

Agricultural Transformation and Rural Development

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It is in the agricultural sector that the battle for long-term economic development will be won or lost.

—Gunnar Myrdal, *Nobel laureate in economics*

Recent developments in the land, water, and energy sectors have been wake-up calls for global food security.

—*International Food Policy Research Institute, 2012*

Many development policies continue to wrongly assume that farmers are men.

—*World Bank, World Development Report, 2008*

Africa is the only region where overall food security and livelihoods are deteriorating. We will reverse this trend by working to create an environmentally sustainable, uniquely African Green Revolution. When our poorest farmers finally prosper, all of Africa will benefit.

—*Kofi Annan, former secretary general of the United Nations, Nobel laureate for peace, and first chairman of the Alliance for a Green Revolution in Africa*

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 meager and often inadequate existence in agricultural pursuits. Over 3.1 billion people lived in rural areas in developing countries in 2013, about a quarter of them in extreme poverty. And despite the extraordinary urbanization 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 urbanized, having reached the same level of urbanization as the high-income Organization 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 Organization estimated that in 2012, about 870 million people did not have enough food to meet their basic nutritional needs.² In the daily struggle to subsist, behavior 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 is 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 fueling this industrial expansion by means of its cheap food and surplus labor. 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 labor 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 industrialization rather than rural modernization 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, labor-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.

Seven 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 behavior 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?

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 urbanized 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 commercialized 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

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.

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 modernization. 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.

9.2 Agricultural Growth: Past Progress and Current Challenges

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 programs 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

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 labor 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 labor in agriculture declines greatly even when GDP per capita does not

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

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

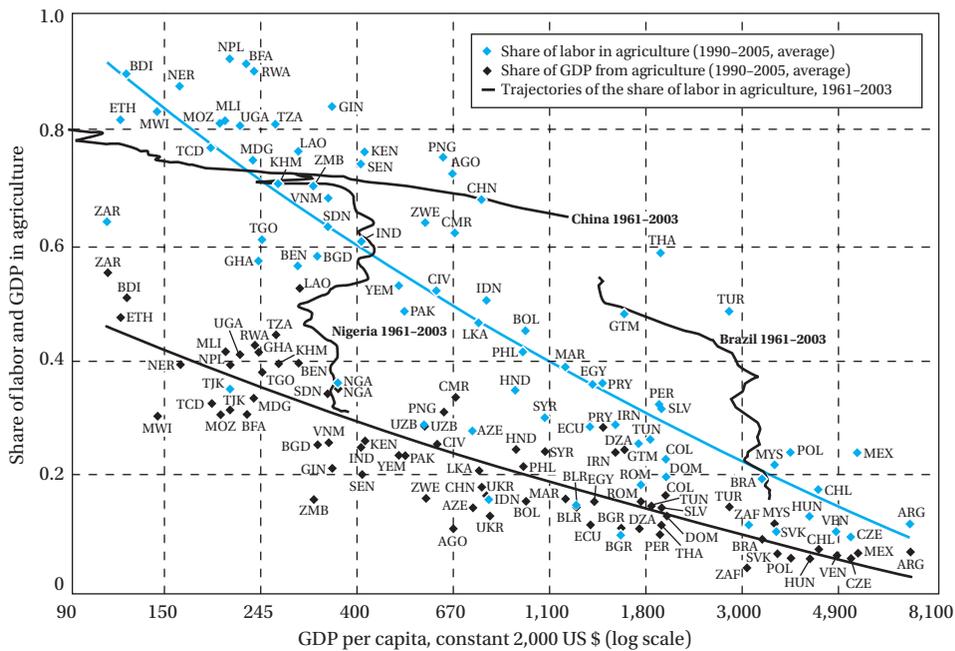
Source: IFPRI (International Food Policy Research Institute). 2013. Global Food Policy Report, Table 1. Washington, DC.

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 the Chapter 7, that urbanization 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 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 labor 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 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 labor 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 labor 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, fertilizers, 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.

