://www.fao.org/hunger/en/. See also FAO, "Economic growth is necessary but not sufficient to accelerate reduction of hunger and malnutrition," 2012, http://www.fao.org/docrep/016/i2845e/i2845e00.pdf. In 2009, the UN FAO estimated that for the first time, over 1 billion people did not have enough food to meet their basic nutritional needs as a result of a world food price spike, showing the high vulnerability many people face. See United Nations Food and Agriculture Organisation, "The state of food insecurity in the world, 2012, and 2009," http://www.fao.org/docrep/012/i0876e/i0876e00.htm. See also, http://www.fao.org/publications/sofi/en; and International Food Policy Research Institute, "2012 Global Hunger Index: The challenge of hunger: Ensuring sustainable food security under land, water, and energy stresses," and "2009 Global Hunger Index," http://www.ifpri.org/publication/2009-global-hunger-index.
3. Kuznets, S. (1964), 'Economic growth and the contribution of agriculture,' in C.K. Eicher and L.W. Witt (eds), *Agriculture in Economic Development*, New York: McGraw-Hill.
4. Ibid. See also John W. Mellor, "Agriculture on the road to industrialisation," in *Development Strategies Reconsidered*, eds. John P. Lewis and Valeriana Kallab (Washington, D.C.: Overseas Development Council, 1986), pp. 67–89; Subrata Ghatak, "Agriculture and economic development," in *Surveys in Economic Development*, ed. Norman Gemmell (Oxford: Blackwell, 1987), ch. 10; Charles P. Timmer, "The agricultural transformation," in *Handbook of Development Economics*, vol. 1, eds. Hollis B. Chenery and T. N. Srinivasan (Amsterdam: Elsevier, 1988), pp. 276–331.
5. For data see World Development Indicators, Table 4.1, columns 3 and 4, which show growth in low- and middle-income areas accelerating in the 2001–2011 period over the 1990–2000 period, but slightly decelerating in high-income countries. On successful agricultural development and hunger programmes and projects, see International Food Policy Research Institute, "Millions fed," 2009, http://www.ifpri.org/publication/millions-fed. Regarding high developing country productivity gains, see World Bank, *World Development Report, 2008* (New York: Oxford University Press, 2007), p. 69, and Mette Wik, Prabhu Pingali, and Sumiter Broca, "Global agricultural performance: Past trends and future prospects," WDR background paper, 2007.
6. See the United Nations Food and Agriculture Organisation (FAO), *State of Food Insecurity*, 2012, http://www.fao.org/publications/sofi/2012/en; the *OECD-FAO Agricultural Outlook 2013–2022*, June 2013, http://www.oecd.org/site/oecd-faoagriculturaloutlook; and previous issues of these annual series.
7. Rockefeller Foundation Web page, http://www.rockefellerfoundation.org. The AGRA home page is http://www.agra.org. For information on the NEPAD initiative, go to http://www.nepad.org/2005/files/documents/172.pdf.
8. On NERICA, see Office of the Chief Economist, Africa Region, World Bank, *Yes, Africa Can: Success Stories from a Dynamic Continent* (Washington D.C.: World Bank, 2009), p. 9. On the 2008 food price spike and an explanation of short- and long-term forces for price increases, see the OECD-FAO reports, op. cit. (endnote 5). For more analysis on progress and challenges in reducing global hunger, see International Food Policy Research Institute, *2012 Global Food Policy Report* (Washington, D.C.: IFPRI, 2013); and K. O. Fuglie and S. L. Wang, "New evidence points to robust but uneven productivity growth in global agriculture," *Amber Waves* 10 (September 2012). Note that 30 countries imposed food export restrictions by the peak of the food price spike, at the same time as many food-importing developing nations were making efforts to rebuild stocks. This kind of panic can be expectations driven and raise prices above what is consistent with long-run equilibrium.

