3

Classic Theories of Economic Growth and Development

There is no Economic Theory of Everything,

—Robert Solow, Nobel laureate in economics

[In] modern economic growth…the rate of structural transformation of the economy is high.

—Simon Kuznets, Nobel laureate in economics

Every nation strives after development. Economic progress is an essential component, but it is not the only component. As noted in Chapter 1, development is not purely an economic phenomenon. In an ultimate sense, it must encompass more than the material and financial side of people's lives, to expand human freedoms. Development should therefore be perceived as a multidimensional process involving the reorganization and reorientation of entire economic and social systems. In addition to improvements in incomes and output, it typically involves radical changes in institutional, social, and administrative structures as well as in popular attitudes and even customs and beliefs. Finally, although development is usually defined in a national context, its more widespread realization may necessitate modification of the international economic and social system as well.

In this chapter, we explore the historical and intellectual evolution in scholarly thinking about how and why development does or does not take place. We do this by examining four major and often competing development theories. You will see that each offers valuable insights and a useful perspective on the nature of the development process. Some newer models of development and underdevelopment draw eclectically on the classic theories, and we consider them in Chapter 4.

Approaches to the analysis of economic growth are introduced throughout this review of alternative theories of development and are then amplified in three chapter appendixes.

3.1 Classic Theories of Economic Development: Four Approaches

The classic post–World War II literature on economic development has been dominated by four major and sometimes competing strands of thought: (1) the linear-stages-of-growth model, (2) theories and patterns of structural change, (3) the international-dependence revolution, and (4) the neoclassical, free-market counterrevolution. In recent years, an eclectic approach has emerged that draws on all of these classic theories.

Theorists of the 1950s and 1960s viewed the process of development as a series of successive stages of economic growth through which all countries must pass. It was primarily an economic theory of development in which the right quantity and mixture of saving, investment, and foreign aid were all that was necessary to enable developing nations to proceed along an economic growth path that had historically been followed by the more developed countries. Development thus became synonymous with rapid, aggregate economic growth.

This linear-stages approach was largely replaced in the 1970s by two competing schools of thought. The first, which focused on theories and patterns of structural change, used modern economic theory and statistical analysis in an attempt to portray the internal process of structural change that a "typical" developing country must undergo if it is to succeed in generating and sustaining rapid economic growth. The second, the international-dependence revolution, was more radical and more political. It viewed underdevelopment in terms of international and domestic power relationships, institutional and structural economic rigidities, and the resulting proliferation of dual economies and dual societies both within and among the nations of the world. Dependence theories tended to emphasize external and internal institutional and political constraints on economic development. Emphasis was placed on the need for major new policies to eradicate poverty, to provide more diversified employment opportunities, and to reduce income inequalities. These and other egalitarian objectives were to be achieved within the context of a growing economy, but economic growth per se was not given the exalted status accorded to it by the linear-stages and structural-change models.

Throughout much of the 1980s and 1990s, a fourth approach prevailed. This neoclassical (sometimes called *neoliberal*) counterrevolution in economic thought emphasized the beneficial role of free markets, open economies, and the privatization of inefficient public enterprises. Failure to develop, according to this theory, was not due to exploitive external and internal forces as expounded by dependence theorists. Rather, it was primarily the result of too much government intervention and regulation of the economy. Today's eclectic approach draws on all of these perspectives, and we will highlight the strengths and weaknesses of each.

3.2 Development as Growth and the Linear-Stages Theories

When interest in the poor nations of the world really began to materialize following World War II, economists in the industrialized nations were caught

off guard. They had no readily available conceptual apparatus with which to analyze the process of economic growth in largely agrarian societies that lacked modern economic structures. But they did have the recent experience of the Marshall Plan, under which massive amounts of U.S. financial and technical assistance enabled the war-torn countries of Europe to rebuild and modernize their economies in a matter of years. Moreover, was it not true that all modern industrial nations were once undeveloped agrarian societies? Surely their historical experience in transforming their economies from poor agricultural subsistence societies to modern industrial giants had important lessons for the "backward" countries of Asia, Africa, and Latin America. The logic and simplicity of these two strands of thought—the utility of massive injections of capital and the historical experience of the now developed countries—was too irresistible to be refuted by scholars, politicians, and administrators in rich countries, to whom people and ways of life in the developing world were often no more real than UN statistics or scattered chapters in anthropology books. Because of its emphasis on the central role of accelerated capital accumulation, this approach is often dubbed "capital fundamentalism."

Rostow's Stages of Growth

Stages-of-growth model of development A theory of economic development, associated with the American economic historian Walt W. Rostow, according to which a country passes through sequential stages in achieving development.

The most influential and outspoken advocate of the **stages-of-growth model of development** was the American economic historian Walt W. Rostow. According to Rostow, the transition from underdevelopment to development can be described in terms of a series of steps or stages through which all countries must proceed. As Rostow wrote in the opening chapter of *The Stages of Economic Growth:*

> This book presents an economic historian's way of generalizing the sweep of modern history.…It is possible to identify all societies, in their economic dimensions, as lying within one of five categories: the traditional society, the preconditions for takeoff into self-sustaining growth, the take-off, the drive to maturity, and the age of high mass consumption.…These stages are not merely descriptive. They are not merely a way of generalizing certain factual observations about the sequence of development of modern societies. They have an inner logic and continuity.…They constitute, in the end, both a theory about economic growth and a more general, if still highly partial, theory about modern history as a whole.[1]

The advanced countries, it was argued, had all passed the stage of "takeoff into self-sustaining growth," and the underdeveloped countries that were still in either the traditional society or the "preconditions" stage had only to follow a certain set of rules of development to take off in their turn into self-sustaining economic growth.