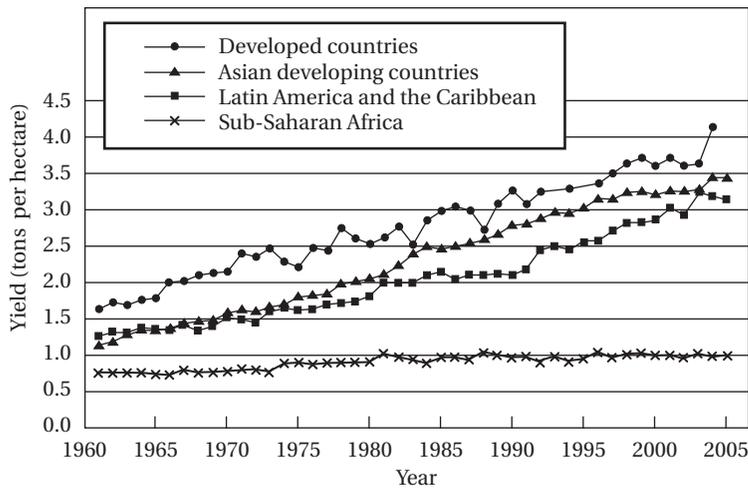
FIGURE 9.1 As Countries Develop, the Shares of GDP and Labor in Agriculture Tend to Decline, but with Many Idiosyncrasies



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

Note: The list of 3-letter codes and the countries they represent can be found in Table 2.1 on pp. 43–44 of this text.

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 The recent famine in the Horn of Africa is examined in Box 9.1.

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 Program to emphasize 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 Center 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

As Nora Lustig has summarized, 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 food (particularly meat, which uses much more land than grain

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

On July 20, 2011, the United Nations declared formally that a famine was under way in two regions of Somalia, after horrific images of suffering were publicized.

Facts about the Famine

Somalia and neighboring countries faced a terrible drought, probably the worst in a half-century. More importantly, it took place in one of 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 already 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 seems to be an unusually strong Pacific La Niña, which has interrupted seasonal rains for the last two seasons. About half of all livestock has died in some areas. Staple food prices are soaring in affected areas, making the situation dire for the poor. Globally, food prices have risen greatly over the past 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 have 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 have historically 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 fractionalization, and "fault lines" of regional inequality corresponding with ethnic or religious areas. Undoubtedly the area has some quite unfavorable geography; but other regions with unfavorable 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 is well over 9 million today, 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 is far more a symptom of poverty than its cause.

International Response

This famine has already 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 are getting through, but the militants have thwarted efforts by the UN'S World Food Program (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 claim drought conditions have been exaggerated into famine proportions for political purposes, but the facts on the ground are too obvious to ignore; and there are indications they are reconsidering: There is little political gain in claiming dominance of an area depopulated by the escape of refugees and famine deaths. But governments, international organizations, and NGOs are now gearing up for a full-scale response to worsening famine. 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 unfavorable to produce for the market. In response, an important strategy is to purchase food for those suffering from local producers whenever possible.

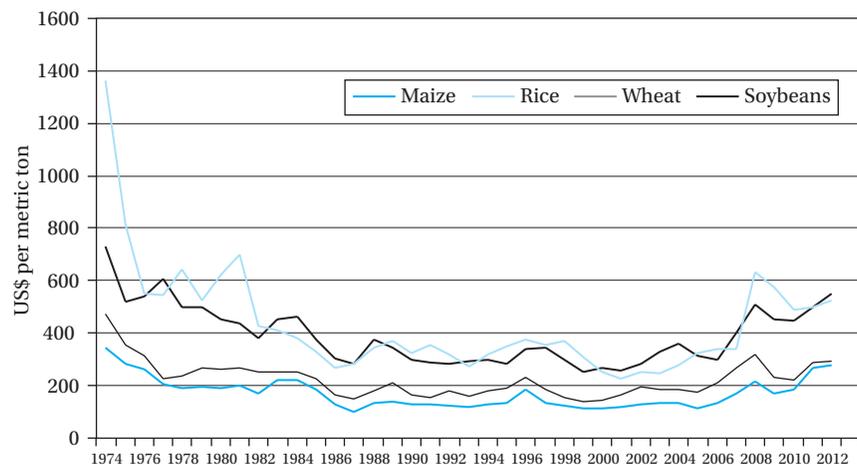
The Entitlement Problem

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 liters 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 laborers 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 to survive in such conditions. While specific evidence of food exporting is not yet readily verifiable in Somalia, 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.