9. For background and additional perspectives, see Douglas Gollin, David Lagakos, Michael E. Waugh (2014) "The Agricultural Productivity Gap," *Quarterly Journal of Economics*, 939–93.
10. Sczepanik, E.F. (1970), *Agricultural Capital Formation in Selected Developing Countries*, Rome: FAO.
11. See World Bank, *World Development Report, 2008,* ch. 11.
12. Stephen C. Smith, *Ending Global Poverty: A Guide to What Works* (New York: Palgrave Macmillan, 2005); Sungil Kwak and Stephen C. Smith, "Regional agricultural endowments and shifts of poverty trap equilibria: Evidence from Ethiopian panel data," *Journal of Development Studies* 47, No. 7 (July 2013): 955–975.
13. For an excellent survey of recent developments in agricultural development economics, see Alain de Janvry and Elisabeth Sadoulet, "Progress in the modeling of rural households' behaviour under market failures," in de Janvry and Kanbur, eds., *Poverty, Inequality, and Development: Essays in Honor of Erik Thorbecke* (New York: Kluwer, 2006). See also World Bank, "Pakistan: Promoting rural growth and poverty reduction," 2007, http://siteresources.worldbank.org/PAKISTANEXTN/Resources/293051-1177200597243/ruralgrowthandpovertyreduction.pdf.
14. References to seminal contributions by Carmen Diana Deere and Kathleen Staudt are listed in the case study sources. References on the other points in this section are also found in the case, including Anderson and Feder 2007, Bold, et al., 2017, Davis, et al., 2012, Davison, 1989, Evenson and Mwabu ,2001, Christina Gladwin and Della McMillan, 1989, and Pan, et al., 2018.
15. Beginning in the early 1960s, many countries in Latin America initiated land reform programmes that did not alter the highly unequal distribution of land ownership but did do away with some of the more feudal patron–client social relationships associated with *latifundios* and *minifundios*. For pedagogical purposes, we will continue to use these terms more as a designation of the dualistic agrarian structure that still permeates Latin America than as a description of contemporary rural social relationships. For an early analysis, see also Celso Furtado, *Economic Development in Latin America* (New York: Cambridge University Press, 1970). The Latin America data in Table 9.3 also reflect the extreme inequality of the region.
16. United Nations Development Programme, *Human Development Report, 1996* (New York: Oxford University Press, 1996), p. 98. For other country estimates, see Keijiro Otsuka, Hiroyuki Chuma, and Yujiro Hayami, "Land and labour contracts in agrarian economies: Theories and facts," *Journal of Economic Literature* 30 (1992): 1965–2018.
17. For a summary of the empirical evidence on this point, see the *World Development Report, 2008*; and R. Albert Berry and William Cline, *Agrarian Structure and Productivity in Developing Countries* (Baltimore: Johns Hopkins University Press, 1979), ch. 3 and app. B; G. A. Cornia, "Farm size, land yields and the agricultural production function: An analysis of fifteen developing countries," *World Development* 13 (1985): 513–534; Nancy L. Johnson and Vernon Ruttan, "Why are farms so small?" *World Development* 22 (1994): 691–705; and United Nations Development Programme, *Human Development Report, 1996*, p. 95.
18. For evidence that land redistribution is likely to lead to greater output and higher productivity levels, see Cornia, "Farm size, land yields and the agricultural production function."
19. Francis M. Foland, "Agrarian unrest in Asia and Latin America," *World Development 2* (1974): 57.
20. See *World Development Report, 2008,* ch. 10, and Cathy Farnworth and Michael Goodman, "Growing ethical networks: The Fair Trade market for raw and processed agricultural products (in five parts) with associated case studies on Africa and Latin America," November 2006.
21. Kenneth L. Sokoloff and Stanley L. Engerman, "History lessons: Institutions, factor endowments, and paths of development in the New World," *Journal of Economic Perspectives* 14 (2000): 217–232, and Stanley L. Engerman and Kenneth L. Sokoloff, "Colonialism, inequality, and long-run paths of development," in *Understanding Poverty,* eds. Abhijit V. Banerjee, Roland Benabou, and Dilip Mookherjee (New York: Oxford University Press, 2006), pp. 37–62. On Colombia, see *World Development Report, 2008,* Box 11.1, and Klaus Deininger, Ana Maria Ibañez, and Pablo Querubin, "Determinants of internal displacement

and desire to return: Micro-level evidence from Colombia," working paper, World Bank, 2007.