Harrod-Domar growth model A functional economic relationship in which the growth rate of gross domestic product (g) depends directly on the national net savings rate (s) and inversely on the national capital-output ratio (c).

One of the principal strategies of development necessary for any takeoff was the mobilization of domestic and foreign saving in order to generate sufficient investment to accelerate economic growth. The economic mechanism by which more investment leads to more growth can be described in terms of the **Harrod-Domar growth model**,[2] today often referred to as the AK model because it is based on a linear production function with output given by the capital stock K times a constant, often labeled A. In one form or another, it has frequently been applied to policy issues facing developing countries, such as in the two-gap model examined in Chapter 14.

The Harrod-Domar Growth Model

Every economy must save a certain proportion of its national income, if only to replace worn-out or impaired capital goods (buildings, equipment, and materials). However, in order to grow, new investments representing net additions to the capital stock are necessary. If we assume that there is some direct economic relationship between the size of the total capital stock, K, and total GDP, Y—for example, if \$3 of capital is always necessary to produce an annual \$1 stream of GDP—it follows that any net additions to the capital stock in the form of new investment will bring about corresponding increases in the flow of national output, GDP.

Suppose that this relationship, known in economics as the **capital-output ratio**, is roughly 3 to 1. If we define the capital-output ratio as k and assume further that the national **net savings ratio**, s, is a fixed proportion of national output (e.g., 6%) and that total new investment is determined by the level of total savings, we can construct the following simple model of economic growth:

Capital-output ratio A ratio that shows the units of capital required to produce a unit of output over a given period of time.

Net savings ratio Savings expressed as a proportion of disposable income over some period of time.

1. Net saving (S) is some proportion, s, of national income (Y) such that we have the simple equation

$$S = sY \tag{3.1}$$

2. Net investment (I) is defined as the change in the capital stock, K, and can be represented by ΔK such that

$$I = \Delta K \tag{3.2}$$

But because the total capital stock, K, bears a direct relationship to total national income or output, Y, as expressed by the capital-output ratio, c,[3] it follows that

$$\frac{K}{Y} = c$$

or

$$\frac{\Delta K}{\Delta Y} = c$$

or, finally,

$$\Delta K = c\Delta Y \tag{3.3}$$

1/c is a measure of the efficiency of capital utilization.

3. Finally, because net national savings, S, must equal net investment, I, we can write this equality as

$$S = I \tag{3.4}$$

But from Equation 3.1 we know that $S = sY$, and from Equations 3.2 and 3.3 we know that

$$I = \Delta K = c\Delta Y$$

It therefore follows that we can write the "identity" of saving equaling investment shown by Equation 3.4 as

$$S = sY = c\Delta Y = \Delta K = I \tag{3.5}$$

or simply as

$$sY = c\Delta Y \tag{3.6}$$

Dividing both sides of Equation 3.6 first by Y and then by c, we obtain the following expression:

$$\frac{\Delta Y}{Y} = \frac{s}{c} \tag{3.7}$$

Note that the left-hand side of Equation 3.7, $\Delta Y/Y$, represents the rate of change or rate of growth of GDP.

Equation 3.7, which is a simplified version of the famous equation in the Harrod-Domar theory of economic growth, states simply that the rate of growth of GDP ($\Delta Y/Y$) is determined jointly by the net national savings ratio, s, and the national capital-output ratio, c. More specifically, it says that in the absence of government, the growth rate of national income will be directly or positively related to the savings ratio (i.e., the more an economy is able to save—and invest—out of a given GDP, the greater the growth of that GDP will be) and inversely or negatively related to the economy's capital-output ratio (i.e., the higher c is, the lower the rate of GDP growth will be). Equation 3.7 is also often expressed in terms of gross savings, s^G, in which case the growth rate is given by

$$\frac{\Delta Y}{Y} = \frac{s^G}{c} - \delta \tag{3.7'}$$

where δ is the rate of capital depreciation.[4]

The economic logic of Equations 3.7 and 3.7′ is very simple. To grow, economies must save and invest a certain proportion of their GDP. The more they can save and invest, the faster they can grow. But the actual rate at which they can grow for any level of saving and investment—how much additional output can be had from an additional unit of investment—can be measured by the inverse of the capital-output ratio, c, because this inverse, $1/c$, is simply the output-capital or output-investment ratio. It follows that multiplying the rate of new investment, $s = I/Y$, by its productivity, $1/c$, will give the rate by which national income or GDP will increase.

In addition to investment, two other components of economic growth are labor force growth and technological progress. The roles and functioning of these three components are examined in detail in Appendix 3.1. In the context of the Harrod-Domar growth model, labor force growth is not described explicitly. This is because labor is assumed to be abundant in a developing-country context and can be hired as needed in a given proportion to capital investments (this assumption is not always valid). In a general way, technological progress can be expressed in the Harrod-Domar context as a decrease in the required capital-output ratio, giving more growth for a given level of investment, as follows from Equation 3.7 or 3.7′. This is obvious when we realize that in the longer run, this ratio is not fixed but can change over time in response to the functioning of financial markets and the policy environment. But again, the focus was on the role of capital investment.

