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THE ROLE OF AGRICULTURE AND SURPLUS LABOUR FOR INDUSTRIALIZATION

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Introduction

The task of a true theory of economic growth and development must be to explain why some societies developed sooner than others, why some societies have experienced such rapid increases in living standards while others have lagged behind, and why development has not spread more evenly across the globe.

The answer must be that at different stages of development, different constraints on progress operate. While some of these factors are likely to be sociological and political, the major constraints are likely to be economic. One of the most critical factors in the early stages of development is the health of the agricultural sector, because without a surplus of food production over subsistence needs, little else can be done. There would be no surplus labour, no saving, no investment and no food to feed labour working in alternative activities.

It is no coincidence that the material progress of mankind started 8,000 years ago in the region of Mesopotamia (the cradle of civilization, now Iraq), where, for the first time, agriculture became settled. Unless agriculture is settled, there is no prospect of agricultural productivity increasing to provide the basis for the development of non-agricultural activities, the building of cities and the enjoyment of leisure. Where shifting agriculture is practised, as by nomadic tribes in the Kalahari Desert of Botswana and Namibia, for example, there is no basis for an agricultural surplus.

As the World Bank says in its *World Development Report 2008: Agriculture for Development* (World Bank, 2007):

agricultural growth was the precursor to the industrial revolutions that spread across the temperate world from England in the mid-18th century to Japan in the late-19th century. More recently, rapid agricultural growth in China, India and Vietnam was the precursor to the rise of industry . . . the special powers of agriculture as the basis for early growth are well established.

In many developing countries today, agriculture is still extremely backward. Low productivity is a major cause of poverty and retards development of the whole economy. Over 3 billion people live in rural areas, and most of them live in households engaged in agriculture earning just a few dollars a day. The World Bank (2007) recognizes 'that agriculture must be a prominent part of the development agenda whether for delivering growth in the agricultural-based countries or for reducing rural poverty'. It also recognizes that the state has a role to play in providing core public goods and incentives for investment in the agricultural sector.

In this chapter, we consider some of the reasons for agricultural backwardness, and why productivity is so low. We look at the process of transforming traditional agriculture and the growth of the money economy, and model the interrelationship between the growth of agriculture and industry. Then, we use Arthur Lewis's (1954) well-known model of economic development with unlimited supplies of labour to illustrate the important role that surplus labour in agriculture (and other sectors) plays in the development process and in fuelling industrial growth. The precise meaning of surplus labour is addressed, as well as the rural–urban migration process. An appendix describes the various markets in agrarian societies – land, labour and credit – and how they interlock.

The role of agriculture in development

Agriculture makes four major contributions to the process of economic development: a **product**, a **factor**, a **market** and a **foreign exchange contribution**.

Product contribution

The product contribution of agriculture refers to the fact that agriculture must supply food above subsistence needs in order to feed labour working in alternative occupations. If other sectors of the economy are to be developed, labour needs to be fed, and this cannot be done by imports until export activities have been developed to provide foreign exchange to pay for the imports. It will be remembered from Chapter 3 that in Rostow's model of economic growth, the take-off stage of development must be preceded by an agricultural revolution. Indeed, as mentioned above in the quote from the World Bank, one of the major reasons why Britain was the first country to industrialize was that it was the first to experience a significant agricultural revolution based on the abolition of serfdom and on the enclosure movement, which raised agricultural productivity and provided surplus labour and food to support industrial expansion.

The difference between total agricultural output and subsistence needs is called the **marketable surplus**. Economic progress in the early stages of development requires an increase in the marketable surplus, which, in turn, requires an increase in labour productivity. If productivity does not increase naturally or 'voluntarily', a marketable surplus can be forcibly extracted, as it was in Japan at the time of the Meiji Restoration in 1868, when landowners were compulsorily taxed, and more dramatically in the Soviet Union in the 1920s, when there was mass genocide of the *kulaks* (small prosperous landowners) during Stalin's collectivization programme.

'Marketable surplus' is an important concept in the neoclassical model of the development process, because unless the marketable surplus rises as the demand for food increases, the price of food will tend to rise. This will turn the terms of trade against industry, higher wages will have to be paid to workers in industry, which will eat into profits and capital accumulation. The marketable surplus therefore becomes the major constraint on industrial growth.

Factor contribution

The factor contribution of agriculture consists of two parts: a labour contribution and a capital contribution. Labour for industry and other activities must come from agriculture, but can be released only if productivity in agriculture rises. The existence of surplus labour (or disguised unemployment) plays a major role in the development process, as we shall see when we consider the Lewis model of economic development with unlimited supplies of labour. The lower the cost of industrial labour, the faster the rate of industrial expansion is likely to be, but this depends on the rate at which the agricultural sector is releasing labour. Industrial development today in many of the rapidly growing countries of Southeast Asia is being fuelled by cheap labour drawn from agriculture. In this respect, China's industrial potential is enormous.

Agriculture is a source of saving and capital accumulation for industrial development. The saving can be voluntary or involuntary. Examples of voluntary saving are rich landlords voluntarily investing in industrial activities (the Industrial Revolution in Britain was partly financed in this way), and peasant farmers investing small savings in rural banks. Involuntary saving could take the form of the government taxing the agricultural sector and using the proceeds for investment, or, more drastically, the forced extraction of the agricultural surplus through expropriation or collectivization (as in Stalinist Russia).

Another traditional way in which governments have taxed the agricultural sector is through the pricing policies of **marketing boards**, established to market agricultural produce. The prices paid to farmers are lower than the prices at which the goods are sold on the market – the difference providing net revenue to the government.

The general policy in developing countries of keeping agricultural prices low used to be justified on two main grounds: that low prices benefit the industrial sector, and that peasant farmers have limited horizons and do not respond to incentives, so if prices are higher, they may actually produce less if all they are interested in is a fixed money income. This is the notion of a **backward-bending supply curve of effort**. It can be said without hesitation that the deliberate policy of keeping agricultural prices low has done enormous damage to the agricultural sector in developing countries. As we shall see later, there is ample evidence that peasant farmers do respond to price incentives. They not only increase supply in response to price rises, but also switch crops as relative prices change.

Market contribution

The market contribution of agriculture refers to the fact that the demand from agriculture must be the major source of autonomous demand for industrial goods. If industry is to grow and prosper, it must be able to sell its goods. In the early stages of development, the agricultural sector is likely to provide the largest market for industrial goods. There is a *complementarity* between agricultural and industrial growth. This is well documented in the historical experience of developed countries, and in the contemporary world economy. In his classic study of Japanese economic development, Lockwood (1954) wrote:

The growth of primary production was interrelated with industrialization and urbanization at every point . . . As industry developed, it offered a widening market for the food and raw material surpluses of the countryside . . . On the other hand, the increasing productivity of the primary industries created a growing home market for manufactures and services.

The *World Development Report 1979* (World Bank, 1979) noted that 'a stagnant rural economy with low purchasing power holds back industrial growth in many developing countries'. The *World Development Report 1982* (World Bank, 1982) documented the close correspondence across countries between agricultural development and industrial growth: 'fast growth of industry and sluggish agriculture were evident *only* in countries with oil or mineral-based economies, such as Algeria, Ecuador, Mexico, Morocco and Nigeria . . . These were exceptions but they prove the rule.' In other words, a precondition for rapid industrial growth is a rapidly expanding agricultural sector, at least in terms of purchasing power.

This has implications for the pricing of agricultural goods relative to industrial goods, or what is called the agricultural (or industrial) terms of trade. Low farm prices are good for industry from the point of view of supply potential, because this means that industry can obtain cheaper raw material inputs and wage goods, which increases profitability. On the other hand, low farm prices are bad for industry from the demand side, because this means low farm purchasing power and therefore a lower demand for industrial goods. There needs to be an equilibrium terms of trade between the two sectors to achieve balanced growth between the two sectors, so that industrial growth is not constrained from the supply side by agricultural prices being too high or constrained from the demand side by agricultural prices being too low. Later in the chapter, we bring the two sectors together in an equilibrium framework and derive the equilibrium terms of trade that maximizes the growth rate of the economy as a whole.

Foreign exchange contribution

In the early stages of development, the only source of foreign exchange is likely to be primary commodity exports. Agriculture therefore makes an important foreign exchange contribution. Foreign exchange is a resource, just like savings. It provides access to goods that either cannot be

produced domestically or can be produced only at higher cost in an opportunity cost sense. Either way, the imports made possible by exporting agricultural products will be very productive – the more so if they are investment-type goods necessary for the development process. There are not many countries in the world that could not grow faster, given the greater availability of foreign exchange. The link between trade, the balance of payments and growth is explored fully in Chapters 15 and 16.

Barriers to agricultural development

For the agricultural sector to supply food, release labour, provide savings, contribute to the market for industrial goods, and earn foreign exchange, it must generate a steadily rising surplus of production in excess of subsistence needs. Since land is relatively fixed in supply, this requires rising agricultural productivity. The ‘grassroots’ school of economic development, which came into fashion as a reaction against the emphasis on industrialization at any cost, lays stress on policies to raise the level of productivity in agriculture as the most crucial development priority and an indispensable element of a long-run development strategy. Overall, agricultural productivity in developing countries is less than one-twentieth of the level in developed countries, and there are even bigger differences between countries.

Table 5.1 gives figures on agricultural productivity in selected regions of the world in 2013 measured in US dollars at 2005 prices. Notice the huge disparities that exist, which go some way to explaining divisions in world income. In low-income countries, in which over half of the population are engaged in agriculture, value-added per head is only \$310, which is less than a dollar a day. In sub-Saharan Africa and South Asia (which includes India, Bangladesh and Pakistan), productivity is less than \$2 a day. In East Asia and the Pacific region (which includes China), value-added is just over \$2 a day. By contrast, in the high-income countries, productivity is over \$24,000. Some progress has been made in recent years with particular crops in particular countries, but

Table 5.1 Agricultural productivity, 2013

	Value-added per worker, US\$
World	1,406
Low income	310
Middle income	1,053
Lower middle income	939
Upper middle income	1,156
Low and middle income	956
East Asia and Pacific	803
Europe and Central Asia	5,247
Latin America and Caribbean	4,125
Middle East and North Africa	3,264
South Asia	711
Sub-Saharan Africa	706
High income	24,509

Source: World Bank, 2015.

the performance of the agricultural sector is still disappointing, and the lack of marketable surplus still holds back development on a wide front. So what impedes agricultural productivity? There are several factors, particularly related to geography and land–labour ratios, the existence of urban bias in the treatment of agriculture and the allocation of resources, and unfair competition in world markets, but the most important factors of all are the structure of rural societies, the organization of agriculture and the land tenure system that operates.

As far as geographical factors are concerned, climate and terrain determine, to a large degree, what goods a country can produce, the amount of cultivatable land available per inhabitant and the land's fertility. To some extent, the application of capital to land can compensate for unfavourable natural forces, but there are obvious limits. Mountains cannot easily be flattened or deserts readily watered. This is the concept of **geographic determinism**, which can be advanced as a hypothesis of underdevelopment in its own right. Having said this, however, differences in natural conditions and the fertility of the soil can be no more than a partial explanation of low productivity. Poor people are to be found along the highly productive alluvial banks of the Nile, as well as on the barren plateaus of Asia and South America.

Productivity is also affected by land–labour ratios. Low labour productivity may be associated, for example, with a high population density and a high ratio of labour to land. In this case, productivity might be increased substantially with small applications of capital in the form of drainage schemes, fertilizers and so on. On the other hand, low productivity may be associated with the opposite situation of a high ratio of land to labour, in which case the solution to low productivity is likely to involve much larger doses of capital for labour to work with. Most countries in Asia have high ratios of labour to land, while in Latin America and Africa, the reverse is true, as was the case in many of today's richest countries at an equivalent stage in their economic history, for example the USA, Canada and Australia.

Urban bias against agriculture takes many forms:

- The holding down of agricultural prices to favour the industrial/urban sector.
- The concentration of investment in industry.
- Tax incentives and subsidies to industry.
- Overvalued exchange rates, which keep the price of industrial inputs low, and the domestic price of agricultural exports low.
- Tariff and quota protection for industry, which raises the price of fertilizers, seeds and equipment.
- Greater spending in urban areas on education, training, housing, nutrition and medical provision, which all affect productivity and the quality of life.

Unfair competition consists of the subsidies that developed countries give to their farmers, and the tariffs that developed countries impose on imported agricultural products from developing countries. The USA and the European Union (EU) alone spend nearly \$150 billion a year on farm subsidies. This has two major consequences. First, it leads to overproduction, and the surpluses are then frequently dumped on the markets of developing countries, impoverishing domestic farmers. Second, farmers in developing countries are not able to compete in their own markets, let alone overseas markets. The situation is made worse by developing countries being forced by international agreements to lower their tariffs against imported agricultural produce, while developed countries continue to protect their own agricultural sectors. The average global tariff on agricultural commodities is 62%. The maize growers of Mexico cannot compete with cheap maize from the USA; nor can the cotton growers of West Africa compete against subsidies of \$4 billion a year given to the 20,000 cotton growers in the southern states of America. Unfair competition between developed and developing countries in the markets for

agricultural goods is one of the central issues in ongoing world trade talks under the auspices of the World Trade Organization.

Geographic factors, the land–labour ratio, urban bias and competition from developed countries can only explain a small part of the low productivity of agriculture in most developing countries. There are more fundamental forces at work concerned with the structure of rural society, the organization of agriculture, the incentives to produce and the supply of inputs (see Binswanger and Deininger, 1997).