Sources: Dreze, Jean, and Amartya Sen. *Hunger and Public Action*. New York: Oxford University Press, 1989; Amartya Sen. *Poverty and Famines: An Essay on Entitlement and Deprivation*. New York: Oxford University Press, 1981. 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

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 February 7, 2014). Prices for 2012 are through August 2012.

Note: Prices are in real 2005 US dollars.

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 unfavorable 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.

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 industrialization 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 generally thought of as a perfectly competitive activity, but this does not mean that there are no market failures and no role 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 services, economies of scale in marketing, information asymmetries in product quality, missing markets, and monopoly power in input supply, 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 favorable risks for fear of falling below subsistence. Without middlemen, they cannot specialize (and without specialization, 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 globalization when governments liberalize 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

9.3 The Structure of Agrarian Systems in the Developing World

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.

One helpful way to categorize world agriculture, proposed by the agricultural development economist Alain de Janvry and his colleagues in the World Bank's 2008 *World Development Report*, is to see that alongside advanced agricultural systems in developed countries, three quite different situations are found among developing countries.

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.

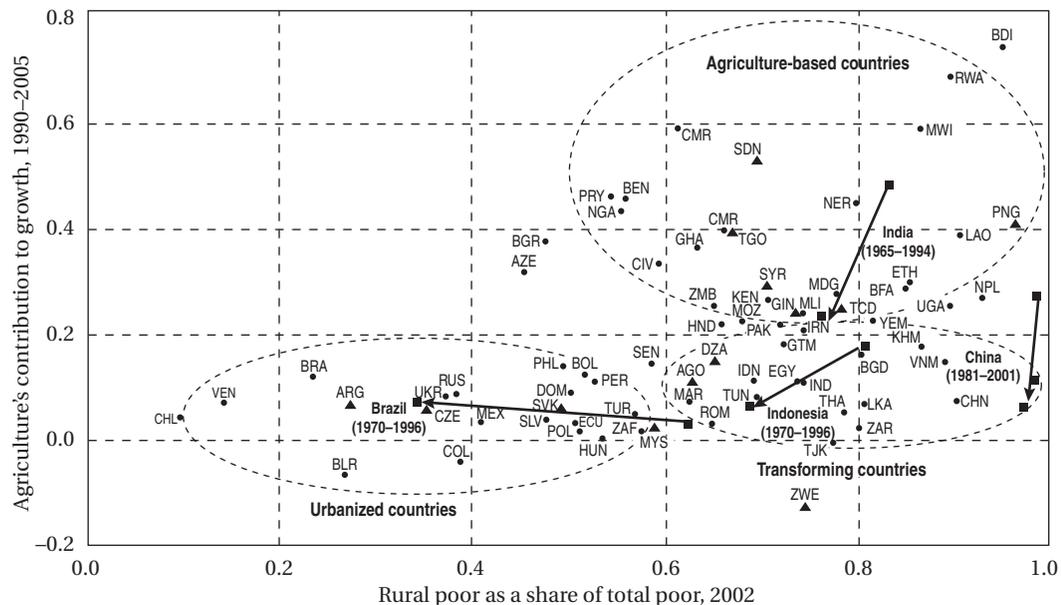
Second, most of the world's rural people—some 2.2 billion—live in what the report categorizes as transforming countries, in which the share of the poor who are rural is very high (almost 80% on average) but agriculture now contributes only a small share to GDP growth (7% on average). Most of the population 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 *urbanized 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 urbanized 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 urbanized 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 3 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 2.4 times that of India and almost 9 times that of the DRC

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

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

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.

(Congo). The value added per worker in U.S. agriculture was over 75 times that of India and over 177 times that of Congo.