Obstacles and Constraints

Returning to the stages-of-growth theories and using Equation 3.7 of our simple Harrod-Domar growth model, we learn that one of the most fundamental strategies of economic growth is simply to increase the proportion of national income saved (i.e., not consumed). If we can raise s in Equation 3.7, we can increase $\Delta Y/Y$, the rate of GDP growth. For example, if we assume that the national capital-output ratio in some less developed country is, say, 3 and the aggregate net saving ratio is 6% of GDP, it follows from Equation 3.7 that this country can grow at a rate of 2% per year because

$$\frac{\Delta Y}{Y} = \frac{s}{c} = \frac{6\%}{3} = 2\% \tag{3.8}$$

Now if the national net savings rate can somehow be increased from 6% to, say, 15%—through some combination of increased taxes, foreign aid, and general consumption sacrifices—GDP growth can be increased from 2% to 5% because now

$$\frac{\Delta Y}{Y} = \frac{s}{c} = \frac{15\%}{3} = 5\% \tag{3.9}$$

In fact, Rostow and others defined the takeoff stage in precisely this way. Countries that were able to save 15 to 20% of GDP could grow ("develop") at a much faster rate than those that saved less. Moreover, this growth would then be self-sustaining. The mechanisms of economic growth and development, therefore, would be simply a matter of increasing national savings and investment.

The main obstacle to or constraint on development, according to this theory, is the relatively low level of new capital formation in most poor countries. But if a country wanted to grow at, say, a rate of 7% per year and if it could not generate savings and investment at a rate of 21% of national income (assuming that c, the final aggregate capital-output ratio, is 3) but could only manage to save 15%, it could seek to fill this "savings gap" of 6% through either foreign aid or private foreign investment.

Thus, the "capital constraint" stages approach to growth and development became a rationale and (in terms of Cold War politics) an opportunistic tool for justifying massive transfers of capital and technical assistance from the developed to the less developed nations. It was to be the Marshall Plan all over again, but this time for the nations of the developing world.

Necessary versus Sufficient Conditions: Some Criticisms of the Stages Model

Unfortunately, the mechanisms of development embodied in the theory of stages of growth did not always work. And the basic reason they didn't work was not because more saving and investment isn't a **necessary condition** for accelerated rates of economic growth but rather because it is not a **sufficient condition**. The Marshall Plan worked for Europe because the European countries receiving aid possessed the necessary structural, institutional, and

Necessary condition A condition that must be present, although it need not be in itself sufficient, for an event to occur. For example, capital formation may be a necessary condition for sustained economic growth (before growth in output can occur, there must be tools to produce it). But for this growth to continue, social, institutional, and attitudinal changes may have to occur.

Sufficient condition A condition that when present causes or guarantees that an event will or can occur; in economic models, a condition that logically requires that a statement must be true (or a result must hold) given other assumptions.

attitudinal conditions (e.g., well-integrated commodity and money markets, highly developed transport facilities, a well-trained and educated workforce, the motivation to succeed, an efficient government bureaucracy) to convert new capital effectively into higher levels of output. The Rostow and Harrod-Domar models implicitly assume the existence of these same attitudes and arrangements in underdeveloped nations. Yet, in many cases, they are lacking, as are complementary factors such as managerial competence, skilled labor, and the ability to plan and administer a wide assortment of development projects. There was also insufficient focus on another strategy for raising growth that is apparent from Equation 3.7: reducing the capital-output ratio, c, which entails increasing the efficiency with which investments generate extra output—a theme we take up later.

3.3 Structural-Change Models

Structural-change theory The hypothesis that *underdevelopment* is due to underutilization of *resources* arising from structural or institutional factors that have their origins in both domestic and international *dualism*. *Development* therefore requires more than just accelerated *capital* formation.

Structural transformation The process of transforming an economy in such a way that the contribution to national income by the manufacturing sector eventually surpasses the contribution by the agricultural sector. More generally, a major alteration in the industrial composition of any economy.

Lewis two-sector model A theory of development in which surplus labor from the traditional agricultural sector is transferred to the modern industrial sector, the growth of which absorbs the surplus labor, promotes industrialization, and stimulates sustained development.

Surplus labor The excess supply of labor over and above the quantity demanded at the going free-market wage rate. In the Lewis two-sector model of economic development, *surplus labor* refers to the portion of the rural labor force whose marginal productivity is zero or negative.

Structural-change theory focuses on the mechanism by which underdeveloped economies transform their domestic economic structures from a heavy emphasis on traditional subsistence agriculture to a more modern, more urbanized, and more industrially diverse manufacturing and service economy. It employs the tools of neoclassical price and resource allocation theory and modern econometrics to describe how this transformation process takes place. Two well-known representative examples of the structural-change approach are the "two-sector surplus labor" theoretical model of W. Arthur Lewis and the "patterns of development" empirical analysis of Hollis B. Chenery and his coauthors.