In a typical developing country, rural society consists of rich landowners, peasants, sharecroppers, tenants and labourers. Apart from the landowners, most others in the rural sector are extremely poor. Because they live on the margin of subsistence, they tend to be **risk averse**. In all developing countries, peasant subsistence farming is a traditional way of life, and attempts to raise productivity will alter that way of life and necessarily involve risk. As Theodore Schultz (1980) perceptively remarked in his Nobel Prize-winning lecture:

Most of the people in the world are poor, so if we knew the economics of being poor we would know much of the economics that really matters. Most of the world's poor people earn their living from agriculture so if we knew the economics of agriculture we would know much of the economics of being poor. People who are rich find it hard to understand the behaviour of poor people. Economists are no exception, for they, too, find it difficult to comprehend the preferences and scarcity constraints that determine the choices that poor people make. We all know that most of the world's people are poor, that they earn a pittance for their labour, that half and more of their meagre income is spent on food, that they reside predominantly in low-income countries and that most of them are earning their livelihood in agriculture. What many economists fail to understand is that poor people are no less concerned about improving their lot and that of their children than rich people are.

Poor people on the margin of subsistence may be reluctant to make the changes necessary to improve productivity because if things go wrong it will spell disaster. But even if poor people wanted to change the traditional ways of doing things, there is the serious constraint of lack of access to credit to finance the purchase of new inputs such as seeds, fertilizers, pesticides, drainage schemes and so on.

Then there is the question of the incentive to change. Where there are tenant farmers, there is little or no security of tenure, and therefore no incentive to invest in improved methods of production. Where there is sharecropping, a certain proportion of output must be relinquished to the landowner, which also reduces the incentive to invest. Any serious programme of agrarian reform must provide greater security of tenure for farmers and give incentives to raise agricultural production, coupled with access to credit, water, fertilizers and extension services for advice.

The appendix to this chapter gives a detailed description of the markets for land, labour and credit in rural societies, how they are interlocked, and the inefficiencies that arise as a result of the structure of the agricultural sector of developing countries.

Land reform

The system by which land is held and farmed is a serious impediment to increased productivity in many developing countries. The structure of peasant agriculture differs between countries, largely for historical reasons, but the structures have many common characteristics that keep productivity low. In many countries, landholding tends to be highly concentrated. The average Gini ratio for

the concentration of landholdings in Latin America is 0.8, and in Asia, 0.4. In Latin America, 1% of landowners own roughly 70% of the land. In Brazil, 15% of landowners own 90% of the land. In many parts of Latin America, agriculture is based on a combination of large estates (*latifundios*), owned by a wealthy few, and small farms (*minifundios*), which are often so small that they cannot support a single family. When land is held and worked in the form of large estates, it is frequently underutilized and farmed inefficiently by peasants, who may have no security of tenure and may have to relinquish to the landowner a large fraction of their output. In these circumstances, there is little incentive to increase efficiency and improve productivity.

In Asia, the organization of peasant agriculture is also an important determinant of productivity. Because of the high population density, the major problem is that too many small farms are operated by sharecroppers and tenant farmers, the land being owned by absentee landlords. As families multiply and debts rise, land is continually sold and subdivided, leading to a very inefficient structure.

Land reform has two aspects: first, the redistribution of land in favour of landless or near-landless households, and second, tenancy reform in favour of sharecroppers and other forms of tenant farming. Such reforms involving land rights, and security for tenants, can contribute both to an increased intensity of land use and to improved efficiency and initiative on the part of the tenant farmers, particularly if they are allowed to reap fully the rewards of their own labour.

There is impressive evidence that where a change in the tenure system has permitted the producers themselves to reap the rewards of new techniques, peasant farmers have been ready to break with custom and tradition. The task of persuading producers to adopt more modern methods of production and to purchase improved seeds and fertilizers has been much easier. In a study of China from 1978, Lin (1992) finds that the shift from collective to household farming led to big increases in agricultural productivity related to the acquisition of property and land rights. Likewise, in a study of India, Besley and Burgess (2000) find that rural poverty was reduced by land reform, particularly reforms that strengthened property rights over land. In Vietnam, efficiency has increased and poverty has been reduced since the end of collectivization in the 1990s.

As was first discovered by Amartya Sen (1964), using Indian farm data, small farms are more productive (per hectare) than large farms. This has been shown in many other studies subsequently. The reason is that land tends to be more fertile on small farms, and family labour tends to work the land more intensively. In other words, small farms tend to employ more labour per unit of land than large farms. Thus, land redistribution from owners of large estates to smaller family farms can raise agricultural output and employment simultaneously, helping to reduce poverty.

Land reform may be a necessary condition for increased productivity, but it is clearly not a sufficient condition. It needs to be accompanied by other measures of agrarian reform. New landowners must be given access to credit, water, fertilizers and extension services for advice. Farmers need to be brought within the organized money market to improve access to credit and to reduce the role of village moneylenders, who charge exorbitant interest rates. Improved farm implements, irrigation and new social infrastructure are likely to be important. There needs to be improved dissemination of agricultural research. Too often, the agricultural extension services available are perfunctory and ineffective because the personnel are ill-trained and ill-equipped. Conditions vary from country to country, but in theory at least, agrarian reform, coupled with the application of complementary inputs, offers substantial scope for increased agricultural productivity.¹ See Case example 5.1 on the attempt to raise productivity in Africa, and Case example 5.2 on the approach of the World Bank.

Case example 5.1

Raising agricultural productivity in Africa

African agriculture was often neglected by most governments and donors in the 1980s and 1990s. Now, however, there is a renewed commitment to agriculture centred on the **Comprehensive Africa Agricultural Development Programme**. There is broad agreement that there needs to be more investment in agriculture, particularly in public goods, such as rural roads, agricultural research and extension services, rural schooling, clean water and healthcare. But, often in rural Africa, there are market failures in that farmers cannot get access to credit, insurance and necessary inputs. These failures can be severe and leave small farmers in a poverty trap from which they struggle to escape even when the technology exists for them to produce more.

Subsidies can help overcome poor farmers' inability to obtain credit or take risks and to allow farmers to learn about new agricultural inputs such as new seeds and fertilizers. Subsidies can also be justified, on the grounds of equity, to overcome soil degradation and improve soil quality in the case of fertilizers, and to stimulate production to reduce the cost of food and raise the real incomes of the poor. But subsidies can be costly, with costs rising over time if not targeted properly. Where subsidies are used, they need to be 'smart': targeted to those who need them most, limited in time, and designed to enhance commercial distribution rather than supplant it. Complementary investment in transport and input dealer training can reinforce these programmes and make it easier to reduce or remove subsidies in the future. There are alternatives to subsidies, as Kenya's experience of liberalized fertilizer distribution shows.

Source: Africa Progress Panel, 2010.

Case example 5.2

The World Bank tackles low productivity in agriculture

The World Bank is committed to boosting agricultural productivity and agricultural-related investment. The world needs to produce at least 50% more food by the year 2050 to feed a projected 9 billion people. To help meet this goal, the bank is working with countries to boost the productivity of farms, livestock and fisheries.

To raise yields sustainably, the bank supports 'climate-smart' approaches that have the potential to increase productivity, enhance resilience, promote agricultural innovation through research and education, and facilitate responsible agricultural investment. Gender-specific interventions are important because women account for the majority of smallholder farms – up to 70% in Africa.

Improved land governance can help smallholder farmers increase the productivity of their land and improve their livelihoods. The bank supports government policies that implement systematic land surveying and titling programmes that recognize all forms of land tenure.

The bank is committed to agricultural innovations that boost productivity, as well as better land and water management. It also promotes the use of new livestock breeds, better animal nutrition, improved veterinary services, vaccinations and improved husbandry to sustainably increase livestock productivity for about 1 billion farmers who depend on livestock for their livelihoods. The bank supports work on breeding and animal nutrition in India, grassland management in China, and sustainable aquaculture at coastal fisheries in Tanzania and Vietnam. These are just a few examples of the World Bank's work.

Source: World Bank, 2013.

The supply response of agriculture

What may also be required is a rise in the price of agricultural products relative to industrial products in order to induce extra supply. Traditionally, attempts have been made to 'tax' the agricultural sector by keeping prices low in order to maintain the terms of trade in favour of the industrial sector. This policy was justified by the widespread belief that peasant producers in traditional societies would not respond to price incentives, but this assumption has proved to be wrong. Depressing the agricultural terms of trade has depressed agricultural output and caused problems for the feeding of a growing urban population.

Many countries have had to introduce a positive price policy to act as a stimulus to agricultural output in general and to alter the composition of agricultural output as circumstances warrant. There is, in fact, considerable evidence that producers, especially those in close proximity to large markets with good transport facilities, respond positively to price changes, as economic theory would predict. Schultz (1964) gave early warning that 'the doctrine that farmers in poor countries either are indifferent or respond perversely to changes in prices . . . is patently false and harmful. Price policies based on it always impair the efficiency of agriculture.'

When discussing the supply response of agricultural output to price, however, a distinction needs to be made between three types of response:

- A change in the composition of agricultural output to a change in the relative price of individual agricultural commodities.
- An increase in total agricultural output with respect to an improvement in the relative price of agricultural commodities compared with industrial goods.
- An increase in the marketed surplus in response to an increase in the price of agricultural commodities.

Most of the studies on the supply response in peasant agriculture in developing countries relate to how producers respond to changes in the relative price of different agricultural commodities. But, of course, it would be quite possible for the supply of any individual commodity to be quite elastic with respect to price, yet the total supply of agricultural output and the marketed surplus to be quite inelastic, or even to fall, in response to a change in prices.

Having said this, there are reasons for believing that the other two elasticities are likely to be positive if the supply of individual commodities is positive, especially when crops are grown not just for subsistence purposes. For example, for any crop grown commercially, the elasticity of marketed supply will be virtually equal to the output elasticity, and unless inputs are withdrawn from the production of other commodities, the elasticity of total agricultural supply will also be positive. Only in cases where peasants are content with a fixed money income, or all increased production of a commodity is consumed within the subsistence sector, will the elasticity of marketed supply be zero or negative at the same time as the price elasticity of supply is positive. These conditions are not likely to prevail.

Empirical research on the supply response of agriculture can be divided into four main categories:

1. Cross-country studies that look at output differences in relation to price differences across countries.
2. Time-series studies that examine output movements in relation to price movements within countries over time.
3. Cross-section studies that look at output differences in relation to price differences across farms within a country.

4. Intersectoral general equilibrium models that examine how the output of agriculture varies in response to changes in the prices of agricultural goods relative to the price of other goods in the economy.

The evidence shows that aggregate supply elasticities of agricultural output range from 0.3 to 0.9 (Chhibber, 1988).² Long-run elasticity is obviously higher than short-run elasticity, and elasticity tends to be higher in the more advanced and land-abundant developing countries. The supply response of farmers to price changes depends crucially on the ability of farmers to respond to price signals, which, in turn, depends on transport, infrastructure and access to agricultural inputs. In poorer countries with inadequate infrastructure, supply elasticity is low (0.2–0.5). In fact, the supply elasticity of agriculture with respect to non-price factors (e.g., the provision of public goods and services) is much higher than it is with respect to price, especially in poorer developing countries with inadequate infrastructure and marketing facilities. In a study of farm households in Ethiopia, Abrar et al. (2004) find a high supply response of different crops to changes in relative prices, but non-price factors such as access to fertilizers, land, infrastructure and marketing are often more important than prices in determining how much of which crops is produced for market.

The International Monetary Fund (IMF) and the World Bank are naturally concerned with the performance of the agricultural sector in countries to which they lend under various adjustment programmes (see Chapters 14 and 16). Three interrelated issues are typically addressed:

- The terms of trade between agriculture and the rest of the economy.
- The efficiency of the agricultural sector.
- The supply response of agriculture to price changes.

With regard to the agricultural terms of trade, the IMF normally insists that the prices paid by state marketing boards to producers be increased. Traditionally, governments have ‘taxed’ the agricultural sector through agricultural marketing boards, driving a large wedge between the prices paid to producers and the market prices of the commodities concerned. One implication, therefore, of raising producer prices is that government revenue may fall. This has implications for government expenditure if there is a budget constraint. Only if the elasticity of the supply of output with respect to producer prices is greater than unity will government revenue not fall; but as we saw above, supply elasticity is typically less than unity.

To achieve efficiency within agriculture, the IMF concentrates on factors such as improving storage and transport facilities, increasing the availability of agricultural inputs, improving extension services, insisting on the economic pricing of output and inputs, and privatizing marketing and extension services.

We saw earlier that the supply response of farmers to price changes depends a great deal on the ability to respond, which, in turn, depends on infrastructure, transport, access to inputs and so on. Governments may be in a dilemma here because raising producer prices and reducing their own revenue may impair their ability to spend on infrastructure and other facilities. Given that the elasticity of supply with respect to non-price factors is higher than with respect to price, it would seem unwise to cut public expenditure as far as it affects the agricultural sector.

Transforming traditional agriculture

The task of transforming traditional agriculture is not simply a question of land reform or price policy, however. The transformation of traditional agriculture is also dependent on **new inputs**. The policy issue is to determine the form that the new inputs should take if agriculture is to

attract an adequate share of investment resources. New seeds are especially important to raise agricultural productivity (see Lipton and Longhurst, 1989).

The way to transform traditional agriculture into a dynamic source of growth is by investment to produce a supply of new agricultural inputs that will be profitable for farmers to adopt. What is lacking is not so much an unwillingness on the part of the agricultural sector to accept new ideas, but public expenditure and the organization of particular public activities to serve the agricultural sector. Agricultural research, and investment in people to improve human capabilities in agriculture, has been neglected.

The state of agriculture in Africa is particularly dire. Agricultural yields are low and food shortages and undernourishment are rife. Much of the support in place for agriculture in Africa was dismantled in the 1970s by World Bank structural adjustment programmes (see Chapter 14); for example, subsidies for fertilizers and seeds, guaranteed prices for crops, and research and development – all the policies that supported Asia's so-called **Green Revolution** in the 1960s, which tripled and quadrupled yields of crops such as wheat, rice and maize.

The father of the 1960s' Green Revolution (which bypassed Africa) was **Norman Borlaug**, an American biologist working in Mexico, who crossed Japanese dwarf wheat with a disease-resistant local strain to produce a high-yielding hybrid, which came to be known as 'Mexican dwarf wheat'. In countries such as India and Pakistan, yields increased threefold. Borlaug is credited with saving more lives than anyone in history – at least 1 billion in Asia alone. His motto was 'it is impossible to build a peaceful world on empty stomachs'. He was awarded the Nobel Peace Prize in 1970 and died in 2009, aged 95. Borlaug's breakthrough – the result of 30 years' research – is a prime example of the impact that technology can have on the productivity of agriculture.