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 modernized Punjab to semifeudal Bihar. Even upper-middle-income, urbanized 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.

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

TABLE 9.2 Labor and Land Productivity in Developed and Developing Countries

Country Group	Agricultural Productivity (value added per worker, US\$, in 2011)	Average Grain Yield (kilograms per hectare, 2011)
Low-income	337	2,035
Middle-income	953	3,678
High-income	21,957	4,645
Country		
Burundi	123	1,326
Congo, DR	281	766
Senegal	346	966
Kenya	363	1,514
Bangladesh	475	4,191
Bolivia	629	2,365
India	657	2,883
China	713	5,706
Ghana	810	1,594
Indonesia	937	4,886
Mexico	4,028	3,241
Brazil	5,019	4,038
Japan	42,953	4,911
United States	49,817	6,818
Canada	59,818	3,527

Source: Based on data from World Bank, *World Development Indicators*, 2013 (Washington, D.C.: World Bank, 2013), tab. 3.3.

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

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 and others showing decreasing inequality over time.

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

TABLE 9.3 Changes in Farm Size and Land Distribution

Country	Period	Land Distribution Gini (percent)		Average Farm Size (hectares)		Change (%)		Farm Size Definition Used
		Start	End	Start	End	Total Number of Farms	Total Area	
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

^aFigure for 2004–2005

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

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 seen increasingly also in Africa.

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 organization of rural life. The agrarian structure that has existed in Latin America since colonial times and is still widespread in a substantial

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.

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

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

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

part of the region is a pattern of agricultural dualism known as *latifundio-minifundio*.¹⁴ 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.

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.¹⁵ 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, Brazil, and Uruguay, these intermediate farm organizations account for almost 50% of total agricultural output and employ similar proportions of agricultural labor. These farms use a more efficient balance between labor 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.¹⁶

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 labor, are much higher than the low effective cost of using family labor 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 fertilizer, less distorted factor prices, higher output prices, and improved marketing facilities.¹⁷ It will also require a reorganization 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.¹⁸

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.¹⁹

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 2.3 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.²⁰

Areas with less favorable 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.²¹

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 inter-related forces that molded the traditional pattern of land ownership into its present fragmented condition: (1) the intervention of European rule, (2) the progressive introduction of monetized transactions and the rise in power of the moneylender, and (3) the rapid growth of Asian populations.²²

The traditional Asian agrarian structure before European colonization was organized around the village. Local chiefs and peasant families each provided goods and services—produce and labor 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 monetization of the indigenous economy and on the growth of population."²³ 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.²⁴

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.

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.²⁵

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 important, 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, fertilizer, 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.²⁶ And rapid population growth often led to fragmentation and impoverishment.²⁷

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 unfavorable terms. And because labor is abundant, wages are extremely low. Peasants can thus get trapped in a vise 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 laborers, then jobless vagrants, and finally migrant slum dwellers on the fringes of modern urban areas.²⁸ At the same time, many other farmers have benefited from the

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

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.

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.²⁹

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 labor, 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 ax, 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 labor 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 labor inputs. In such conditions, **shifting cultivation** is the most economic method of using limited supplies of labor 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

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.

cropped land is allowed to recover fertility until it can be used again. Under such a process, manure and chemical fertilizers 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.