The Lewis Theory of Economic Development

Basic Model One of the best-known early theoretical models of development that focused on the **structural transformation** of a primarily subsistence economy was that formulated by Nobel laureate W. Arthur Lewis in the mid-1950s and later modified, formalized, and extended by John Fei and Gustav Ranis.[5] The **Lewis two-sector model** became the general theory of the development process in surplus-labor developing nations during most of the 1960s and early 1970s, and it is sometimes still applied, particularly to study the recent growth experience in China and labor markets in other developing countries.[6]

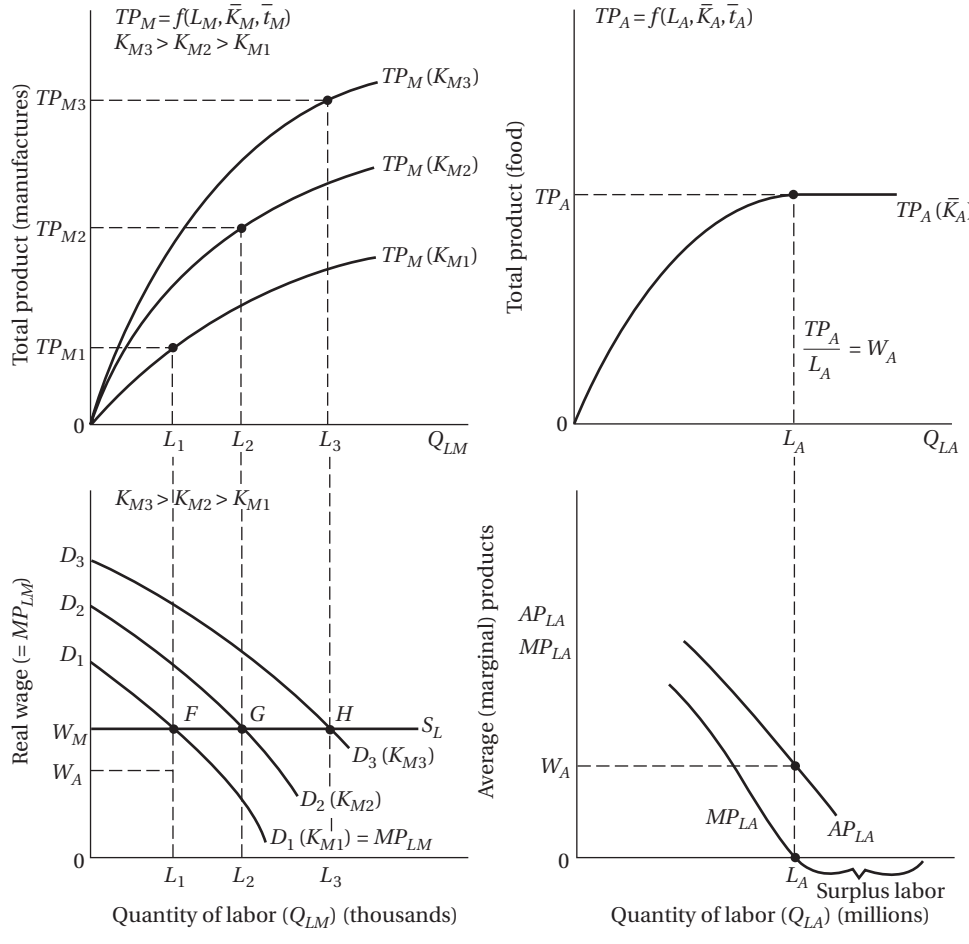
In the Lewis model, the underdeveloped economy consists of two sectors: a traditional, overpopulated, rural subsistence sector characterized by zero marginal labor productivity—a situation that permits Lewis to classify this as **surplus labor** in the sense that it can be withdrawn from the traditional agricultural sector without any loss of output—and a high-productivity modern, urban industrial sector into which labor from the subsistence sector is gradually transferred. The primary focus of the model is on both the process of labor transfer and the growth of output and employment in the modern sector. (The modern sector could include modern agriculture, but we will call the sector "industrial" as a shorthand). Both labor transfer and modern-sector employment growth are brought about by output expansion in that sector. The speed with which this expansion occurs is determined by the rate

of industrial investment and capital accumulation in the modern sector. Such investment is made possible by the excess of modern-sector profits over wages on the assumption that capitalists reinvest all their profits. Finally, Lewis assumed that the level of wages in the urban industrial sector was constant, determined as a given premium over a fixed average subsistence level of wages in the traditional agricultural sector. At the constant urban wage, the supply curve of rural labor to the modern sector is considered to be perfectly elastic.

We can illustrate the Lewis model of modern-sector growth in a two-sector economy by using Figure 3.1. Consider first the traditional agricultural sector portrayed in the two right-hand diagrams of Figure 3.1b. The upper diagram shows how subsistence food production varies with increases in labor inputs. It is a typical agricultural **production function** in which the total output or product (TP_A) of food is determined by changes in the amount of

Production function A technological or engineering relationship between the quantity of a good produced and the quantity of inputs required to produce it.

FIGURE 3.1 The Lewis Model of Modern-Sector Growth in a Two-Sector Surplus-Labor Economy



Average product Total output or product divided by total factor input (e.g., the average product of labor is equal to total output divided by the total amount of labor used to produce that output).

Marginal product The increase in total output resulting from the use of one additional unit of a variable factor of production (such as labor or capital). In the Lewis two-sector model, *surplus labor* is defined as workers whose marginal product is zero.

the only variable input, labor (L_A), given a fixed quantity of capital, $\overline{K}_A$, and unchanging traditional technology, $\overline{t}_A$. In the lower-right diagram, we have the **average** and **marginal product** of labor curves, AP_{LA} and MP_{LA}, which are derived from the total product curve shown immediately above. The quantity of agricultural labor (Q_{LA}) available is the same on both horizontal axes of the right-hand side of the figure and is expressed in millions of workers, as Lewis is describing an underdeveloped economy where much of the population lives and works in rural areas.