A similar breakthrough or 'kick-start' is required in Africa. To this end, an Alliance for a Green Revolution in Africa (AGRA) was founded in 2006 with a \$150 million grant from the Rockefeller Foundation and the Bill & Melinda Gates Foundation to help raise yields through improved farming methods, new seeds and fertilizers, working with the African Agricultural Technology Foundation based in Nairobi, Kenya. One of the major projects is to develop 'water-efficient' maize to cope with long periods of drought now being experienced in southern Africa.

In general, there is a need for a second Green Revolution in agriculture to follow the first in the 1960s, which has now run its course. Modern science can help. **Biotechnology**, including **genetically modified (GM) technology**, has the potential to raise productivity substantially and to reduce the incidence of famine and malnutrition. A GM crop is any crop variety that has had a gene or genes from a different species or variety inserted into its genetic material using genetic engineering techniques. Currently, about 15% of the world's farmland (approximately 180 million hectares) is devoted to GM crops. Research is being done on many crops, but virtually all planting covers just five crops: soya beans, maize, cotton, rice and oilseed rape (canola). There is, however, strong opposition to GM crops from consumers and environmental groups on the grounds of risk to human health, but GM crops are already in the food chain because they are widely used as processed food ingredients and for animal feed. So far, there is no scientific evidence that they are harmful.

The benefit of GM technology is that it can produce crops that can resist pests, can grow in salty soil, are drought resistant, use nitrogen more efficiently, can be stored for longer, and are more nutritious. Rice is an important staple food for poor people. Over 3 billion people in the world get at least 20% of their calorie intake from rice. The International Rice Research Institute in Manila, Philippines is at the forefront of research to produce different varieties of rice to suit particular environments where the problem may be drought, flooding, heat or salty water. With

regard to nutrition, **Ingo Potrykus**, working in Zurich, teamed up with Peter Beyer to genetically engineer a type of rice ('golden rice') to contain beta-carotene, which is the pigment that produces vitamin A. This is an important breakthrough since vitamin A deficiency kills 2 million children a year and blinds many more. This research has been funded not by biotechnology companies, concerned with maximizing returns by patenting and the exercise of intellectual property rights, but by the Swiss government and the Rockefeller Foundation. The plan is for growers to be given the new rice free by national research centres supervised by the International Rice Research Institute. Agricultural innovation cannot flourish without well-resourced agricultural extension services within countries. Research is now under way to cross 'golden rice' with a grain implanted with three genes to boost iron content to combat anaemia, which many people suffer from in developing countries. A quality protein maize has also been developed by Norman Borlaug, containing many important amino acids that could dramatically reduce the number of children who die of malnutrition. GM cotton has increased yields by nearly 100% in India by being more disease resistant.

Some people argue that GM is the only technology that can prevent future world food crises and rising prices of basic foodstuffs. Malnutrition remains a major scourge in developing countries, and by 2030, there will also be 2 billion more mouths to feed. The application of new technology is urgently required.

What matters most are the incentives and associated opportunities that farm people have to augment production by means of investments that include the contribution of agricultural research and the improvement of human skills. We emphasize again that subsistence agriculture is an uncertain activity and therefore risky, particularly when survival is at stake, and this is another factor that breeds conservatism and makes change difficult, even in the face of opportunities. Poor people prefer to be safe than sorry; they tend to prefer an inferior outcome that is relatively certain to the prospect of a higher average return with a greater degree of risk attached. They are **risk averse**. This is clearly not irrational behaviour for poor people living on the margin of subsistence, even if the greater risk is imagined rather than real. To overcome inertia on this score, an integral element of agrarian reform must be policies designed to minimize risk and uncertainty through the provision of various types of insurance (as discussed in Chapter 2).

The growth of the money economy

The question of the willingness to change customs and traditions leads naturally to a consideration of how peasant subsistence economies, producing goods for consumption only, typically transform themselves into money economies with an export and industrial sector. From historical experience (see Chang, 2009), two factors would appear to be crucial for the expansion of the agricultural sector and the eventual production of goods for exchange at home and abroad:

1. The expansion of communications to create outlets and markets for surplus production – and to encourage the production of the surplus itself.
2. The emergence of a class of middlemen or export–import merchants acting as agents between world markets and the domestic agricultural sectors.

If these conditions prevail, purely subsistence farming can develop first into mixed agriculture, where part of the crop is retained for subsistence and part is sold in the market, and then into modern agriculture with production entirely for the market, very often based on one crop. In

the transition from subsistence agriculture, cash crops can utilize slack labour and land when the subsistence crops are finished; but the transition into mixed farming is possible only if the farmer has the inputs to raise productivity and the credit to purchase those inputs, as well as the marketing facilities.

Modern agriculture, run on strictly commercial lines for profit and based on one crop, must rely on exports since the size of the domestic market will generally be too small. The system of modern commercialized agriculture, upon which many developing countries depend for their export earnings, is often termed **agribusiness**. This is a catch-all phrase referring not only to the production of the commodity in question, but also to the backward and forward linkages associated with the production process: the provision of finance, machinery, fertilizers, seed and so on at the input end, and the processing, manufacturing and marketing of the product at the output end.

Today, **multinational corporations** have a powerful position and a strong hold over the production and export of major agricultural commodities produced in developing countries. To give just a few examples: three US firms control over one-half of the global banana trade, five European companies control 90% of the tea sold in developed countries, and the two largest coffee companies control 20% of the world market.

The ability to export and the ability to market internally imply surplus production over subsistence needs, and it is the size of this surplus that will largely determine the speed with which the subsistence sector can be drawn into the money economy. Again, we come to the fact that unless productivity in agriculture increases, the expansion of the monetized sector will tend to decelerate as the land for cultivation dries up. When land has been exploited to the full, it acts as a constraint on development unless agricultural productivity increases or non-agricultural activities can be established.

The emergence of an export sector provides a powerful stimulus to the development and extension of the money economy. Exports create the capacity to import, and the very purchase of foreign products can encourage further export specialization. A population that acquires a taste for imported goods provides the impetus to producers to export more. In the case of new goods, as well as new techniques, there is strong evidence that peasant producers respond to incentives, and are not as different from 'Western economic man' as is sometimes claimed. Imports also provide a stimulus to industrialization. If a market for a foreign manufactured good becomes established, it becomes easier and less risky, with the aid of tariff protection, for a domestic manufacturer to set up in business because the market is assured. Imports can also substitute for domestic capital and raise the growth rate directly.

When farmers start to specialize in goods for export, and rely on other producers for goods they previously produced themselves, the money economy will spread from the foreign trade sector to the rest of the domestic economy. This is nothing more than the international division of labour giving rise to the need for a means of exchange within a country as well as between countries.

The emergence of an export sector, the spread of the money economy and the establishment of industries typically occur concurrently. What form industrialization takes will depend, in the first instance, on the initial impetus. One stimulus to industrialization that we have already mentioned is imports creating a market for goods that can be produced domestically without much difficulty. A more obvious factor leading naturally to industrialization is the availability of resources from the land, forming an indigenous industrial base. In this case, industrialization takes the form of the processing of raw materials. There are few countries that do not possess

some natural resource or other, and every country will have a comparative advantage in the production of one or other raw material that can be processed. These are the agribusinesses mentioned earlier.

In many of the present developing countries, formerly under colonial rule, the initiating force behind industrialization was the foreign exploitation of resources. Industrial activity took the form of mining operations and plantation agriculture. The establishment of foreign enclave activities undoubtedly exerted a development impact, but it is sometimes argued that development would have been more rapid if countries had been left to their own devices. Some claim that the long-run development of these countries was impaired because the availability of cheap labour from the subsistence sector discouraged the installation of more modern productive machinery, and also that the foreign ownership and exploitation of countries' resources considerably reduced the potential level of investment through the remittance of profits to the host country. This is the argument of dependency theorists, which is discussed more fully in Chapter 10.

Finance for traditional agriculture

For many years, traditional agriculture has been starved of investment resources. While it accounts for approximately 30% of output and 50% of total employment, it attracts little more than 10% of total investment resources. Private capital has no doubt been deterred by the risks involved and the low returns in traditional agriculture. But institutional investment has also been meagre. For example, in the early years of the World Bank, 1947–59, only \$124 million was spent on agriculture out of total loans of \$4 billion. Official development assistance (ODA) to agriculture from multilateral and bilateral sources rose sharply in the 1970s, but since 1979, the share of ODA going to agriculture decreased from 18% to 3.5% in 2004. In absolute terms, it reached a peak of \$8 billion (measured at 2004 US\$) in 1984, falling to only £3.4 billion in 2004 (World Bank, 2007).

Within agriculture-based developing economies, the share of public expenditure spent on agriculture has also decreased from 7% in 1980 to 4% in 2004 (World Bank, 2007). This gives some measure of the neglect of agriculture, which was partly responsible for the world food crisis and food price rises in 2007–08.

The public sectors of developing countries, and multilateral institutions such as the World Bank, have a responsibility to invest in agriculture to raise productivity and combat poverty. Some projects will involve increasing the output of traditional crops through the more effective use of seeds, fertilizers and water. Other projects will involve changing the product mix from subsistence crops to the production of high-value crops.

At present, the largest single component of lending to agriculture is irrigation, which permits the expansion of cultivation and makes more intensive cultivation possible by permitting double cropping. Bank-financed irrigation schemes have had a major impact on rice yields and production in Asia. The World Bank has also become the most important source of financial and technical assistance for the construction of fertilizer plants in developing countries, and these have played an important role in increasing yields and output. The World Bank gives credit for rural infrastructure projects, such as roads to reduce marketing and supply bottlenecks, and rural electrification schemes. **Agricultural extension** is another important aspect of the World Bank's assistance to the rural sector. In India, where 'contact' farmers disseminate knowledge to their neighbours of improved techniques learnt from field agents, over 10 million farm families have

been helped. The rural poor now have more extensive and easier access to credit financed by the World Bank. In India, much of the credit has been used by small farmers to provide supplementary irrigation.

Finally, the World Bank operates various multipurpose projects that combine a wide range of activities, normally in conjunction with a regional development programme. In Mexico, some 75,000 low-income families have benefited from such a project in about 30 localities through investments in irrigation, soil conservation, electrification, schools, healthcare, water supplies and marketing services. Each dollar the bank invests in rural development is supplemented by local investment, and the bank rightly stresses that its contribution to the total flow of resources can be effective only if appropriate national policies are pursued on pricing, taxation, land reform and so on. The major part of the World Bank's programme to reach the rural poor is still in the process of implementation, and is therefore difficult to assess reliably, but indications suggest that a combination of additional resources, institutional reforms and national government commitment to improvement in the rural sector can have a major impact.

Apart from the World Bank, other multilateral institutions exist to help traditional agriculture, notably the UN's **International Fund for Agricultural Development (IFAD)**, which seeks to integrate small farmers and landless people into the development process. IFAD states that its priority is for 'projects which will have a significant impact on improving food production in developing countries, particularly for the benefit of the poorest sections of the rural population'. Between 1978 and 2014, \$15 billion had been dispersed.

In the absence of external institutional investment, the sources of capital for the expansion of agriculture and industry are relatively limited in the early stages of development. In a truly subsistence economy, in the sense of an economy producing only what it needs for itself and no more, everyone is a Robinson Crusoe, supplying their own capital by refraining from present consumption. With specialization in the production of goods for export, and the producer's need for capital to expand productive capacity, mechanisms grow up spontaneously to meet the need for credit. It is a good market maxim that demand will create a supplier at a price. The suppliers are generally village moneylenders, shopkeepers, landlords and, not infrequently, the Church – especially in South America – charging rates of interest that often exceed 50%.

The interdependence of agriculture and industry

Once agriculture emerges from its subsistence state and starts to specialize and produce goods for export, and industry develops under the impact of growth in the agricultural sector, the two sectors of agriculture and industry become interdependent. The industrial sector adds to the demand for goods produced by agriculture and absorbs surplus labour, which may raise productivity in agriculture. In turn, the agricultural sector provides a market for industrial goods out of rising real income, and makes a factor contribution to development through the release of resources if productivity rises faster than the demand for commodities. Adam Smith, in *Wealth of Nations* (1776), clearly recognized this interdependence (Kim, 2015).

Demand coming from agriculture can be a major stimulus to industrialization. Adelman (1984) has described the process as 'agricultural demand-led industrialization'. Taking 27 social accounting matrixes for low- and high-income economies, Vogel (1994) has shown that the impact of agriculture on industry is much higher than the impact of industry on agriculture, and it increases with the level of income. At low levels of income, a \$1 expenditure in agriculture generates a \$2.75 increase in induced demand for non-agricultural inputs and services, and a \$10 increase

in high-income countries. It is rural household demand that contributes most to the backward multiplier, which leads Vogel (1994) to conclude: 'the early development theorists failed to articulate a place for rural household demand for consumer goods. Not recognizing the centrality of these institutional feedbacks in agriculture's production linkages in developing economies has been one of the great failures of theories of economic development.' It is true that a stagnant rural sector has held back industrial development in several developing countries. (See section below, A model of the complementarity between agriculture and industry.)

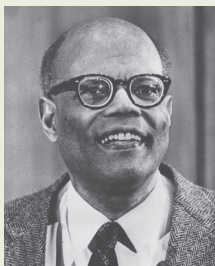
The transfer of resources from agriculture to industry may be in the form of capital or labour or both. Since labour is in abundant supply in most low-income countries, there is generally no difficulty in releasing labour for industry, except during harvest time. In any case, labour will tend to migrate naturally in response to seemingly better opportunities in the industrial sector and higher real incomes. The real earnings of labour in the industrial sector may be more than twice as much as the agricultural wage. If the industrial sector is to be guaranteed an adequate supply of labour, some wage differential is inevitably required to offset the higher real living costs in an urban environment, to compensate for the forfeit of non-monetary benefits of rural life, and to compensate for greater job uncertainty in the industrial sector. Real earnings may also be higher because of genuinely higher productivity in the industrial sector, where labour has more factors of production to work with. Most models of rural–urban migration make migration a positive function of the *expected* urban–rural wage differential, which is the difference between the urban wage, adjusted for the proportion of the total urban labour force employed (as a proxy for the probability of finding work), and the agricultural real wage (see the section below, Rural–urban migration and urban unemployment, for an outline of the model).