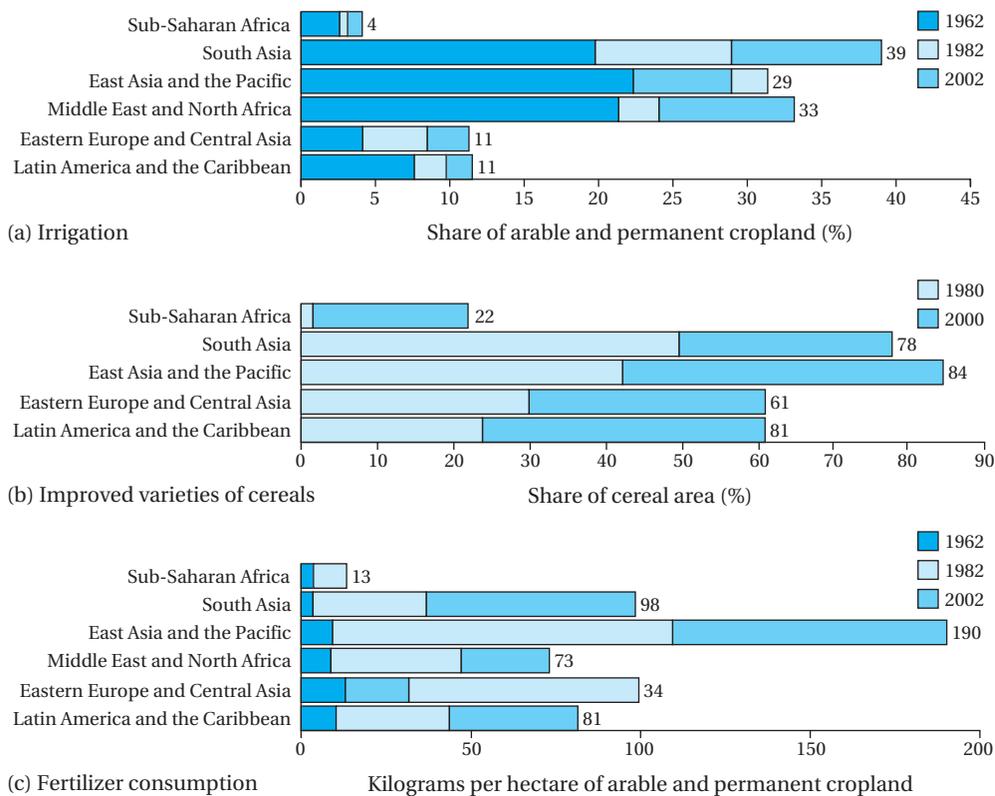
3. Labor is scarce during the busiest part of the growing season, planting and weeding times. At other times, much of the labor is underemployed. Because the time of planting is determined by the onset of the rains and because much of Africa experiences only one extended rainy season, the demand for workers during the early weeks of this rainy season usually exceeds all available rural labor supplies.

The net result of these three forces had been slow growth in agricultural labor 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. The 2008 *World Development Report* concluded:

Higher productivity is not possible without urgent attention to better soil and water management. Sub-Saharan Africa must replace the soil nutrients it has mined for decades. African farmers apply less than 10 kilograms of fertilizer per hectare, compared with more than 100 kilograms in South Asia. Programs to develop efficient fertilizer markets, and agroforestry systems to replenish soil fertility through legumes, need to be scaled up.³⁰

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 unfertilized, rain-fed fields is a worsening problem for the region, given both the depletion of soils and the unreliability of rainfall (see Figure 9.5).

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.³¹ 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.³²

FIGURE 9.5 Expansion of Modern Inputs in the World's Developing Regions

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

Note: Figures for improved cereal varieties are based on estimates for rice, wheat, maize, and sorghum.

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.³³ 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 labor 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.³⁴ Recent research confirms women's "time poverty" predicament.

Women do much of the labor 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 labor—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 labor. It is estimated that in addition to work in the household, women provide 60 to 80% of agricultural labor 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.

Women make an important contribution to the agricultural economy through the labor 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

Cash crops Crops produced entirely for the market.

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 stabilizing 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 commercialized, 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 programs 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 programs reflect 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 maximize 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 labor and fertilizer 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 programs that empower rural women.³⁵

Yet many government-sponsored programs 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 programs 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 programs 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, programs 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 labor 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 Behavior and Agricultural Development

The Transition from Traditional Subsistence to Specialized Commercial Farming

For expository convenience, we can identify three broad stages in the evolution of agricultural production.³⁶ 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, specialized agriculture geared to the commercial market, as in developed countries, and often found in the highly urbanized developing countries.

Agricultural modernization in mixed-market developing economies may be described in terms of the gradual but sustained transition from subsistence to diversified and specialized production. But such a transition involves much more than reorganizing 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 sizable gap between the few wealthy large landholders and the masses of impoverished tenant farmers, smallholders, and landless laborers.