Lewis makes two assumptions about the traditional sector. First, there is surplus labor in the sense that MP_{LA} is zero, and second, all rural workers share *equally* in the output so that the rural real wage is determined by the average and not the marginal product of labor (as will be the case in the modern sector). Metaphorically, this may be thought of as passing around the family rice bowl at dinnertime, from which each person takes an equal share (this need not be literally equal shares for the basic idea to hold). Assume that there are L_A agricultural workers producing TP_A food, which is shared equally as W_A food per person (this is the average product, which is equal to TP_A/L_A). The marginal product of these L_A workers is zero, as shown in the bottom diagram of Figure 3.1b; hence the surplus-labor assumption applies to all workers in excess of L_A (note the horizontal TP_A curve beyond L_A workers in the upper-right diagram).

The upper-left diagram of Figure 3.1a portrays the total product (production function) curves for the modern industrial sector. Once again, output of, say, manufactured goods (TP_M) is a function of a variable labor input, L_M, for a given capital stock $\overline{K}_M$ and technology, $\overline{t}_M$. On the horizontal axes, the quantity of labor employed to produce an output of, say, TP_{M1}, with capital stock K_{M1}, is expressed in thousands of urban workers, L_1. In the Lewis model, the modern-sector capital stock is allowed to increase from K_{M1} to K_{M2} to K_{M3} as a result of the reinvestment of profits by industrial capitalists. This will cause the total product curves in Figure 3.1a to shift upward from $TP_M(K_{M1})$ to $TP_M(K_{M2})$ to $TP_M(K_{M3})$. The process that will generate these capitalist profits for reinvestment and growth is illustrated in the lower-left diagram of Figure 3.1a. Here we have modern-sector marginal labor product curves derived from the TP_M curves of the upper diagram. Under the assumption of perfectly competitive labor markets in the modern sector, these marginal product of labor curves are in fact the actual demand curves for labor. Here is how the system works.

W_A in the lower diagrams of Figures 3.1a and 3.1b represents the average level of real subsistence income in the traditional rural sector. W_M in Figure 3.1a is therefore the real wage in the modern capitalist sector. At this wage, the supply of rural labor is assumed to be unlimited or perfectly elastic, as shown by the horizontal labor supply curve $W_M S_L$. In other words, Lewis assumes that at urban wage W_M above rural average income W_A, modern-sector employers can hire as many surplus rural workers as they want without fear of rising wages. (Note again that the quantity of labor in the rural sector, Figure 3.1b, is expressed in millions, whereas in the modern urban sector, Figure 3.1a, units of labor are expressed in thousands.) Given a fixed supply of capital K_{M1} in the initial stage of modern-sector growth, the demand curve for labor is determined by labor's declining marginal product and is shown by the negatively sloped curve $D_1(K_{M1})$ in the lower-left diagram. Because profit-maximizing modern-sector employers are assumed to hire laborers to the point where their

marginal physical product is equal to the real wage (i.e., the point F of intersection between the labor demand and supply curves), total modern-sector employment will be equal to L_1. Total modern-sector output, TP_{M1}, would be given by the area bounded by points $0D_1FL_1$. The share of this total output paid to workers in the form of wages would be equal, therefore, to the area of the rectangle $0W_MFL_1$. The balance of the output shown by the area W_MD_1F would be the total profits that accrue to the capitalists. Because Lewis assumes that all of these profits are reinvested, the total capital stock in the modern sector will rise from K_{M1} to K_{M2}. This larger capital stock causes the total product curve of the modern sector to shift to $TP_M(K_{M2})$, which in turn induces a rise in the marginal product demand curve for labor. This outward shift in the labor demand curve is shown by line $D_2(K_{M2})$ in the bottom half of Figure 3.1a. A new equilibrium modern-sector employment level will be established at point G with L_2 workers now employed. Total output rises to TP_{M2} or $0D_2GL_2$, while total wages and profits increase to $0W_MGL_2$ and W_MD_2G, respectively. Once again, these larger (W_MD_2G) profits are reinvested, increasing the total capital stock to K_{M3}, shifting the total product and labor demand curves to $TP_M(K_{M3})$ and to $D_3(K_{M3})$, respectively, and raising the level of modern-sector employment to L_3.

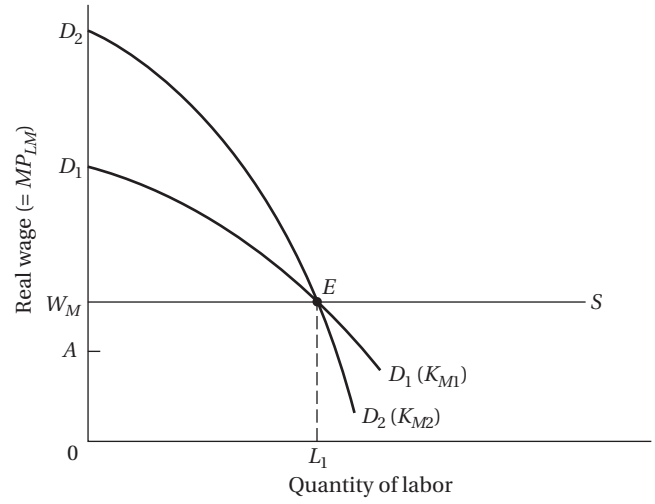
This process of modern-sector **self-sustaining growth** and employment expansion is assumed to continue until all surplus rural labor is absorbed in the new industrial sector. Thereafter, additional workers can be withdrawn from the agricultural sector only at a higher cost of lost food production because the declining labor-to-land ratio means that the marginal product of rural labor is no longer zero. This is known as the "Lewis turning point." Thus, the labor supply curve becomes positively sloped as modern-sector wages and employment continue to grow. The structural transformation of the economy will have taken place, with the balance of economic activity shifting from traditional rural agriculture to modern urban industry.