Capital may be less 'mobile' than labour, and if there is considered to be insufficient lending from the agricultural sector on a voluntary basis, it may become necessary for a government to extract savings compulsorily from the agricultural sector by taxation. As mentioned already, this method was resorted to in a harsh manner by Japan at the time of the Meiji Restoration and Soviet Russia after the communist revolution. In Japan between 1880 and 1900, the land tax provided approximately 80% of central government tax revenue, and in Russia forced extraction of the agricultural surplus took the form of expropriation of land and the extermination of labour. Industrialization in Western Europe, and particularly in England, was also financed to a large extent by surpluses generated on the land, but transference of these surpluses was, on the whole, voluntary through a rapidly expanding banking system. Today, developing countries, despite their access to foreign sources of capital, must also rely heavily on extracting the surplus from agriculture to finance industrialization. The difficulty is to decide on the best means of extraction without impairing the incentive to produce, or damaging the growth of productivity, on which a growing agricultural surplus depends. The financing of economic development will be discussed more fully in Part IV.

Economic development with unlimited supplies of labour

The process of the emergence of a money economy from a subsistence state was formalized by Sir Arthur Lewis in his classic paper 'Economic Development with Unlimited Supplies of Labour' (1954).³ There, he presented a 'classical' model of a dual economy with the purpose, as he described it, of seeing what can be made of the classical framework for understanding the issues of distribution, capital accumulation and growth in developing countries. His ultimate aim was to emphasize the crucial role of the capitalist surplus in the development process.

Arthur Lewis



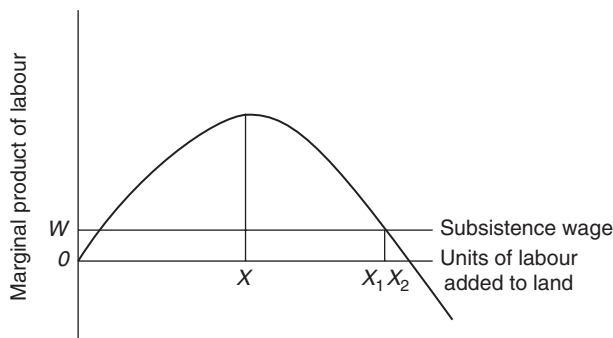
Born 1915, St Lucia, West Indies. Died 1991. Professor of Economics, Manchester University, University of the West Indies and Princeton University. Vice-Chancellor, University of the West Indies; Director of the Caribbean Development Bank. Wrote the first textbook on development economics, *The Theory of Economic Growth* (1955), but most famous for his 1954 paper, 'Economic Development with Unlimited Supplies of Labour', one of the most influential papers in development economics, still widely consulted today. One of the 'fathers' of development economics; awarded the Nobel Prize for Economics, 1979.

The Lewis model therefore starts with the assumption of a dual economy with a modern exchange (capitalist) sector and an indigenous (non-capitalist) subsistence sector, and assumes that there are unlimited supplies of labour in the subsistence sector, in the sense that the supply of labour exceeds the demand for labour at the subsistence wage; that is, the marginal product of workers in the subsistence sector is equal to, or less than, the subsistence or institutional wage.

It has even been argued that the marginal product of labour may be zero or negative in an economy that is still at a fairly low level of development and experiencing a rapid growth of population. Indeed, Lewis (1954) said: 'there are large sectors of [a developing] economy where the marginal productivity of labour is negligible, zero or even negative'.

One of the distinguishing features of agriculture is that it is an activity that is subject to diminishing returns owing to the fixity of the supply of land. If there is rapid population growth and labour has little employment opportunity other than on the land, a stage may be reached where the land cannot provide further workers with a living unless the existing workers drastically reduce their hours of work. These propositions are illustrated in Figure 5.1. The curve drawn represents the marginal product of successive units of labour added to the land. After the employment of X units of labour, the marginal product of labour begins to fall owing to diminishing returns; after X_1 units of labour, labour's marginal contribution to output falls below the subsistence wage; and

Figure 5.1 Marginal product of successive units of labour added to the land



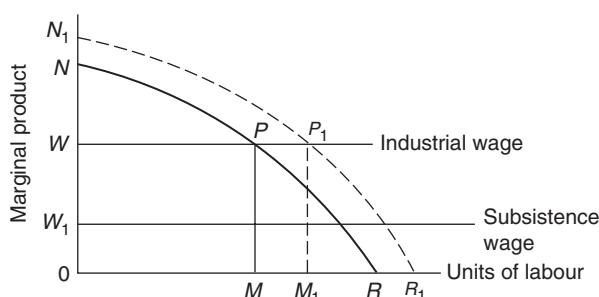
after X_2 units of labour, labour's contribution to output becomes negative and total product will decline with successive additions of labour beyond X_2 .

In Lewis's model, labour in excess of X_1 in Figure 5.1 is in completely elastic supply to the industrial sector at whatever the industrial wage.⁴ The industrial or capitalist sector is represented in Figure 5.2. The curve NR represents the marginal product of labour in the capitalist sector, W is the industrial wage and, on the profit-maximizing assumption, labour is employed in the capitalist sector up to the point where the marginal product is equal to the wage rate. That is, M will be employed. Workers in excess of M earn what they can in the subsistence sector. The industrial wage is assumed to be determined in some relation to the wage that workers can earn in the subsistence sector. The differential (WW_1) between the industrial wage and the subsistence wage will be a function of many factors, some of which were mentioned earlier, for example higher real living costs in the capitalist sector and greater job uncertainty. Given that the industrial wage is based on earnings in the subsistence sector, capitalists have a direct interest in holding down productivity in the subsistence sector, and Lewis commented that the record of every imperial power in Africa in modern times was one of impoverishing the subsistence economy.

In Figure 5.2, the total product of labour, $ONPM$, is split between the payment to labour in the form of wages, $OWPM$, and the capitalist surplus, WNP . The expansion of the capitalist sector and the rate of absorption of labour from the subsistence sector depends on the use made of the capitalist surplus. If the surplus is reinvested, leading to greater capital formation, this will increase the total product of labour. The marginal product curve will shift upwards to the right, say N_1R_1 , which means that if wages remain constant, the capitalist sector can now afford to employ more labour and will do so by drawing on labour from the subsistence sector to the extent of MM_1 workers. The size of the capitalist surplus will increase from WNP to WN_1P_1 , which is available for further reinvestment and so the process goes on. For Lewis, this is the essence of the development process. The stimulus to investment in the capitalist sector comes from the rate of profit, which must rise over time because all the benefits of increased productivity accrue to capital if the real wage is constant.⁵

According to Lewis (1954), the share of profits in the national income (P/O) will also rise. First, the share of profits in the capitalist sector (P/C) will increase, and second, the capitalist sector relative to the national income (C/O) will tend to expand; that is, if $P/O = P/C \times C/O$, then P/O will rise as P/C and C/O increase. For Lewis, the latter is the more important. Lewis (1954) said: 'if we ask why the less developed countries save so little, the answer is not because they are so poor but because their capitalist sector is so small'.

Figure 5.2 Industrial/capitalist sector



The process outlined by Lewis comes to an end when capital accumulation has caught up with population, so that there is no surplus labour in the subsistence sector left to absorb. When all surplus labour is absorbed, the supply of labour to the industrial sector becomes less than perfectly elastic. It is now in the interests of producers in the subsistence sector to compete for labour, since the marginal product of labour is no longer below the institutional wage. This is the so-called 'Lewis turning point'. This change in producer behaviour in the subsistence sector has also been defined as the end of the take-off stage (Ranis and Fei, 1961). There is a debate in the literature over whether China has reached the Lewis turning point (Islam and Yokota, 2008). Some argue that its arrival can be seen in more assertive workers and wage rises. Others argue, however, that recent wage rises represent an upward shift in the whole labour supply curve, not a turning point, because the reserves of labour in agriculture are still vast and where labour's productivity is less than 20% of the rest of the economy. Lewis gave several reasons why wages may rise before the turning point is reached (see below).

Implicit in the Lewis model is the assumption that employment growth in the capitalist sector will be proportional to the rate of capital formation. If profits are reinvested in labour-saving technology, however, this will not be so, and the rate of growth of employment in the industrial sector, as well as the rate of absorption from the agricultural sector, may be very low.

It is also possible that the process of absorption may end prematurely before surplus labour in the subsistence sector is fully exhausted, owing to checks to the expansion of the capitalist surplus. Capital accumulation and labour absorption may be checked due to the expansion of the capitalist sector itself. For example, as the capitalist sector expands, the terms of trade may turn against it. If the demand for food expands faster than agricultural output, the capitalist sector will be forced to pay higher prices for food in exchange for industrial goods, reducing the size of the capitalist surplus. This will have two effects.

First, if the capitalists are forced to pay higher prices for the goods they buy relative to those they sell, this means less saving for investment. The problem does not arise if productivity in agriculture is expanding rapidly, but Lewis recognized that the failure of peasant agriculture to increase its productivity has probably been the chief factor holding back the expansion of the industrial sector in many developing countries. If this is so, argue Lewis's critics, the growth of non-farm employment can be said to depend on the growth of the agricultural surplus. This is, in fact, the starting point of **neoclassical models of development** (see Jorgenson, 1966), in contrast to classical models with their emphasis on surplus labour.

The second effect arising from the expansion of the capitalist sector if there is a shortage of food is that the real wage may have to rise in industry, further squeezing the capitalist surplus. If labour is needed in agriculture to meet the demand for food, unlimited supplies of labour at a *constant real wage* may be very limited indeed. The assumption of an unlimited supply of labour is the central proposition underlying the classical approach to the theory of development, and Jorgenson has argued that the classical approach stands or falls by this hypothesis. Historically, of course, real wages have risen in agriculture *and* industry, and the capitalist sector has also expanded rapidly, which lends support to a middle view between the classical and neoclassical approaches. Lewis (1954) recognized the importance of both capital accumulation and food supply, and it is this consideration that forms the basis of his argument for the balanced growth of the agricultural and industrial sectors.

Capital accumulation in the industrial sector may also be checked for reasons unrelated to the expansion of the capitalist sector and its demand for food. For example, real wages may be forced up directly by trade unions, or indirectly through rising real wages in the subsistence sector due to increased agricultural productivity. Lewis (1954) states that:

anything which raises the productivity of the subsistence sector (average product per person) will raise real wages in the capitalist sector, and will therefore reduce the capitalist surplus and the rate of capital accumulation, unless it at the same time more than correspondingly moves the terms of trade against the subsistence sector.

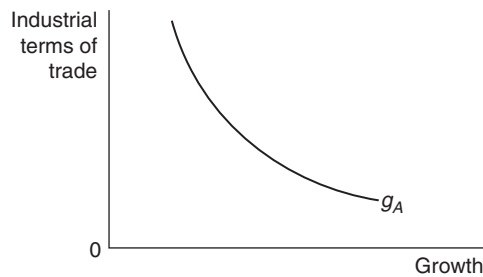
Lewis reached this conclusion because one of the simplifying assumptions of his classical two-sector model is that the expansion of the capitalist sector is limited *only* by a shortage of capital, so that any increase in prices and purchasing power for farmers is not a stimulus to industrialization but an obstacle to the expansion of the capitalist sector. How does this square with the idea of the agricultural sector providing a market for industrial goods, and the view of the World Bank (1979) that 'a stagnant rural economy with low purchasing power holds back industrial growth in many developing countries'? The answer is that there does seem to be a contradiction, because the classical approach emphasizes supply to the exclusion of demand, or rather takes for granted that there will always be a market clearing price for industrial goods. In practice, there will always be a minimum below which the price of industrial goods cannot fall, set by the subsistence level wage in industry.

Johnston and Mellor (1961) recognized this worrying feature of the Lewis model many years ago, when they perceptively remarked: 'there is clearly a conflict between emphasis on agriculture's essential contribution to the capital requirements for overall development, and emphasis on increased farm purchasing power as a stimulus to industrialization. Nor is there any easy reconciliation of the conflict.' The challenge of reconciliation has never been taken up in a satisfactory way, but there is a resolution of the conflict if the **complementarity** between the two sectors is recognized from the outset, and it is remembered that there must be an equilibrium terms of trade that balances supply and demand in both sectors. The basis of a model of reconciliation is provided by Kaldor (1979).

A model of the complementarity between agriculture and industry⁶

We have seen that agriculture provides the potential for capital accumulation in industry by providing a marketable surplus. The greater the surplus, the cheaper industry can obtain food and the more saving and capital accumulation can be undertaken. This is the supply side. But industry also needs a market for its industrial goods, which, in the early stages of development, must largely come from agriculture. This is the demand side, and the higher the price of agricultural goods, the greater agricultural purchasing power will be. Given this conflict between low food prices being good for industrial supply and high food prices being good for industrial demand, what is required is a simple model that brings together agriculture and industry in an equilibrium framework, where the terms of trade between agriculture and industry provide the equilibrating mechanism, ensuring that supply and demand grow at the same rate in each sector.

Let us first model growth in the agricultural sector in relation to the terms of trade, then growth in the industrial sector, and then bring the two sectors together. Agriculture's growth rate will be a function of how much it invests relative to output and of the productivity of investment. How much investment goods it obtains from industry in exchange for food that it 'saves' depends on the price of industrial goods relative to food; that is, on the terms of trade between industry and agriculture. The higher the price of investment goods, the lower the possible investment for a given amount of food and the lower the growth of supply capacity. This inverse relation between the industrial terms of trade (the price of industrial goods relative to the price of food) and the agricultural growth rate (g_A) is shown in Figure 5.3.