22. See World Bank, *World Development Report, 2003*, ch. 10.
23. Gunnar Myrdal, *Asian Drama* (New York: Pantheon, 1968), pp. 1033–1052.
24. Ibid., p. 1035.
25. Ibid.
26. Otsuka, Chuma, and Hayami, "Land and labour contracts," tab. 1.
27. A somewhat more positive view of the efficiency of land leases and access to credit through moneylenders and other informal sources of credit in Asia (and Latin America) was the focus of the "new agrarian economics" of the late 1970s and 1980s. In general, the position of this school of thought was that land contracting and usurious moneylending are efficient given the existence of other market failures, imperfect information, high transaction costs, moral hazards, and the like. Whether or not they were as efficient as these theorists claimed was far from clear, but their ultimate exploitive nature is difficult to deny. For examples of this literature, see Pranab K. Bardhan, *Land, Labour, and Rural Poverty: Essays in Development Economics* (New York: Columbia University Press, 1984); Keijiro Otsuka and Yujiro Hayami, "Theories of shared tenancy: A critical survey," *Economic Development and Cultural Change* 37 (1988): 31–68; Karla Hoff and Joseph E. Stiglitz, "Imperfect information and rural credit markets: Puzzles and policy perspectives," *World Bank Economic Review* 4 (1990): 235–250; and Timothy Besley, "How do market failures justify interventions in rural credit markets?" *World Bank Research Observer* 9 (1994): 27–47.
28. Myrdal, *Asian Drama*, p. 1048.
29. For a discussion of the phenomenon of landlessness in developing countries with a particular emphasis on Asia, see Mahmood H. Khan, "Landlessness and rural poverty in underdeveloped countries," *Pakistan Development Review* 25 (1986): 371–394.
30. Part of the debate has centred on whether the use and high cost of new varieties and agricultural inputs is the key cause of debt, or whether, given climate and other farming conditions, the problem is too little opportunity to modernise, as improved seeds, fertilisers, and other inputs that have otherwise represented the big success of the Green Revolution. See Tamma A. Carletona (2017) "Crop-damaging temperatures increase suicide rates in India." Proceedings of the National Academy of Sciences, 15 Aug; 114(33): 8746–51; and the accompanying critical commentary.
31. Abhijit V. Banerjee and Lakshmi Iyer, "History, institutions, and economic performance: The legacy of colonial land tenure systems in India," *American Economic Review* 95 (2005): 1190–1213.
32. World Bank, *World Development Report, 2008*, p. 233 and fig. 2.2.
33. See World Bank, *World Development Indicators, 2003*, p. 131, and *2004*, tabs. 2.1, 3.3, and 4.1 (Washington, D.C.: World Bank, 2003, 2004) and Figure 9.2 in this chapter.
34. World Resources Institute, *World Resources, 1996–97,* tab. 10.1, and *World Resources, 1987* (New York: Basic Books, 1987).
35. See Carolyn Sachs, *The Invisible Farmers: Women in Agriculture* (Totowa, N.J.: Rowman & Littlefield, 1983). The classic and still influential treatment of the subject can be found in Ester Boserup, *Women's Role in Economic Development* (New York: St. Martin's Press, 1970).
36. Boserup, *Women's Role.* For a valuable collection of reviews and studies, see C. Mark Blackden and Quentin Wodon, eds., *Gender, Time Use, and Poverty in Sub-Saharan Africa* (Washington, D.C.: World Bank, 2006).
37. See Christopher Udry, "Gender, agricultural production, and the theory of the household," *Journal of Political Economy* 104 (1996): 1010–1046; Udry examines detailed data from Burkina Faso and finds that "plots controlled by women have significantly lower yields than similar plots within the household planted with the same crop in the same year, but controlled by men. The yield differential is attributable to significantly higher labour and fertiliser inputs per acre on plots controlled by men. These results contradict the Pareto efficiency of resource allocation within the household. Production function estimates imply that about six percent of output is lost due to the misallocation of variable factors across plots within the household."