Self-sustaining growth Economic growth that continues over the long run based on saving, investment, and complementary private and public activities.

Criticisms of the Lewis Model Although the Lewis two-sector development model is simple and roughly reflects the historical experience of economic growth in the West, four of its key assumptions do not fit the institutional and economic realities of most contemporary developing countries.

First, the model implicitly assumes that the rate of labor transfer and employment creation in the modern sector is proportional to the rate of modern-sector capital accumulation. The faster the rate of capital accumulation, the higher the growth rate of the modern sector and the faster the rate of new job creation. But what if capitalist profits are reinvested in more sophisticated laborsaving capital equipment rather than just duplicating the existing capital, as is implicitly assumed in the Lewis model? (We are, of course, here accepting the debatable assumption that capitalist profits are in fact reinvested in the local economy and not sent abroad as a form of "capital flight" to be added to the deposits of Western banks.) Figure 3.2 reproduces the lower, modern-sector diagram of Figure 3.1a, only this time the labor demand curves do not shift uniformly outward but in fact cross. Demand curve $D_2(K_{M2})$ has a greater negative slope than $D_2(K_{M1})$ to reflect the fact that additions to the capital stock embody laborsaving technical progress—that is, KM_2 technology requires much less labor per unit of output than KM_1 technology does.

FIGURE 3.2 The Lewis Model Modified by Laborsaving Capital Accumulation: Employment Implications



We see that even though total output has grown substantially (i.e., $0D_2EL_1$ is significantly greater than $0D_1EL_1$), total wages ($0W_MEL_1$) and employment (L_1) remain unchanged. All of the extra output accrues to capitalists in the form of profits. Figure 3.2 therefore provides an illustration of what some might call "antidevelopmental" economic growth—*all* the extra income and output growth are distributed to the few owners of capital, while income and employment levels for the masses of workers remain largely unchanged. Although total GDP would rise, there would be little or no improvement in aggregate social welfare measured, say, in terms of more widely distributed gains in income and employment.

The second questionable assumption of the Lewis model is the notion that surplus labor exists in rural areas while there is full employment in the urban areas. Most contemporary research indicates that there is little surplus labor in rural locations. True, there are both seasonal and geographic exceptions to this rule (e.g., at least until recently in parts of China and the Asian subcontinent, some Caribbean islands, and isolated regions of Latin America where land ownership is very unequal), but by and large, development economists today agree that Lewis's assumption of rural surplus labor is generally not valid.

The third dubious assumption is the notion of a competitive modern-sector labor market that guarantees the continued existence of constant real urban wages up to the point where the supply of rural surplus labor is exhausted. Prior to the 1980s, a striking feature of urban labor markets and wage determination in almost all developing countries was the tendency for these wages to rise substantially over time, both in absolute terms and relative to average rural incomes, even in the presence of rising levels of open modern-sector unemployment and low or zero marginal productivity in agriculture. Institutional factors such as union bargaining power, civil service wage scales, and

multinational corporations' hiring practices tend to negate competitive forces in modern-sector labor markets in developing countries.

The fourth concern with the Lewis model is its assumption of diminishing returns in the modern industrial sector. Yet there is much evidence that increasing returns prevail in that sector, posing special problems for development policymaking that we will examine in Chapter 4.

We study the Lewis model because, as many development specialists still think about development in this way either explicitly or implicitly, it helps students participate in the debates. Moreover, the model is widely considered relevant to recent experiences in China, where labor has been steadily absorbed from farming into manufacturing, and to a few other countries with similar growth patterns. The Lewis turning point at which wages in manufacturing start to rise was widely identified with China's wage increases starting in 2010 (see the case study for Chapter 4).

However, when we take into account the laborsaving bias of most modern technological transfer, the existence of substantial capital flight, the widespread nonexistence of rural surplus labor, the growing prevalence of urban surplus labor, and the tendency for modern-sector wages to rise rapidly even where substantial open unemployment exists, we must acknowledge that the Lewis two-sector model—though valuable as an early conceptual portrayal of the development process of sectoral interaction and structural change and a description of some historical experiences, including some recent ones such as China—requires considerable modification in assumptions and analysis to fit the reality of most contemporary developing nations.

Structural Change and Patterns of Development

Like the earlier Lewis model, the **patterns-of-development analysis** of structural change focuses on the sequential process through which the economic, industrial, and institutional structure of an underdeveloped economy is transformed over time to permit new industries to replace traditional agriculture as the engine of economic growth. However, in contrast to the Lewis model and the original stages view of development, increased savings and investment are perceived by patterns-of-development analysts as necessary but not sufficient conditions for economic growth. In addition to the accumulation of capital, both physical and human, a set of interrelated changes in the economic structure of a country are required for the transition from a traditional economic system to a modern one. These structural changes involve virtually all economic functions, including the transformation of production and changes in the composition of consumer demand, international trade, and resource use as well as changes in socioeconomic factors such as urbanization and the growth and distribution of a country's population.

Patterns-of-development analysis An attempt to identify characteristic features of the internal process of structural transformation that a "typical" developing economy undergoes as it generates and sustains modern economic growth and development.