Figure 5.3 Industrial terms of trade and agricultural growth rate

Industry's growth rate will also be a function of its investment ratio and the productivity of investment. But there is a certain minimum to the terms of trade, below which industry would not be able to invest anything because all output would be required to pay for workers' wage goods (food). If all wages are consumed, the cost of food input per unit of output in industry will depend on the real wage rate in industry divided by the productivity of labour, that is $w/(O/L) = (W/O)$, where w is the real wage and W is the wage bill. Industrial prices must cover W/O , and this sets the lower limit to industrial prices relative to food prices. At the other extreme, industrial growth cannot exceed a certain maximum where the price of food is so low relative to industrial goods that all industrial goods are retained for investment in industry. The investment ratio approaches, in effect, 100%, and the upper limit to growth is given by the productivity of investment. The positive relation between the industrial terms of trade and the industrial growth rate (g_i) is shown in Figure 5.4.

If we now assume for simplicity (although without loss of generality) that the income elasticity of demand for agricultural and industrial goods is unity, then at a given terms of trade, the rate of growth of agricultural output represents the rate of growth of demand for industrial goods, and the rate of growth of industrial output represents the rate of growth of demand for agricultural output, and where g_A and g_i cross, there will be balanced growth of agriculture and industry (g^*) at equilibrium terms of trade (p^*), as shown in Figure 5.5.⁷ In this model of the complementarity between agriculture and industry, we can see the implications of what happens if the terms of trade are not in equilibrium, as well as the checks to the expansion of industry that Lewis mentioned.

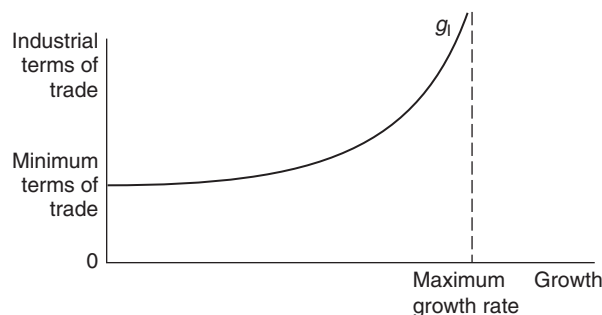
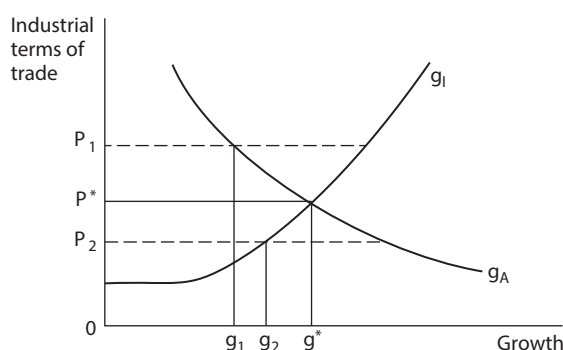
Figure 5.4 Industrial terms of trade and industrial growth rate

Figure 5.5 Growth equilibrium and disequilibrium

If the terms of trade are not in equilibrium – if the price of food is ‘too low’ or ‘too high’ in relation to industrial goods – then industrial growth is either demand constrained or supply constrained. For example, if in Figure 5.5, the terms of trade were at P_1 , because the price of food was ‘too low’, industrial growth would be demand constrained to g_1 by a lack of agricultural purchasing power over industrial goods. Industry could accumulate capital, but it could not sell its goods. Alternatively, if the terms of trade were below equilibrium at P_2 , industrial growth would be supply constrained to g_2 because the price of food would be ‘too high’, impairing capital accumulation in industry. Agriculture could buy, but industry could not supply. Growth is maximized at P^* .

We can now examine what happens if there are shifts in the curves. Clearly, shifts in the curves will cause both the growth rates and the equilibrium terms of trade to vary. An improvement in agricultural productivity that shifts g_A outwards will mean both higher industrial growth and an improvement in the industrial terms of trade. The importance of agricultural productivity improvement could not be better illustrated. An improvement in industrial productivity will shift g_I outwards, which will also mean higher industrial growth but at the expense of worse terms of trade for industry.⁸ If there is a tendency for real wages in industry to rise commensurately with productivity increases, however, the g_I curve will remain stable and the terms of trade will never move against industry in favour of agriculture unless agricultural productivity falls and the g_A curve shifts inwards.

The checks to industrial expansion in Lewis’s model are easily illustrated. A rise in the real wage in industry will shift the g_I curve inwards, which will choke industrial expansion unless an equivalent increase in agricultural productivity shifts the g_A curve outwards (see the earlier quote from Lewis).

A final implication of the model is that if, through time, agriculture is subject to diminishing returns, productivity in agriculture will fall, shifting inwards the g_A curve and reducing the rate of industrial growth. If the g_I curve is relatively stable, industrial growth depends fundamentally on the rate of land-saving innovations (technical progress) in agriculture to offset the effect of diminishing returns.

Rural–urban migration and urban unemployment

Lewis (1954) spoke of an urban–rural wage differential of approximately 30% to attract labour to the industrial sector. What has happened in recent years, however, is that the urban–rural wage differential has widened considerably beyond this level – there has been rural–urban migration on

an unprecedented scale, but the expansion of the industrial sector has not generated sufficient employment for all those available to work. The urban–rural wage differential in China is over 300%, in Guatemala 300%, and in Vietnam 210% (World Bank, 2007). Migration has thus served to transfer unemployment from rural to urban areas, as described in Chapter 3. In 2008, for the first time in human history, the number of people living in urban areas exceeded those living in the rural sector. The **informal economy** of the urban sector harbours the bulk of unemployed labour in transition from the rural sector into industrial employment. The conclusion to be drawn is that the *expected* value of the urban wage, notwithstanding the probability of long spells of unemployment, still exceeds the wage in the rural sector, and as long as it does so, the process of migration will continue.

In these changed circumstances, development theory has focused its attention in recent years on **urban unemployment** and policies to combat it. Most of the models of the rural–urban migration process are pessimistic about reducing the level of urban unemployment by conventional means such as subsidies to labour or public works programmes in the urban areas. The reason is that migration from the land is made to be a function not only of the *actual* urban–rural wage differential but also of the level of employment opportunities. More employment opportunities reduce unemployment immediately but encourage more migration. It thus becomes an empirical question whether increasing the rate of growth of employment in urban areas will actually reduce unemployment. New migrants may exceed the number of new jobs created. The very real possibility exists that urban areas may be caught in a ‘high level unemployment equilibrium trap’ as long as surplus labour on the land remains and development policy concentrates new activity in established urban (industrial) centres.

One of the earliest and simplest models of the rural–urban migration process, which is also operational in the sense of being testable, is that of Todaro (1969, 1971). Let us consider its main features and implications.

The supply of labour to the urban sector is assumed to be a function of the *expected* urban–rural wage differential (d), where the expected urban–rural wage differential is equal to the actual urban wage times the probability of obtaining a job in the urban sector minus the average rural wage. Thus:

$$S = f_s(d) \quad (5.1)$$

where S is the supply of labour to the urban sector and:

$$d = w\pi - r \quad (5.2)$$

where w is the urban real wage, r is the average rural wage, and π is the probability of obtaining a job in the urban sector.

The probability of obtaining a job in the urban sector is assumed to be directly related to the rate of new job creation and inversely related to the ratio of unemployed jobseekers to the number of existing job opportunities,⁹ that is:

$$\pi = \frac{\gamma N}{W - N} = \frac{\gamma N}{U} \quad (5.3)$$

where γ is the net rate of new urban job creation, N is the level of urban employment, W is the total urban labour force,¹⁰ and U is the level of urban unemployment. Substituting equation (5.3) into equation (5.2) gives:

$$d = \frac{w\gamma N}{U} - r \quad (5.4)$$

If it is assumed that migration will come to a stop when the *expected* urban wage equals the rural wage (that is, when $d = 0$), we can derive from equation (5.4) the equilibrium level of unemployment as:

$$U^e = \frac{w\gamma N}{r} \quad (5.5)$$

It can be seen from equation (5.5) that a reduction in the *actual* urban wage will reduce the equilibrium level of unemployment, and a rise in the rural wage will also reduce it, but (paradoxically) an increase in the rate of new job creation will *raise* the equilibrium level of unemployment by increasing the probability of obtaining a job and encouraging migration. Whether policies such as wage subsidies can reduce unemployment therefore depends on whether the increase in the demand for labour as a result is greater or less than the induced supply.

From equation (5.5), we can solve for the equilibrium ratio of unemployment to employment and give some quantitative content to the model. Dividing both sides by N gives $U^e/N = w\gamma/r$. Thus, for example, if the industrial wage is twice as high as the rural wage ($w/r = 2$), and $\gamma = 0.05$, the equilibrium ratio of unemployment to employment will be 10%.

To consider the policy implications more fully, and to answer the question: Under what conditions will the actual level of urban unemployment rise?, let us suppose that the rate of urban job creation is a function of the urban wage, w , and a policy parameter, a (e.g., a government policy variable to increase employment). Thus:

$$\gamma = f_d(w, a) \quad \frac{\partial \gamma}{\partial a} > 0 \quad (5.6)$$

If the growth of urban labour demand is increased, the response of labour supply can be written as:

$$\frac{\partial S}{\partial a} = \frac{\partial S}{\partial d} \frac{\partial d}{\partial \gamma} \frac{\partial \gamma}{\partial a} \quad (5.7)$$

Now, from equation (5.4) by partial differentiation, we have:

$$\frac{\partial d}{\partial \gamma} = w \frac{N}{U} \quad (5.8)$$

Substituting equation (5.8) into equation (5.7) gives:

$$\frac{\partial S}{\partial a} = \frac{\partial S}{\partial d} \frac{wN}{U} \frac{\partial \gamma}{\partial a} \quad (5.9)$$

There will be an increase in the absolute level of urban unemployment if the increase in supply in response to a policy change exceeds the increase in the absolute number of new jobs created, that is, if:

$$\frac{\partial S}{\partial d} \frac{wN}{U} \frac{\partial \gamma}{\partial a} > N \frac{\partial \gamma}{\partial a} \quad (5.10)$$

Now, cancelling N and $\partial\gamma/\partial a$ from both sides and multiplying both sides by d/w and U/W , the condition for unemployment to increase becomes:

$$\frac{\partial S/W}{\partial d/d} > \frac{d}{w} \frac{U}{W} \quad (5.11)$$

or substituting equation (5.2) into equation (5.11):

$$\frac{\partial S/W}{\partial d/d} > \frac{w\pi - r}{w} \frac{U}{W} \quad (5.12)$$

In words, equation (5.12) says that unemployment will increase in the urban sector as a result of a policy change to increase employment if the elasticity of the urban labour supply (by migration) with respect to the urban–rural wage differential exceeds the expected urban–rural wage differential as a proportion of the urban wage times the unemployment rate. Equation (5.12) is clearly testable. It transpires, in fact, that equation (5.12) is satisfied with a very low elasticity. For example, suppose that the actual urban wage is twice the rural wage,¹¹ that the probability of obtaining a job in the urban sector is 0.8 and that the unemployment rate is 10%, then the level of unemployment will increase if the elasticity of the urban labour supply with respect to the expected urban–rural wage differential is 0.03.

Note that the growth of total labour supply as a result of migration ($\partial S/W$) is not the same thing as the rate of growth of migration ($\partial S/S$), so that the elasticity of *supply* with respect to a change in job opportunities is not the same as the elasticity of *migration* with respect to a change in job opportunities. We could, however, convert equation (5.12) into the elasticity of migration with respect to $\partial d/\partial$ by multiplying both sides of equation (5.10) by U/S instead of U/W . This would give:

$$\frac{\partial S/S}{\partial d/d} > \frac{w\pi - r}{w} \frac{U}{S} \quad (5.13)$$

Since the ratio of unemployment to migration (U/S) is much higher than U/W , the elasticity of migration itself would have to be higher than the elasticity of labour supply for unemployment to increase following a job expansion programme. If, as before, we assume that $w/r = 2$, $\pi = 0.8$ and, say, $U/S = 2$, the migration elasticity would have to exceed 0.6 for unemployment to rise. In principle, this elasticity is easy to estimate by specifying a migration function in which migration is a function of the expected urban–rural wage differential, holding constant other factors affecting migration. For an interesting case study on Tanzania, see Barnum and Sabot (1977), who estimate an elasticity of migration with respect to the urban wage itself, holding other things constant, of between 0.7 and 2.0.¹²

Disguised unemployment: types and measurement

We must now examine more critically the classical assumption of unlimited supplies of labour, defined as labour's marginal product below the subsistence wage.

If the marginal product of labour in the rural sector is positive (which is not precluded in Lewis's model as long as it is below the subsistence wage), the withdrawal of labour from the subsistence

sector will reduce total output. To argue that development via unlimited supplies of labour is feasible and relatively painless, one must implicitly assume that the marginal product of labour is virtually zero. The term **disguised unemployment** is usually defined loosely in this way. But the question arises of how workers can survive on the land if their marginal product is zero, or even positive but below subsistence. Who would employ such labour? Would output in the subsistence sector really remain unaffected if substantial quantities of labour migrated? In short, what precisely is meant by the term 'disguised unemployment'? Can it be quantified, and what are we to make of the argument that industrial development in surplus labour economies is a relatively painless process?

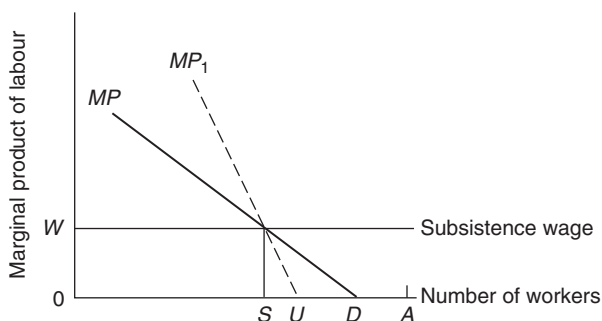
Let us redraw Figure 5.1 from the point of diminishing returns and describe more formally three possible interpretations of the concept of disguised unemployment that are commonly found in the literature. Let A in Figure 5.6 be the actual number of workers employable. One possible measure of disguised unemployment is the difference between A and S , or the gap between the number of workers available for work and the amount of employment that equates the marginal product of labour and the subsistence wage. This is the definition of unlimited supplies of labour in Lewis's model where, if the marginal product of labour is below the subsistence wage, landowners have no interest in retaining these workers and therefore do not compete for them with the industrial sector.