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.

Subsistence Farming: Risk Aversion, Uncertainty, and Survival

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 labor are the principal factors of production. The law of diminishing returns is in operation as more labor 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

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

outstanding debts are the banes of the peasant's existence. Labor 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 labor, although many traditional farmers intermittently employ one or two landless laborers. Much of the cash income that is generated comes from nonfarm wage labor.³⁷

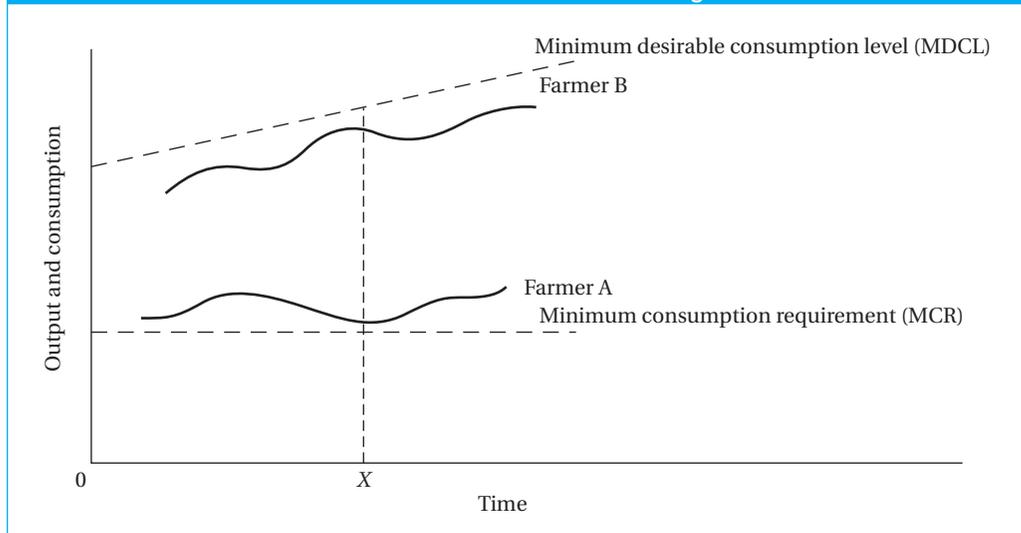
In much of sub-Saharan Africa, agriculture is still largely in this subsistence stage, as it is in pockets in Asia and even Latin America. The Green Revolution has bypassed much of Africa. But in spite of the relative backwardness of production technologies and the misguided convictions of some foreigners 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, labor is the only variable input, and profit is maximized. 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-maximizing farm or firm will always choose a method of production that will increase output for a given cost (in this case, the available labor 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 behavior posited by neoclassical theory and goes a long way toward explaining the actual risk-averse behavior of peasant farmers, including their caution in the use of purchased inputs such as fertilizer.³⁸

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 maximization, 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

FIGURE 9.6 Small-Farmer Attitudes toward Risk: Why It Is Sometimes Rational to Resist Innovation and Change