See also Christopher Udry, John Hoddinott, Harold Alderman, and Lawrence Haddad, "Gender differentials in farm productivity: Implications for household efficiency and agricultural policy," *Food Policy* 20 (1995): 407–423; Michael Carter and Elizabeth Katz, "Separate spheres and the conjugal contract: Understanding gender-biased development," in *Intrahousehold Resource Allocation in Developing Countries: Methods, Models, and Policy,* eds. Lawrence Haddad, John Hoddinott, and Harold Alderman (Baltimore: Johns Hopkins University Press, 1997); Pierre Chiappori, Lawrence Haddad, John Hoddinott, and Ravi Kanbur, "Unitary versus collective models of the household: Time to shift the burden of proof?" World Bank Policy Research Working Paper No. 1217; James Warner and D. A. Campbell, "Supply response in an agrarian economy with non-symmetric gender relations," *World Development* 28 (2000): 1327–1340; and Kaushik Basu, "Gender and say: A model of household behaviour with endogenous balance of power," *Economic Journal* 116 (2006): 558–580.

38. For the classic treatment, see Raanan Weitz, *From Peasant to Farmer: A Revolutionary Strategy for Development* (New York: Columbia University Press, 1971), pp. 15–28, from which much of the following material is drawn. The three stages of farm evolution outlined in this section should not be interpreted as inevitable periods or sequences implying that all farms are in one of these stages before moving on to the next. In reality, of course, all three types of farms exist in every developing country at all points in time.

39. See Carmen Diana Deere and Alain de Janvry, "A conceptual framework for the empirical analysis of peasants," *American Journal of Agricultural Economics* 61 (1979): 602–612. See also Alain de Janvry, Elisabeth Sadoulet, and Linda Wilcox Young, *Rural Labour in Latin America* (Geneva: International Labour Organisation, 1986), tab. 24.

40. See World Bank, *World Development Report 2014, Risk and Opportunity: Managing Risk for Development*, Washington DC: World Bank, 2013; and Marcel Fafchamps, *Rural Poverty, Risk, and Development* (Northampton, Mass.: Elgar, 2004). Important earlier contributions include Alain de Janvry, Marcel Fafchamps, and Elisabeth Sadoulet, "Peasant household behaviour with missing markets: Some paradoxes explained," *Economic Journal* 101 (1991): 1400–1417, and Alain de Janvry and Elisabeth Sadoulet, "Structural adjustment under transaction costs," in *Food and Agricultural Policies under Structural Adjustment,* eds. F. Heidhues and B. Knerr (Frankfurt, Germany: Lang, 1995).

41. See Marvin P. Miracle, "Subsistence agriculture: Analytical problems and alternative concepts," *American Journal of Agricultural Economics* 50 (1968): 292–310.

42. For a rigorous analysis of how related farmer productivity traps operate, see Frederick J. Zimmerman and Michael R. Carter, "Asset smoothing, consumption smoothing, and the reproduction of inequality under risk and subsistence constraints," *Journal of Development Economics* 71 (2003): 233–260. See also the two special issues on poverty traps in *Journal of Development Studies* in 2006 (Volume 42, No. 2) and 2013 (Volume 47, No. 7).

43. We are grateful to Professor Frank Thompson for this suggestion.

44. See Marcel Fafchamps and John Pender, "Precautionary saving, credit constraints, and irreversible investment: Theory and evidence from semiarid India," *Journal of Business and Economic Statistics* (1997): 180–194; Hans P. Binswanger and Mark Rosenzweig, "Wealth, weather risk, and the composition and profitability of agricultural investments, *Economic Journal* 103 (1993): 56–78; and Harold Alderman and Christina Paxson, "Do the poor insure? A synthesis of the literature on risk and consumption in developing countries," World Bank Policy Research Paper No. 1008, 1994.

45. Hanan G. Jacoby, Guo Li, and Scott Rozelle, "Hazards of expropriation: Tenure insecurity and investment in rural China," *American Economic Review* 92 (2002): 1420–1447. For broader background, see also Keith Griffin, "Agrarian policy. The political and economic context," *World Development* 1 (1973): 6.