A second possible measure of disguised unemployment is the difference between A and D , or the gap between the actual number of workers available for employment and the level of employment at which the marginal product of labour is zero, which is sometimes referred to as the **static surplus**. This surplus is clearly less than if disguised unemployment is defined as labour with a marginal product below the subsistence wage.

A third measure of disguised unemployment is the difference between the actual number of workers available and the level of employment at which the marginal product of labour would be zero if some change occurred that enabled the same level of output to be produced with fewer workers. This is represented by a pivoting of the marginal product curve to MP_1 . Disguised unemployment is now measured by the difference between A and U , which is sometimes referred to as the **dynamic surplus**. The dynamic surplus clearly embraces many 'types' of disguised unemployment because there are many reasons, particularly in developing countries, why labour productivity may be low and why small changes in technique and organization of production may release substantial quantities of labour.

There are three main ways of ascertaining whether surplus labour exists in the sense that labour's marginal product is zero. The first is to examine instances where substantial numbers of

Figure 5.6 Disguised unemployment



the agricultural labour force have been withdrawn from the land, either to work on some industrialization project or as the result of illness, and to observe whether agricultural output falls or not.

This method was followed by Schultz (1964), who examined the effect of the influenza epidemic in India in 1918–19, which killed approximately 8% of the agricultural labour force. He found that acreage and output during the following year declined, and concluded from this that surplus labour in Indian agriculture did not exist. An important criticism of Schultz's study, however, is that he failed to distinguish between the summer and winter season of the year following the epidemic. Mehra (1966) has shown that summer production, which just followed the epidemic, was not in fact reduced and that the decline in agricultural production in 1919–20 found by Schultz was entirely due to a reduction in the winter crop, which could have resulted from low rainfall. Notwithstanding the criticism, this is one method of approach.

A second method of estimating the static surplus is to take the difference between the labour available and the labour required to produce the current level of agricultural output *with given techniques*, making due allowance for the seasonality of production. The estimate of the magnitude of surplus labour in this case will vary with local conditions, and what is regarded as a normal working day.

A third approach is to estimate agricultural production functions (see Chapter 4) to test whether the elasticity of output with respect to labour input is significantly different from zero. This approach indicates whether or not there is surplus labour, but does not measure its magnitude.

When discussing labour's marginal product in agriculture and the extent of disguised unemployment, two important distinctions need to be made: between harvest and non-harvest time; and between farms that hire labour and those that do not. Within the production function approach, this distinction is easily made explicit and is a fruitful approach for that reason. As far as the distinction between hired and non-hired labour is concerned, the marginal product of family labour is unlikely to be zero if workers are hired, nor can the marginal product of the hired workers be zero if they are paid.

We now turn to the measurement of the **dynamic surplus**, which is the difference between the actual labour employed and the labour required, given some small change in technique (including an increase in the number of hours worked per day).

Unfortunately, those investigators who have measured the dynamic surplus have generally not distinguished between the causes of the surplus, nor made explicit the assumptions on which their estimates of labour requirements are based, and this is a major reason why estimates and opinions differ on the extent and existence of disguised unemployment. If the surplus is measured simply by the difference between the amount of labour that, in the investigator's opinion, should be necessary to produce a given output and the amount of labour that there actually is, this does not distinguish between the different causes of low productivity, such as poor health, lack of incentive, primitive technology or institutional factors. One interesting case study is by Foster and Rosenzweig (2010), who calculate that approximately 20% of the Indian agricultural workforce could be in dynamic surplus based on estimates of the minimum efficient scale of farms measured by the land–labour ratio. Increasing efficiency by expanding farm size could release substantial quantities of labour. The dynamic surplus in this case is related to unspecified barriers to land consolidation.

The simplest reconciliation between those who argue that there is such a phenomenon of disguised unemployment, in the sense of a very low marginal product of labour in agriculture, and those who disagree, is provided by the distinction between **the amount of labour time employed**

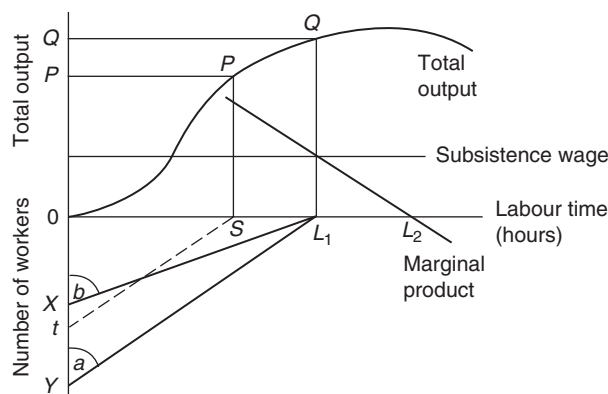
and the number of persons employed. In a wage payment system, it is extremely unlikely that labour would be used up to the point where its marginal product is zero. If the wage is positive, the marginal product will be positive too. But profit-maximizing behaviour is quite consistent with redundant labour. Labour is employed up to the point where the marginal product of a unit of *labour time* is equal to the wage, and **disguised unemployment takes the form of a small number of hours worked per person.** It is not that there is too much labour time but too many labourers spending it. Total output would fall if workers were drawn from the land, unless those remaining worked longer hours to compensate. How much disguised unemployment is estimated to exist depends on what is regarded as a normal working day. Estimates may be subjective, but unlimited supplies of labour exist in the classical sense provided those remaining on the land work harder or longer. Let us illustrate these points diagrammatically.

In Figure 5.7, total output is measured on the vertical axis above the origin, and the amount of labour time on the horizontal axis. Let L_1 be the point where the marginal product of labour time is equal to the subsistence wage corresponding to total output, Q . The number of workers is measured on the vertical axis below the origin, so that the tangent of the angle OYL_1 ($\tan a$) gives the average number of hours worked by each unit of labour. If the tangent of the angle OXL_1 is regarded as the normal length of a working day so that the same output, Q , could be produced by X labour instead of Y , the amount of disguised unemployment would be equal to XY . It can easily be seen that if there was a reduction in the labour force from Y to t and the number of hours worked per worker remained the same (that is, $\tan OtS = \tan OYL_1$), total output would fall from Q to P . If the normal working day is considered to be longer or shorter than the hours given by $\tan b$, the amount of disguised unemployment will be greater or less than XY .

Let us now give a practical example. Suppose a producer employs 10 workers ($Y = 10$), each doing 5 hours' work a day ($\tan a = 5$), and the marginal product of the 50th hour is equal to the subsistence wage ($L_1 = 50$). If one worker leaves (say, Yt), total output will fall from Q to P unless the 9 workers now do the 50 hours' work previously done by 10 workers; that is, the working day must be increased by five-ninths of an hour. The amount of disguised unemployment depends on what is considered to be a full day's work. If 10 hours is considered normal, then only 5 workers would be required to do 50 hours' work and 5 could be regarded as disguised unemployed.

The precise conditions under which the remaining labour force would supply more work effort have been formalized by Sen (1966). If workers are rational, they will work up to the point

Figure 5.7 The dynamic surplus



where the marginal utility of income from work (dU/dL) is equal to the marginal disutility of work (dV/dL). Now the marginal utility of income from work can be expressed as:

$$\frac{dU}{dL} = \frac{dY}{dL} \cdot \frac{dU}{dY} \quad (5.14)$$

where dY/dL is the marginal product of labour and dU/dY is the marginal utility of income. Welfare maximization therefore implies that:

$$\frac{dY}{dL} \cdot \frac{dU}{dY} = \frac{dV}{dL} \quad (5.15)$$

or:

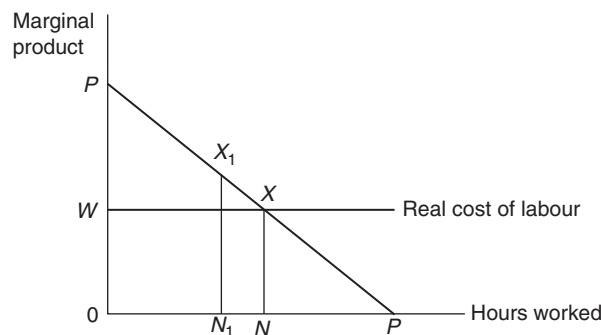
$$\frac{dY}{dL} = \frac{dV}{dY} \div \frac{dU}{dY} = \frac{\text{Marginal disutility of work}}{\text{Marginal utility of income}} \quad (5.16)$$

Sen (1966) defines the ratio of the marginal disutility of work to the marginal utility of income as the **real cost of labour**.

Now consider Figure 5.8. Equilibrium is at N where the marginal product is equal to the real cost of labour. The removal of one worker reduces total output from $OPXN$ to OPX_1N_1 , and marginal product rises from X to X_1 . Equilibrium will be restored again at N if the real cost of labour remains constant – that is, if the ratio of the marginal disutility of work to the marginal utility of income does not increase. If the real cost of labour rises, there will not be full compensation for output lost. In other words, disguised unemployment in the sense of *zero* marginal product (or full compensation for lost output) implies a **non-increasing marginal disutility of work and a non-diminishing marginal utility of income**. Sen (1966) gives a number of reasons why this may be the case for people near subsistence with little work and a lot of leisure; for example, rising aspirations and more public expenditure on things such as education may prevent the marginal utility of income from falling, and higher incomes may prevent the marginal disutility of work from increasing if people are better fed.

The amount of underutilized labour is likely to be greater, the less capitalistic the organization of agriculture. In fact, in the extreme situation of no wage payment system with no competitive

Figure 5.8 Effect of labour withdrawal



pressure and little desire to maximize, the distinction between a unit of labour and a unit of labour time becomes largely redundant, as in the classical model. It is perhaps this type of environment that the originators of the classical model mainly had in mind. In an extended family-type system, for example, the marginal product of both workers and labour time may be below the subsistence wage. It is the *average* product that matters for the group as a whole, not the product of the last worker or hour, and the average product may still be above the subsistence level when the marginal product of labour time is below it. It is difficult to represent both cases on the same diagram, but if the marginal product of labour is zero, the marginal product of labour time is bound to be zero (and probably negative), so we may continue to illustrate the argument in terms of labour time, as in Figure 5.9.

The basis of Figure 5.9 is the same as Figure 5.7. When the marginal product of labour time is zero at L_2 , the average product of labour time is P_1 , or PP_1 in excess of the subsistence wage P . The amount of labour time could be extended to L_3 without the average product of labour time falling below subsistence, and the amount of labour time could be made up of any combination of workers and hours worked. If the number of workers was Y_1 , they could work hours equal to the tangent of OY_1L_3 without the average product of labour time falling below subsistence. Even though the marginal product of labour time, L_2L_3 , is negative, all workers can subsist if the total product is equally shared. A zero or negative marginal product of labour time is not inconsistent with rational worker behaviour if positive utility is attached to work, regardless of the effect on output.

Suppose, as in Figure 5.10, that the marginal product of a unit of labour time is zero after 4 hours' work but the marginal disutility of leisure is still negative at this point. The worker may substitute work for leisure, working, say, 6 hours, despite the fact that the marginal product of labour time is negative after the fourth hour. If such behaviour is observed, the presumption must be that the marginal utility attached to working exceeds the loss of utility resulting from a lower average product. The fact that people receive positive utility from work may partly explain why, in some societies, the time taken to do specific tasks seems to be much longer than in others.

Figure 5.9 Maximum sustainable labour

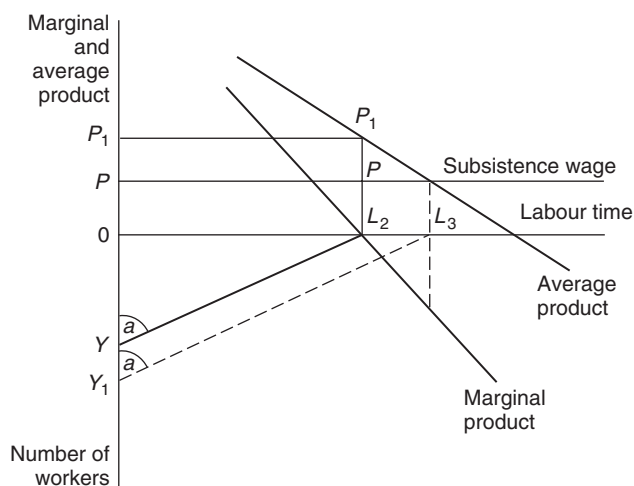
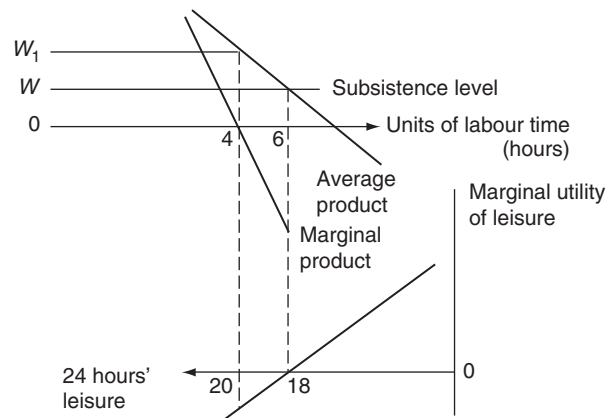


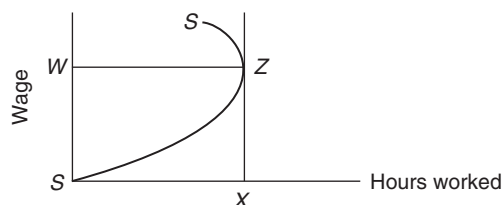
Figure 5.10 The possibility of negative marginal product

Incentives and the costs of labour transfer

Whether workers are willing to work more intensively to compensate for lost production as labour migrates, or whether capital is substituted for labour to raise productivity, requires some discussion of worker motivation and attitudes towards industrialization in general in a predominantly rural society.