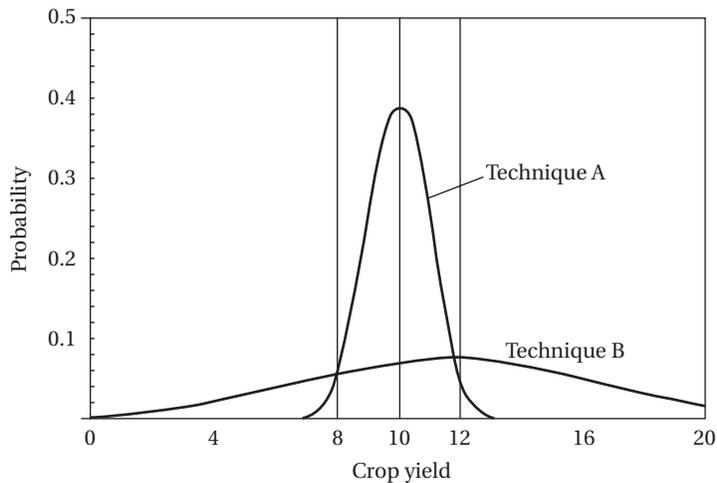


know and understand to a new one that promises higher yields but may entail greater risks of crop failure. When sheer survival is at stake, it is more important to avoid a bad year (total crop failure) than to maximize the output in better years. Risk-avoiding traditional farmers are likely to prefer 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 9.6 provides a simple illustration of how attitudes toward risk among small farmers may militate against apparently economically justified innovations.³⁹ 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 9.6, 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 minimize 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.⁴⁰ Moreover, inequality is growing.

There is an alternative way to look at risk-aversion decisions of peasant farmers. In Figure 9.7, two curves portray hypothetical probabilities for crop yields. The higher curves (technique A) shows a production technology with a

FIGURE 9.7 Crop Yield Probability Densities of Two Different Farming Techniques

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.⁴¹ Evidence is clear that farmers pay for “self-insurance” of this type with much lower average returns.⁴²

Many programs 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 characterizations 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 (fertilizers, 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 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 fertilizer, which will be lowered in relation to the probability they place on expropriation. For example, if fertilizer 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

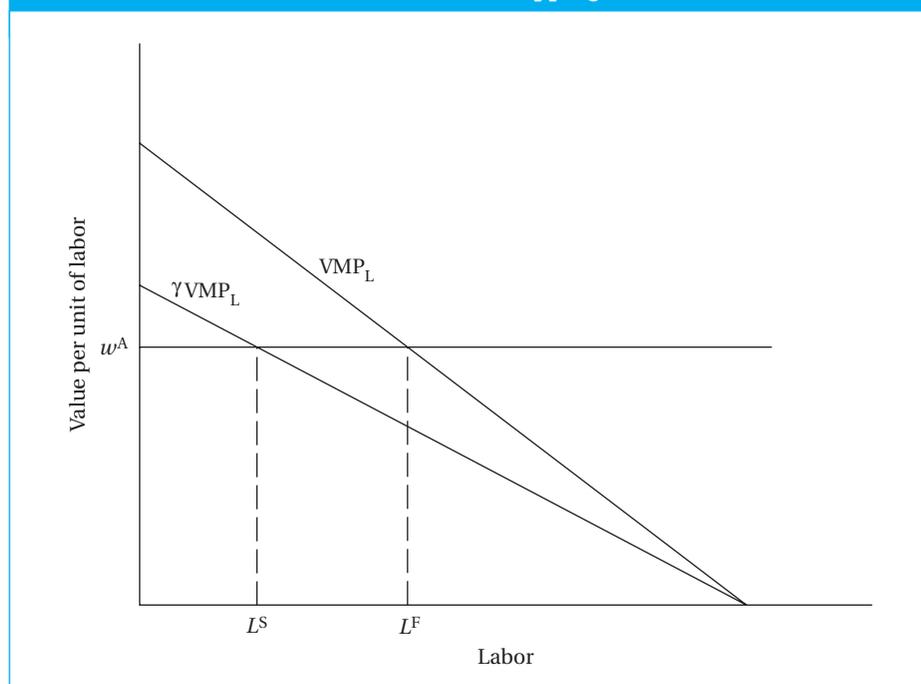
fertilized, then too little fertilizer will be used from the social point of view, because the peasant will consider the benefits of the fertilizer as if it disappeared after just one season (while its price is not lowered). This type of effect has been confirmed by careful econometric evidence from China.⁴³

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.⁴⁴ 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 laborers), 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 labor 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 than all, of his marginal product and would rationally reduce work effort accordingly.⁴⁵ This effect can be seen graphically in Figure 9.8. Labor 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 labor is found along the y -axis. A farmer who owned his own farm would work until his value marginal product of labor (VMP_L) was equal to his alternative wage, or opportunity cost of labor, w^A , and so would put in an

FIGURE 9.8 Incentives under Sharecropping



efficient amount of labor 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 9.8.