Empirical structural-change analysts emphasize both domestic and international constraints on development. The domestic ones include economic constraints such as a country's resource endowment and its physical and population size, as well as institutional constraints such as government policies and objectives. International constraints on development include access to external capital, technology, and international trade. Differences in development level among developing countries are largely ascribed to these domestic and

international constraints. However, it is the international constraints that make the transition of currently developing countries differ from that of now industrialized countries. To the extent that developing countries have access to the opportunities presented by the industrial countries as sources of capital, technology, and manufactured imports, as well as markets for exports, they can make the transition at an even faster rate than that achieved by the industrial countries during the early periods of their economic development. Thus, unlike the earlier stages model, the structural-change model recognizes the fact that developing countries are part of an integrated international system that can promote (as well as hinder) their development.

The best-known model of structural change is the one based largely on the empirical work of the late economist Hollis B. Chenery and his colleagues, who examined patterns of development for numerous developing countries during the postwar period. (This approach also built on research by Nobel laureate Simon Kuznets on modern economic growth of developed countries.)[7] Their empirical studies, both cross-sectional (among countries at a given point in time) and time-series (over long periods of time), of countries at different levels of per capita income led to the identification of several characteristic features of the development process. These included the shift from agricultural to industrial production, the steady accumulation of physical and human capital, the change in consumer demands from emphasis on food and basic necessities to desires for diverse manufactured goods and services, the growth of cities and urban industries as people migrate from farms and small towns, and the decline in family size and overall population growth as children lose their economic value and parents substitute what is traditionally labeled child quality (education) for quantity (see Chapter 6), with population growth first increasing and then decreasing in the process of development. Proponents of this school often call for development specialists to "let the facts speak for themselves" rather than get bogged down in the arcana of theories such as the stages of growth. This is a valuable counterbalance to empty theorizing, but it also has its own limits.

Conclusions and Implications

The structural changes that we have described are the "average" patterns of development that Chenery and his colleagues observed among countries in time-series and cross-sectional analyses. The major hypothesis of the structural-change model is that development is an identifiable process of growth and change, whose main features are similar in all countries. However, as mentioned earlier, the model does recognize that differences can arise among countries in the pace and pattern of development, depending on their particular set of circumstances. Factors influencing the development process include a country's resource endowment and size, its government's policies and objectives, the availability of external capital and technology, and the international trade environment.

One limitation to keep in mind is that by emphasizing patterns rather than theory, this approach runs the risk of leading practitioners to draw the wrong conclusions about causality—in effect, to "put the cart before the horse." Observing developed-country patterns such as the decline of the share of the labor force in agriculture over time, many developing-country policymakers have been inclined to neglect that vital sector. But as you will see in Chapter 9,

that is precisely the opposite conclusion to the one that should be drawn. Observing the important role of higher education in developed countries, policymakers may be inclined to emphasize the development of an advanced university system even before a majority of the population has gained basic literacy, a policy that has led to gross inequities even in countries at least nominally committed to egalitarian outcomes, such as Tanzania.

Empirical studies on the process of structural change lead to the conclusion that the pace and pattern of development can vary according to both domestic and international factors, many of which lie beyond the control of an individual developing nation. Yet despite this variation, structural-change economists argue that one can identify certain patterns occurring in almost all countries during the development process. And these patterns, they argue, may be affected by the choice of development policies pursued by governments in developing countries as well as the international trade and foreign-assistance policies of developed nations. Hence, structural-change analysts are basically optimistic that the "correct" mix of economic policies will generate beneficial patterns of self-sustaining growth. The international-dependence school to which we now turn is, in contrast, much less sanguine and is in many cases downright pessimistic.

3.4 The International-Dependence Revolution

During the 1970s, international-dependence models gained increasing support, especially among developing-country intellectuals, as a result of growing disenchantment with both the stages and structural-change models. While this theory to a large degree went out of favor during the 1980s and 1990s, versions of it have enjoyed a resurgence in the twenty-first century as some of its views have been adopted, albeit in modified form, by theorists and leaders of the antiglobalization movement.[8] Essentially, international-dependence models view developing countries as beset by institutional, political, and economic rigidities, both domestic and international, and caught up in a **dependence** and **dominance** relationship with rich countries. Within this general approach are three major streams of thought: the neocolonial dependence model, the false-paradigm model, and the dualistic-development thesis.

The Neocolonial Dependence Model

The first major stream, which we call the **neocolonial dependence model**, is an indirect outgrowth of Marxist thinking. It attributes the existence and continuance of **underdevelopment** primarily to the historical evolution of a highly unequal international capitalist system of rich country–poor country relationships. Whether because rich nations are intentionally exploitative or unintentionally neglectful, the coexistence of rich and poor nations in an international system dominated by such unequal power relationships between the **center** (the developed countries) and the **periphery** (the developing countries) renders attempts by poor nations to be self-reliant and independent difficult and sometimes even impossible.[9] Certain groups in the developing countries (including landlords, entrepreneurs, military rulers, merchants, salaried public officials, and

Dependence The reliance of developing countries on developed-country economic policies to stimulate their own economic growth. Dependence can also mean that the developing countries adopt developed-country education systems, technology, economic and political systems, attitudes, consumption patterns, dress, and so on.

Dominance In international affairs, a situation in which the developed countries have much greater power than the less developed countries in decisions affecting important international economic issues, such as the prices of agricultural commodities and raw materials in world markets.

Neocolonial dependence model A model whose main proposition is that underdevelopment exists in developing countries because of continuing exploitative economic, political, and cultural policies of former colonial rulers toward less developed countries.