Some economic incentive will almost certainly be required to induce agricultural labour to work extra hours. At the least, there will need to be goods with which to exchange their surplus production. It is sometimes argued, however, that peasant producers, accustomed to a traditional way of life, may not respond to such incentives – that their horizons are so limited that they have no desire to increase their surplus either by investing in capital or by working longer hours. The corollary of this argument is that as labour productivity increases, workers will ultimately reduce the number of hours they work. This is the notion of the **backward-bending supply curve of effort**, illustrated in Figure 5.11. SS is the supply curve of effort relating hours worked to the wage, determined by productivity. Total income is equal to the product of hours worked and the wage. Up to income level SWZX, supply responds positively to the wage. Beyond the wage SW, however, fewer hours will be offered. This is the point where the positive substitution effect of work for leisure (leisure is more 'expensive' the higher the wage) is offset by a negative income effect because of low aspirations.

A backward-bending supply curve of effort is not necessarily indicative, however, that peasants work for a fixed income and no more. The total income from work effort will still increase as long

Figure 5.11 Backward-bending supply curve

There is also the question of increased consumption to consider. If the objective of a surplus labour economy is to maximize growth, as opposed to the level of current consumption, the transference of labour will also involve a further 'cost' in terms of increased consumption because there will be a reduction in the size of the capitalist surplus if labour is valued at its opportunity cost. Consider Figure 5.12, which represents the capitalist sector of the economy. On the normal assumption of profit maximization, labour will be employed up to the point where the marginal product of labour is equal to the industrial wage. The capitalist surplus is equal to WN_X . But suppose the supply of labour to the industrial sector is assumed to be 'costless' to society and is given, by the planners, a notional (or shadow) wage of zero. In this planned system, labour would be employed up to the point L_1 . Given the industrial wage, W , and assuming the propensity to consume out of wages is unity, each additional unit of labour employed beyond L will involve consumption in excess of production. If LL_1 additional labour is employed, the size of the investible surplus would be reduced by XX_1L_1 . It follows that in an economy geared to growth, the relationship between the consumption and production of migrant labour must also be taken into account when estimating the costs to society of industrial expansion with surplus labour from agriculture. If, at the margin, additional saving is valued more than an additional unit of consumption, the cost of a unit of labour transferred from agriculture to industry must include an allowance for increased consumption.

The graph illustrates the relationship between the marginal product of labour and the industrial wage. The vertical axis represents the 'Marginal product' and the horizontal axis represents 'Units of labour'. A downward-sloping curve represents the 'Marginal product'. A horizontal line at wage W intersects the curve at point X , which corresponds to labour level L . A higher wage W_1 intersects the curve at point X_1 , which corresponds to labour level L_1 . The origin is marked 0 .

Summary

- Agriculture plays a crucial role in the early stages of a country's economic development. A surplus of agricultural output over subsistence needs – a marketable surplus – is required to feed labour in alternative activities, to release labour and to provide capital for investment in industry, to buy other domestically produced goods, and to provide foreign exchange to buy imports.
- A necessary condition for agriculture to make these various contributions to economic development is an increase of productivity in agriculture. Agricultural productivity is extremely low in most developing countries, which accounts for why so many people are so poor.
- There are several reasons for low agricultural productivity, including poor geographic and climatic conditions, a lack of investment and knowledge, the land tenure system, and urban bias in the allocation of resources for health, education and infrastructure.
- Land reform is needed in many countries in order to break up large inefficient estates, and to provide tenants with security of tenure so that they have the incentive to invest in new inputs.
- Attention needs to be paid to the pricing of agricultural goods to encourage a supply response in agriculture.
- The transformation of traditional agriculture requires new inputs such as new varieties of seeds and proper irrigation. Genetically modified (GM) food is a matter for debate. Finance for the purchase of new inputs is crucial.
- As productivity in agriculture rises, the agricultural sector and other sectors of the economy become more and more interdependent. Industrial growth can be fuelled by the release of cheap labour from agriculture. This is the essence of Arthur Lewis's model of 'economic development with unlimited supplies of labour'. The reinvestment of industrial profits drives industrial expansion.
- But industry needs a market for its goods, so the purchasing power of the agricultural sector is important. It is vital to get the terms of trade right between agricultural and industrial goods, if the growth of the economy is not to be demand constrained if the prices of agricultural goods are too low, or supply constrained because the prices are too high.
- Surplus labour on the land has led to a vast rural–urban migration process, which is swelling the amount of unemployment and underemployment in the cities of developing countries. Todaro's model of rural–urban migration explains why migration is still so high despite the low probability of getting a job in the urban area.
- There are many different definitions of surplus labour, or different measures of so-called 'disguised unemployment'. The most important distinction is between the static surplus, which assumes that the marginal product of labour is zero, and the dynamic surplus, which is the amount of labour that could be released without agricultural output falling, providing some small compensating changes take place such as the remaining labour working longer hours or small improvements in techniques of production, which raise labour productivity.
- The transfer of labour from agriculture to industry or from rural to urban areas is not a costless process either for individuals or society at large. The economic and social costs of congestion and overcrowding in urban areas are particularly acute.

Appendix: the functioning of markets in agrarian societies¹³

In mature developed countries, markets tend to be specialized; the markets for land, labour and credit are segmented. Each market has its own set of institutions, which have their own specialized function. In developing countries, at least in poor rural communities, markets are different;

transactions of all kinds are interlinked, with the terms of one transaction contingent on another. **The land, labour and credit markets are interlocked.** For example, landlords might provide credit to tenants and labourers in the slack season, when there is no income being generated, in return for a specific amount of labour in the peak season; or traders may grant credit to farmers in return for a specific amount of their crop at a pre-agreed discount price. These interlinked transactions make many of the markets very imperfect, not least because they create serious barriers to the entry of new agents, and inefficiency in one market may be the cause, or consequence, of imperfections in another. Inefficiencies arise through lack of information, lack of incentives, the inability to enforce contracts and so on. Imperfect and inefficient markets are a characteristic feature of the economic functioning of poor developing economies, and they are the basis of informal institutional arrangements that govern economic behaviour in rural societies.

Below, there are separate discussions on the markets for land, labour and credit, but as we go along, we will see how they interlock. What we shall find is that the contract choices made by peasant farmers depend on the technological, economic and social conditions that exist in different environments, which determine risks and transaction costs. Agricultural production has three distinguishing features: production is subject to uncertainty, production is seasonal and hired labour is required, and the costs of supervising labour are high. These all play a part in determining the institutional arrangements and types of contracts reached in different markets.

The land market

One of the characteristics of the market for land is that the volume of land transactions (buying and selling) relative to the stock of land is low. This has to do with the very inequalitarian ownership of land in poor countries, and a lack of property rights for a large number of people who work on the land. The high concentration of land ownership in a few hands, and lack of access to land, can have serious consequences for the overall development of an economy. Land may not be used efficiently, large tracts of land may not be fully utilized, food production is likely to be below potential, and those who might want to farm and work the land become migrants to already overcrowded cities.

The concentration of land, and the size distribution of farms, differ across continents. Latin America has by far the highest concentration of land ownership, with Gini ratios of over 0.8 in countries such as Brazil, Peru, Uruguay, Colombia and Venezuela. In Asia, the concentration is less, but still high – with a Gini ratio in excess of 0.4 in Bangladesh, India, Thailand, Indonesia and Nepal. Latin America, unsurprisingly, also has the largest farms. The proportion of small farms of less than 5 hectares is less than 50% on average, and covers only 2% of the total land area. Ninety per cent of land is cultivated on farms in excess of 50 hectares. In Asia, by contrast, 90% of farms are less than 5 hectares, occupying over 50% of farmland. The figures on land concentration and farm size are summarized in Table A5.1. In Africa, the situation differs because much of the land is communally owned. The predominant form of farming is subsistence agriculture based on the village. On large tracts of land, there is also shifting cultivation, although this type of farming is now on the decline because of increased pressure of population on food supplies. It has been replaced by small owner-occupied plots. There is virtually no sharecropping with large landlords.

There are not many economies of scale in farm production. In fact, it turns out that small farms produce a higher output per hectare than large farms (see Sen, 1964; Ray, 1998). One explanation is that labour is used more intensively on small (family-owned) farms because the opportunity cost of using labour is very low, whereas large farms hire labour and pay a market wage, which leads to a lower input of labour per unit of land. Owner-occupied farms using family labour are

always found to be more productive than large mechanized farms using hired labour, or tenant farms with no property rights, because the incentive to be efficient is greater (see Binswanger and Deininger, 1997).

If small owner-occupied farms are more productive than large farms, there would be an efficiency or productivity gain if large landowners were to sell their land to small family units and appropriate the surplus. But the market for land doesn't work in this rational way. First, land confers power, and can be used as collateral for other purposes. Second, in practice, most land sales are not from rich to poor, but from poor to rich because the poor often have to sell land in order to pay debts and survive, and they are credit constrained (see later). This matters for efficiency if tenants and sharecroppers replace owner-operated family farms. This is a collective action problem and the only solution is state involvement in **land reform**, which transfers land compulsorily from rich to poor.

Land reform can take three main forms:

1. The transfer of land from landowners to tenants who already work the land, as happened historically in South Korea, Japan and Taiwan. South Korea is an interesting case where land reform took place when the country ceased to be a Japanese colony in 1949. Over one-half of agricultural land owned by Japanese and large domestic landowners was transferred to over 60% of the rural population comprising tenant farmers.
2. The transfer of large estates to smaller farms, as happened in Mexico after the revolution in 1917.
3. The expropriation and break-up of large estates for new settlements, as in some countries in Africa in recent times, but often with disastrous results, as in Kenya and Zimbabwe.

Table A5.1 Land concentration and farm size in Asia and Latin America

Countries	Gini ratio of land concentration	Percentage of farms and farmland				Percentage of sharecroppers or tenants
		Below 5 hectares		Above 50 hectares		
Asia		Farms	Area	Farms	Area	
Bangladesh	0.42	90.6	62.6	–	–	91
India	0.62	88.7	46.7	0.1	3.7	48
Indonesia	0.56	92.9	68.7	0	13.6	60
Nepal	0.56	97.2	72.1	0	0.8	48.3
Philippines	0.51	84.8	47.8	0.2	13.9	79.3
Thailand	0.45	72.3	39.4	0	0.9	29
Latin America						
Brazil	0.84	36.8	1.3	16.3	84.6	–
Costa Rica	0.82	48.9	1.9	14.5	79.7	9.4
Colombia	0.86	59.6	3.7	8.4	77.7	49.4
Peru	0.91	78	8.9	1.9	79.1	0
Uruguay	0.82	14.3	0.2	37.6	95.8	4.7
Venezuela	0.91	43.8	0.9	13.6	92.5	–

Source: Otsuka et al., 1992.

Historically, most land reforms have taken place at the same time as political change, which has transferred power from corrupt elites to 'the people' through the creation of democratic institutions. Land reform is an important institutional change conferring property rights and providing incentives to invest.

Where tenant farmers exist, arrangements between tenants and landlords vary in different parts of the world. In Latin America, tenants tend to pay a fixed rent to the landlord for the right to cultivate, but retain 100% of the output. In Asia, tenants tend to be **sharecroppers**, sharing output with the landlord on an agreed percentage basis, depending on circumstances, usually 50:50. With fixed rent contracts, the tenant bears the risk of fluctuations in output. Poor farmers, however, are risk averse, and so they tend to be sharecroppers, sharing the risk with the landlord. It is often argued that sharecropping is inefficient compared with fixed rent tenancies because work incentives are weaker. With fixed rents, tenant farmers keep any extra output produced, whereas sharecroppers have to relinquish a certain share, and thus there will be a tendency for sharecroppers to undersupply effort (unless, of course, their work can be costlessly observed and enforced by the landlord). The empirical evidence shows (see Ray, 1998), however, that productivity on tenant-owned land is higher than on sharecropped land, controlling for other factors.

The question then arises: If sharecropping is inefficient, why is it so widely practised? The answer is that it can be beneficial to landowner and farmer by reducing the risks and costs to both. Stiglitz (1974) was the first to show formally that sharecropping reflects a compromise between risk-sharing and work incentives. From the landlord's point of view, they can use a sharecropping contract as a screening device to choose between more wealthy, high-productivity tenants and poorer, lower productivity tenants – the former receiving the fixed rent contracts and the latter receiving the sharecropping contracts. Also sharecropping is cheaper, compared with self-cultivation using hired labour. Labour recruitment, and the supervision of labour effort, can be costly. This is a classic **principal–agent** example, where the interests of the landowner and the worker differ. The principal (the landowner) naturally wants as much effort and output as possible, but work effort generates disutility and the worker may shirk. The landowner has no way of knowing how much of a worker's output is dependent on their effort and how much on exogenous factors. The principal cannot easily monitor and enforce the work effort they want without employing supervisory staff. Sharecropping may also be the preferred contract if input costs are being shared between landlord and tenant. Cost-sharing inputs is a way of offsetting disincentive effects of applying inputs under output-sharing contracts (Otsuka et al., 1992). Cost-sharing can be thought of as production loans to the tenant, which are repaid with the output, which is deducted from total output before the output is shared.

From the tenants' point of view, not paying a fixed rent considerably reduces risk because in the event of a bad harvest, tenants could find themselves in considerable difficulties, with their livelihood threatened. Landlords also know this. For the landlords, they can vary the share they get in order to get the same income as a fixed rent, taking good and bad years together. In fact, in recent years, the tenant's share has been falling because landlords have been bearing the cost of increased mechanization. But greater overall efficiency will only come with giving sharecroppers a greater share of output, to induce more effort, and providing security of tenure on the land to provide tenants themselves with the incentive to invest.