46. Joseph E. Stiglitz first formulated the argument that sharecropping represents a compromise between landlord and tenant in which the landlord assumes some of the production risk but the tenant accepts some degree of work incentive given that monitoring is costly; see Stiglitz, "Incentives and

risk sharing in sharecropping," *Review of Economic Studies* 41 (1974): 219–255.

47. Alfred Marshall, *Principles of Economics*, 8th ed. (London: Macmillan, 1920).

48. Steven N. S. Cheung, "Private property rights and sharecropping," *Journal of Political Economy* 76 (1968): 1107–1122. Of course, the contract would somehow have to provide an effective total compensation to the employee that matched the opportunity cost of providing the efficient level of effort, or the potential sharecropper would choose an alternative activity instead.

49. The classic article in this literature is William S. Hallagan, "Self-selection by contractual choice and the theory of sharecropping," *Bell Journal of Economics* 9 (1978): 344–354.

50. Radwan Ali Shaban, "Testing between competing models of sharecropping," *Journal of Political Economy* 95 (1987): 893–920. Some of the input results may not be fully free of confounding of expropriation risk.

51. See, for example, Nirviker Singh, "Theories of sharecropping," in *The Economic Theory of Agrarian Institutions*, ed. Pranab K. Bardhan (Oxford: Clarendon Press, 1989), pp. 33–72; David M. Newberry, "Risk-sharing, sharecropping, and uncertain labour markets," *Review of Economic Studies* (1977): 585–594; and Joseph E. Stiglitz, "Sharecropping," in *Economic Development*, eds. John Eatwell, Murray Milgate, and Peter Newman (London: Macmillan, 1989), pp. 308–315.

52. A succinct but rather technical overview of the competing theories is found in Singh, "Theories of sharecropping." The point that sharecropping results from inequality and that it remains inefficient in the Marshallian sense despite the potentially reduced inefficiency relative to straight wage or rental contracts was made by Joseph Stiglitz at a World Bank lecture in Washington, D.C., September 1997.

53. See Abhijit V. Banerjee, Paul Gertler, and Maitresh Ghatak, "Empowerment and efficiency: Tenancy reform in West Bengal," *Journal of Political Economy* 110 (2002): 239–280. Of course, in general, enforcement of tenancy and land reform is problematic in settings in which large landowners wield substantial power. For a simple and intuitive model of investment incentives (including fertiliser that is effective for more than one growing season) in the face of eviction risk, see Jacoby, Li, and Rozelle, "Hazards of expropriation."

54. Pranab K. Bardhan and Christopher Udry, *Development Microeconomics* (New York: Oxford University Press, 1999), p. 111.

55. See Pranab K. Bardhan, "Interlocking factor markets and agrarian development: A review of issues," *Oxford Economic Papers* 32 (1980): 82–98. See also Bardhan and Udry, *Development Microeconomics*. They note that while interlinkage can have some positive efficiency implications in informal rural markets, "personalized interlinking may at the same time act as a formidable barrier to entry for other parties and may give the dominant partner in a transaction some additional leverage" (p. 111). Note that other forms of interlinkage exist in which the peasant retains ownership of his land. An example is contract farming in parts of Africa, in which a contractor who has "cultivated" export marketing channels provides seeds, fertiliser, and other inputs to a farmer to produce an output such as legumes that the contractor buys at an agreed price at harvest time.

56. For an interesting analysis of the process of agricultural specialisation, see M. Shahe Emran and Forhad Shilpi, "The extent of the market and stages of agricultural specialisation," *Canadian Journal of Economics* 45, No. 3 (2012): 1125–1153. An analysis of the impact of market access is presented in M. Shahe Emran and Zhaoyang Hou, "Access to markets and rural poverty: Evidence from household consumption in China," *Review of Economics and Statistics* 95, No. 2 (2013): 682–697. For a detailed analysis of the responsiveness of farmers in developing countries to price incentives, see World Bank, *World Development Report, 1986* (New York: Oxford University Press, 1986), chs. 4 and 5. A more cautious assessment is found in the 2008 *World Development Report*, however. For an analysis of the role of risk, see also Fafchamps, *Rural Poverty, Risk, and Development*, p. 28.