This view was challenged in the 1960s by Steven Cheung, who argued that profit-maximizing 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 9.8; Cheung argued that labor effort, L^F , would also obtain under sharecropping.⁴⁶

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.⁴⁷

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' behavior 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.⁴⁸

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.⁴⁹ 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 9.8, is not negated by this important explanation of why sharecropping arises.⁵⁰

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.⁵¹ 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.”⁵²

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.⁵³

The Transition 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 specialized 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

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.

agriculture because the risks of price fluctuations are added to the uncertainty of nature.

Diversified or mixed farming therefore represents a logical intermediate step in the transition from subsistence to specialized 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 labor. And where labor is in short supply during peak planting seasons, simple labor-saving devices (such as small tractors, mechanical seeders, or animal-operated steel plows) can be introduced to free labor for other farm activities. Finally, the use of better seeds, fertilizers, 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 minimize 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, fertilizer, 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.⁵⁴ 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).

From Divergence to Specialization: Modern Commercial Farming

The specialized 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.

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 specialized farming.



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 fertilizer 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 neighbor, not from learning, but just because neighbors 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 fertilizer by any of their respondents. They utilize 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 fertilizer use after his information neighbors who use similar amounts of fertilizer achieve lower than expected profits.”
- A farmer “increases (decreases) his use of fertilizer after his information neighbors achieve unexpectedly high profits when using more (less) fertilizer than he did.”
- A farmer’s “responsiveness to news about the productivity of fertilizer 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 fertilizer 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 neighbor’s surprising lower profit leads a farmer to make the wrong decision by lowering his own fertilizer 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.

In **specialized 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, fertilizer, 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 utilization is on capital formation, technological progress, and scientific research and development in stimulating higher levels of output and productivity.

Specialized 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 laborsaving 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.

The common features of all specialized farms, therefore, are their emphasis on the cultivation of one particular crop, their use of capital-intensive and in many cases laborsaving techniques of production, and their reliance on economies of scale to reduce unit costs and maximize profits. In some ways, specialized farming is no different in concept or operation from large industrial enterprises. In fact, some of the largest specialized 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 small-holder farmers where subsistence farming predominates, strategies for dealing with risk, and in some cases overcoming coordination failures in specialization as described in Chapter 4, remain prerequisites for successful specialization.

Although we can find all three types of farms—subsistence, mixed, and specialized 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 labor-intensive, also effectively absorb underutilized rural labor offers the major immediate avenue toward the achievement of real people-oriented rural development.

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

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.

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 mechanized agriculture to replace human labor. The introduction of laborsaving machinery can have a dramatic effect on the volume of output per worker, especially where land is extensively cultivated and labor 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 labor is abundant, the introduction of heavily mechanized 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.⁵⁵ 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 mechanized techniques exclude women, the male-female productivity gap could widen further, with serious repercussions.⁵⁶

Biological (hybrid seeds and biotechnology), water control (irrigation), and chemical (fertilizer, 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 fertilizers, 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 mechanized equipment. They are therefore particularly well suited for tropical and subtropical regions, and 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.

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.⁵⁷ 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, fertilizer, 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.⁵⁸

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 favor 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.⁵⁹

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 organization 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 organizations to reach scale in marketing and bargain for better prices."⁶⁰ 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.⁶¹

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.⁶² We return to these problems of environmental sustainability in the next chapter.

Conditions for Rural Development

We can draw three conclusions regarding the necessary conditions for the realization of a people-oriented agricultural and rural development strategy.⁶³

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 usually entails a redistribution of the rights of ownership or use of land away from large landowners in favor 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 fulfill 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 favorable 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 Organization (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.⁶⁴ 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 utilization. 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

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

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 programs 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.⁶⁵ But even an egalitarian land reform program alone is no guarantee of successful agricultural and rural development.⁶⁶ This leads to our second conclusion.

Supportive Policies

Conclusion 2: The full benefits of small-scale agricultural development cannot be realized 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 fertilizer 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.⁶⁷

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 non-farm rural real incomes through job creation, rural industrialization, 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 realization of the true meaning of development.