The labour market

There are two main types of labour working in the rural sector of developing countries. The first is **casual labour**, hired on a daily basis and paid either a daily wage or 'piece rates' for specific tasks. Large landowners need more than family labour to work on their large estates, and if people are

landless, or possess only very small farms, they need to earn extra income for nutrition and survival. The second type of labour is **permanent labour** hired by landlords on long-term contracts. The function of the two types of labour is different. Casual labour is used for routine tasks that are easily monitored. It will need a minimum income in order to have enough nutrition and energy to work productively – the so-called **efficiency wage**. If the labour is landless and has no other source of income, this is the minimum wage that will be paid. If the labour has other sources of income, however, either from a small farm or other assets, it can supply labour at a lower threshold wage because the other income buys the nutrition it needs. On the other hand, as non-labour income rises, the minimum at which labour is willing to work rises because it values leisure more highly. Thus, there are conflicting forces working in the labour market (Ray, 1998). At low levels of non-labour income, the availability to work for a lower wage rate dominates, while at higher levels of non-labour income, the willingness to work dominates. This gives rise to two types of unemployment, or categories of surplus labour, in rural areas. The first category is 'voluntary' unemployment among labour able to work but who do not want to because of high non-labour income. The second category is 'involuntary' because the wage rate is not high enough to enable labour to work productively. In these circumstances, land reform and income distribution would increase total agricultural output, because if the landless are given land, the increase in their non-labour income will increase their ability to work, and a lower level of income for the previously more 'wealthy' will increase the incentive to work. The necessity to pay a minimum efficiency wage is one of the reasons why wages tend to be rigid downwards in rural economies, despite unemployment. Another explanation is the phenomenon of **segmented labour markets**, with village employers hiring local labour even when it is cheaper outside. Institutions and social norms often determine economic outcomes, not the free forces of the marketplace.

The main drawback of the casual labour market from the point of view of economic development is that employers of labour (landlords) have no interest in improving the working conditions of workers or investing in them by way of health or education, because there is no guarantee that they will reap the benefits. Ray (1998) commented, 'a casual labour market creates a deterioration in the nutritional status of the workforce'. The function of permanent labour, and the argument for more permanent labour contracts, is that a lot of agricultural work needs supervising and large landowners require people to supervise and monitor work. One facet of permanent labour is **labour-tying**, which, because of the seasonal nature of production, suits employer and employee. The employer is guaranteed labour in the busy season and the worker is guaranteed work in the off-season. The wage paid to permanent labour will be some margin above the casual wage to provide the incentive to monitor and supervise tasks properly. The premium must be just enough to prevent 'shirking', and also to compensate for the threat of dismissal.

Another way of enforcing work effort is to offer long-term contracts, so that a party not honouring a contract will suffer **loss of reputation**, and find it difficult to work in the future. In small rural communities, reputation matters. If long-term fixed wage contracts can elicit loyal effort from permanent workers, they may also receive fringe benefits and subsidized credit in return.

According to Ray (1998), however, the amount of permanent labour used on farms relative to casual labour has been falling in recent years. One reason may be that because of multiple cropping, the seasonality of production has decreased, and therefore there is less need to offer permanent contracts to ensure labour is available in the harvest season. Second, if the casual wage in the harvest season is above the contracted income for permanent labour, it is difficult to enforce 'tied contracts'.

We can summarize this section on labour contracts by saying that when work effort is unenforceable, there are three basic predictions from a standard model of landlord and workers both attempting to maximize their utility in the face of production uncertainty and risk (Otsuka et al., 1992):

- If production is uncertain and the worker is risk averse, the share contract will be optimal. (If the worker is risk neutral, which is highly unlikely, the fixed rent contract would be chosen.)
- A share or fixed rent tenancy is superior to a fixed wage permanent labour contract because the latter is costly, but long-term and interlinked contracts may be observed because they can help to enforce contracts through reputation effects. Permanent labour contracts will also be observed if land tenancy is illegal.
- A share tenancy is less efficient than a fixed rent tenancy and owner cultivation because of reduced work incentives (unless labour can be monitored costlessly).

Where work effort is perfectly enforceable, optimal contracts are, in general, indeterminate. If the worker is risk neutral and contract enforcement is costless, all forms of contract become equally efficient. If both landlord and workers are risk averse, the share contract will be chosen to share production risk.

Credit markets

Farmers need credit for three main reasons: first, for fixed capital investment; second, to bridge the gap between financing production (seeds, fertilizers, pesticides) and sales receipts from the harvest (in other words, they need working capital); and third, to smooth consumption before the harvest.

Credit markets in the rural sector of developing countries are not well developed, however, for two main reasons. First, due to lack of information, it is difficult for lenders to monitor loans, to know how risky they are, and whether they are going to be used productively. Second, credit contracts are difficult to enforce because the legal system is weak, therefore there is the risk of default. This makes the formal banking sector reluctant to lend to the rural sector. The risk of default means that the formal sector only lends to richer farmers with collateral. The poor may have some collateral in the form of a plot of land, but the formal banking system wants something more.

This means that the rural credit market is dominated by **informal moneylenders**, charging high interest rates either explicit in the form of high money rates of interest, or implicit because the loan is given in return for a share of the borrower's output at a discount price, or an agreed amount of labour service at a lower-than-market wage. The rural credit market is also very segmented. Because moneylenders have much more knowledge of borrowers within a local community, moneylenders tend to become very specialized, dealing with a particular clientele within a village or serving a particular type of person. Segmentation often takes place on occupational lines. Because of these links, lenders in informal markets do not like their borrowers borrowing from another lender, so the existence of many lenders does not necessarily mean there is competition. Rather, the credit market is more like a series of local monopolies, and because of this segmentation, interest rates on loans in the informal market are not only high but can also vary considerably. There is little chance of arbitrage.

High interest rates largely reflect lenders' risk; that is, the risk that the borrowers might not repay either because of adverse circumstance, such as a bad harvest, or because of the difficulties of collecting bad debts. Potential default exists, but in practice, it turns out to be quite low. One reason is that in rural communities where everybody knows each other, if someone defaults,

everybody knows and no one else will lend to them. There is 'peer' pressure to repay. The second reason is that moneylenders devise contracts that minimize the risk of default, which also makes the implicit interest rate high. If the lender is a large landowner, and the landowner knows the farmer, they can minimize the risk of default by making the first claim on the borrower's output, or insist that the borrower supplies labour at a lower-than-market wage (**bonded labour**). If the lender is a trader, they can minimize risk by contracting to buy the output of the borrower at a discount price. Udry (1994) found that over 90% of loans to the rural sector in Northern Nigeria came from the informal sector. Research in the Punjab and Sindh regions of Pakistan shows that landlords are the major source of credit for tenant farmers, while traders are the major source of credit for owner-cultivators (Ray, 1998).

Even though risk of default can be minimized by various practices, credit-rationing still exists because high interest rates may attract too many high-risk customers, and high interest rates, which would equilibrate the supply and demand for loans, would themselves increase the risk of default. Lenders therefore prefer to ration credit instead.

There is also the issue of risk and insurance to consider. Agricultural production is risky because of the vagaries of the weather, the incidence of disease and many other factors. Peasant farmers somehow need to be able to smooth their income and consumption, so as not to suffer unduly in bad times. This is where insurance mechanisms are important. Self-insurance is one possibility, smoothing consumption using one's own resources; for example, saving grain in good times for use in bad. Mutual insurance is another possibility. If farmers produce different products, and good and bad harvests for different crops are negatively correlated, producers can help each other out in what are bad times for some and good times for others. But mutual insurance may not be easily enforceable. There could be risk pooling within a community through formal insurance markets, but these are not well developed. If there is not risk pooling or mutual insurance, saving and credit have to be used for consumption smoothing. There is evidence from a wide variety of studies (see Bardhan and Udry, 1999) that households in poor, risky agricultural environments engage in risk pooling and consumption smoothing, although not always successfully because of informational and enforcement difficulties.

Interlinked markets

As we have indicated above, the markets for land, labour and credit in the rural sector of developing countries are closely interlinked. Inefficiency in one market may be both the cause and consequence of inefficiencies in others. The markets for land and labour are interlinked because an imbalance in the market for land (with both large and small holdings) leads to imbalances in the market for labour. If people are landless, or have only very small holdings, they need to sell their labour to large landowners who need more than just family labour.

The markets for land and credit are linked because, as we have outlined before, landlords are a major source of credit for farmers, and their labour or output is used as collateral. Also crop-traders are the main source of credit for cultivators who own land, and loans are provided in advance of crop production. In Muslim countries, where charging interest is against Sharia law, credit contracts, which take part of the output of the borrower, or specify the sale of the output at a certain discount, are a substitute for charging interest.

Floro and Yotopoulos (1991), in their study of the Philippines, identify five types of credit market interlinkages:

1. Credit in return for the procurement of output.
2. Credit in return for the sale of output to the lender.

3. Credit tied to the purchase of inputs or leasing machinery from the lender.
4. Credit in return for provision of labour to the lender.
5. Transfer of rights over the usufruct (profits) of the land to the lender.

Floro and Yotopoulos (1991) find that the first three types of interlinkages are most common among trader lenders, while the last two are most prevalent among farmer lenders.

In conclusion, in rural communities where formal lending is limited by lack of proper collateral, interlinked contracts in the informal money market make sense because the lender has more control over the borrower and saves the cost of monitoring, and reduces the risk of non-repayment. Landlords, or traders, in effect, get their 'interest' immediately if loans are conditional on work for lower wages or output at lower prices.

Institutions and decision-making in agriculture

Agriculture is a neglected sector of the economy in many developing countries, and governments pursue policies that discriminate against agriculture in favour of industry. The explanation is partly historical, but mainly institutional and political. The agricultural sector's potential for collective action is weak because of the unequal relation between landlords and workers and the weak bargaining power that the agricultural sector has vis-à-vis other groups in society due to history and initial conditions. It is difficult for owner-operated family farms to act collectively to change things because farmers are dispersed and lack political clout. If peasant farmers lack education and cannot vote, they lack the means to promote change. Only by enhancing the poor's potential for collective action, by increasing their potential participation, will there be increased efficiency and sustained and equitable growth in the rural sector (Binswanger and Deininger, 1997).

Chapter 5

Discussion questions

1. What is the importance to economic development of rapid productivity growth in agriculture?
2. What factors hold back productivity growth in agriculture?
3. How could land reform help to raise agricultural productivity?
4. What is meant by 'marketable surplus'?
5. Explain why poor people tend to be risk averse and reluctant to innovate.
6. In what sense is there disguised unemployment on the land?
7. Does disguised unemployment on the land mean that development using surplus labour is a relatively painless and costless process?
8. Compare and contrast the main features of Lewis's classical model of development with the neoclassical model.
9. Explain the continued process of rural–urban migration despite growing unemployment in urban areas.
10. In what ways do the agricultural and industrial sectors of an economy complement one another?

Chapter 5

Discussion questions – continued

11. What are the major characteristics of the market for land in the rural sector of developing countries?
12. What is the principal-agent problem facing landlords in the rural sector of poor countries?
13. Why is sharecropping so common in the agricultural sector of many poor countries?
14. In what ways is the credit market linked to the land and labour markets in the rural sector of poor countries?

Notes

1. For excellent surveys of the issues, see Bardhan (1984), Binswanger and Deininger (1997), Dorner (1992), Otsuka et al. (1992) and Lipton (2011).
2. See also Askari and Cummings (1976) and Schiff and Montenegro (1997).
3. See also the symposium on the Lewis model to celebrate its 25th anniversary in the *Manchester School*, September 1979, Kirkpatrick and Barrientos (2004); the symposium on the Lewis model after 50 years, *Manchester School*, December 2004, and Gollin's 60 retrospective in *Journal of Economic Perspectives*, Summer 2014.
4. The capitalist sector is not synonymous with the industrial sector, but it is convenient to think of it in this way. Agribusiness, for example, is also capitalist.
5. The profit rate can be expressed as

$$P/K = \frac{(O/L - w/p)}{(K/L)}$$

where P is profits, K is the quantity of capital, O/L is the productivity of labour, w/p is the real wage and K/L is the capital–labour ratio. The profit rate will rise if O/L rises and w/p remains the same (assuming no offsetting rise in K/L).

6. A formal algebraic model, with various extensions, can be found in Thirlwall (1986).
7. If the income elasticity of demand for industrial goods is greater than unity, and for agricultural goods less than unity, then the equilibrium growth rate for industry will exceed that for agriculture.
8. See Weisdorf (2006) for historical evidence on how industrial growth promoted agriculture by lowering the relative price of industrial goods and buying more goods commercially rather than producing 'non-agricultural' goods within the agricultural sector itself.
9. This is not a statistical probability, since π is not bounded between zero and unity. The 'chance' of getting a job would be a better word to use.
10. Todaro (1971) uses the same notation, S , for the total urban labour force as for the supply of migrants. This can be confusing. We therefore use W for the total urban labour force and S for the supply of migrants.
11. Any values can be substituted as long as $w/r = 2$.
12. Other early studies of the rural–urban migration process include Knight (1972). For a survey of studies, see Todaro (1976), Yap (1977) and Stark (1991). Todaro gives an alternative way of evaluating whether urban unemployment will rise or not. It can be shown that the *level* of unemploy-

ment will rise if $\eta > g \times N/S$, where η is the period elasticity of induced migration with respect to the change in modern sector job probabilities, g is the growth of urban employment prior to the increase in job opportunities, N is the level of urban employment and S is the existing level of rural–urban migration. It can also be shown that the rate of urban unemployment will rise if $\eta > g \times W/S$, where W is the urban workforce.

13. This section relies heavily on the works of Otsuka et al. (1992), Binswanger and Deininger (1997), Ray (1998) and Bardhan and Udry (1999).

Websites on agriculture

Food and Agricultural Organization www.fao.org/home/en/

International Food Policy Research Institute www.ifpri.org

Consultative Group on International Agricultural Research www.cgiar.org

Inter-American Institute for Cooperation on Agriculture www.iica.int/en

International Rice Research Institute www.irri.org

International Maize and Wheat Improvement Center www.cimmyt.org