57. For an analysis of the adverse effects of premature mechanisation, see Yujiro Hayami and Vernon Ruttan, *Agricultural Development: An International Perspective* (Baltimore: Johns Hopkins University Press, 1985).

58. Two informative articles on appropriate mechanisation for development are Hans P. Binswanger, "Agricultural mechanisation: A comparative historical perspective," *World Bank Research Observer* 1 (1986): 81–98, and Hans P. Binswanger and Prabhu Pingali, "Technological priorities for farming in sub-Saharan Africa," *World Bank Research Observer* 3 (1988): 81–92.
59. See World Bank, *World Development Report, 2008,* esp. chs. 6 and 11. An excellent analysis of the role of institutions in rural development can be found in Brian van Arkadie, "The role of institutions in development," *Proceedings of the World Bank Annual Conference on Development Economics, 1989* (Washington, D.C.: World Bank, 1989), pp. 153–192.
60. For an early analysis of the impact of the Green Revolution in the developing world, see Keith Griffin, *The Political Economy of Agrarian Change* (London: Macmillan, 1974); Chris Manning, "Rural employment creation in Java: Lessons from the green revolution and oil boom," *Population and Development Review* 14 (1988): 17–18; and Donald K. Freebairn, "Did the green revolution concentrate incomes? A quantitative study of research reports," *World Development* 23 (1995): 265–279.
61. World Bank, *World Development Report, 2008,* ch. 11. An informative discussion of the important role of appropriate pricing policies in stimulating agricultural production can be found in A. Drazen and Z. Eckstein, "On the organisation of rural markets and the process of economic development," *American Economic Review* 78 (1988): 431–443. A massive five-volume research report, *The Political Economy of Agrarian Pricing Policy*, published by the World Bank in 1991, found similar results in the 18 developing countries investigated. For an extensive critique of inappropriate government policies hindering agricultural development in sub-Saharan Africa as well as elsewhere in the developing world, see Hans P. Binswanger and Klaus Deininger, "Explaining agricultural and agrarian policies in developing countries," *Journal of Economic Literature* 35 (1997): 1958–2005.
62. World Bank, *World Development Report, 2008,* p. 338.
63. See Oxfam UK, "Our land, our lives: Time out on the global land rush," Oxfam Briefing Note, October 2012, http://www.oxfam.org/sites/www.oxfam.org/files/bn-land-lives-freeze-041012-en_1.pdf; and Joachim von Braun, and Ruth Suseela Meinzen-Dick, "'Land grabbing' by foreign investors in developing countries: Risks and opportunities," *IFPRI Policy Briefing No. 12*, 2009.
64. For a survey of the connections between agriculture and environmental sustainability issues, see World Bank, *World Development Report, 2008,* ch. 8 and the references cited therein.
65. For a more comprehensive review of integrated programmes for rural development, see World Bank, *World Development Report, 2008,* ch. 6, and Alain de Janvry, *The Economics of Investment in Rural Development: Private and Social Accounting Experiences from Latin America* (Berkeley: Department of Agricultural and Resource Economics, University of California, 1988).
66. United Nations Food and Agriculture Organisation, "Land reform: Land settlement and cooperatives," 2007, http://www.fao.org/sd/Ltdirect/landrF.htm. For the seminal analysis see Myrdal, Gunnar, "The equality issue in world development," in *Nobel Lectures, Economics, 1969–1980,* ed. Assar Lindbeck (Singapore: World Scientific Publishing, 1992).
67. See Alain de Janvry, *The Agrarian Question and Reformism in Latin America* (Baltimore: Johns Hopkins University Press, 1981).
68. For an analysis of the successes and failures of various reform efforts, see World Bank, *World Development Report, 2008;* World Bank, *World Development Report, 1990* (New York: Oxford University Press, 1990), pp. 64–73; and Peter Dorner, *Latin American Land Reforms in Theory and Practice: A Retrospective Analysis* (Madison: University of Wisconsin Press, 1992).
69. See, for example, World Bank, *World Development Report, 2008*, and Jock R. Anderson, "Agricultural advisory services," Background paper for 2008 World Development Report. World Bank, 2007.