Underdevelopment An economic situation characterized by persistent low levels of living in conjunction with absolute poverty, low income per capita, low rates of economic growth, low consumption levels, poor health services, high death rates, high birth rates, dependence on foreign economies, and limited freedom to choose among activities that satisfy human wants.

Center In dependence theory, the economically developed world.

Periphery In dependence theory, the developing countries.

trade union leaders) that enjoy high incomes, social status, and political power constitute a small elite ruling class whose principal interest, knowingly or not, is in the perpetuation of the international capitalist system of inequality and conformity in which they are rewarded. Directly and indirectly, they serve (are dominated by) and are rewarded by (are dependent on) international special-interest power groups, including multinational corporations, national bilateral-aid agencies, and multilateral assistance organizations like the World Bank or the International Monetary Fund (IMF), which are tied by allegiance or funding to the wealthy capitalist countries. The elites' activities and viewpoints often serve to inhibit any genuine reform efforts that might benefit the wider population and in some cases actually lead to even lower levels of living and to the perpetuation of underdevelopment. In short, the neo-Marxist, neocolonial view of underdevelopment attributes a large part of the developing world's continuing poverty to the existence and policies of the industrial capitalist countries of the northern hemisphere and their extensions in the form of small but powerful elite or **comprador groups** in the less developed countries.[10] Underdevelopment is thus seen as an *externally* induced phenomenon, in contrast to the linear-stages and structural-change theories' stress on *internal* constraints, such as insufficient savings and investment or lack of education and skills. Revolutionary struggles or at least major restructuring of the world capitalist system is therefore required to free dependent developing nations from the direct and indirect economic control of their developed-world and domestic oppressors.

Comprador group In dependence theory, local elites who act as fronts for foreign investors.

One of the most forceful statements of the international-dependence school of thought was made by Theotonio Dos Santos:

> Underdevelopment, far from constituting a state of backwardness prior to capitalism, is rather a consequence and a particular form of capitalist development known as dependent capitalism.…Dependence is a conditioning situation in which the economies of one group of countries are conditioned by the development and expansion of others. A relationship of interdependence between two or more economies or between such economies and the world trading system becomes a dependent relationship when some countries can expand through self-impulsion while others, being in a dependent position, can only expand as a reflection of the expansion of the dominant countries, which may have positive or negative effects on their immediate development. In either case, the basic situation of dependence causes these countries to be both backward and exploited. Dominant countries are endowed with technological, commercial, capital and sociopolitical predominance over dependent countries—the form of this predominance varying according to the particular historical moment—and can therefore exploit them, and extract part of the locally produced surplus. Dependence, then, is based upon an international division of labor which allows industrial development to take place in some countries while restricting it in others, whose growth is conditioned by and subjected to the power centers of the world.[11]

A similar but obviously non-Marxist perspective was expounded by Pope John Paul II in his widely quoted 1988 encyclical letter (a formal, elaborate expression of papal teaching) *Sollicitudo rei socialis* (The Social Concerns of the Church), in which he declared:

> One must denounce the existence of economic, financial, and social mechanisms which, although they are manipulated by people, often function almost automatically, thus accentuating the situation of wealth for some and poverty for the rest. These mechanisms, which are maneuvered directly or indirectly by the more

developed countries, by their very functioning, favor the interests of the people manipulating them. But in the end they suffocate or condition the economies of the less developed countries.

The False-Paradigm Model

A second and less radical international-dependence approach to development, which we might call the **false-paradigm model**, attributes underdevelopment to faulty and inappropriate advice provided by well-meaning but often uninformed, biased, and ethnocentric international "expert" advisers from developed-country assistance agencies and multinational donor organizations. These experts are said to offer complex but ultimately misleading models of development that often lead to inappropriate or incorrect policies. Because of institutional factors such as the central and remarkably resilient role of traditional social structures (tribe, caste, class, etc.), the highly unequal ownership of land and other property rights, the disproportionate control by local elites over domestic and international financial assets, and the very unequal access to credit, these policies, based as they often are on mainstream, neoclassical (or perhaps Lewis-type surplus-labor or Chenery-type structural-change) models, in many cases merely serve the vested interests of existing power groups, both domestic and international.

False-paradigm model The proposition that developing countries have failed to develop because their development strategies (usually given to them by Western economists) have been based on an incorrect model of development, one that, for example, overstresses capital accumulation or market liberalization without giving due consideration to needed social and institutional change.

In addition, according to this argument, leading university intellectuals, trade unionists, high-level government economists, and other civil servants all get their training in developed-country institutions where they are unwittingly served an unhealthy dose of alien concepts and elegant but inapplicable theoretical models. Having little or no really useful knowledge to enable them to come to grips in an effective way with real development problems, they often tend to become unknowing or reluctant apologists for the existing system of elitist policies and institutional structures. In university economics courses, for example, this typically entails the perpetuation of the teaching of many "irrelevant" Western concepts and models, while in government policy discussions, too much emphasis is placed on attempts to measure capital-output ratios, increase savings and investment ratios, privatize and deregulate the economy, or maximize GDP growth rates. As a result, proponents argue that desirable institutional and structural reforms, many of which we have discussed, are neglected or given only cursory attention.

The Dualistic-Development Thesis

Implicit in structural-change theories and explicit in international-dependence theories is the notion of a world of dual societies, of rich nations and poor nations and, in the developing countries, pockets of wealth within broad areas of poverty. **Dualism** is the existence and persistence of substantial and even increasing divergences between rich and poor nations and rich and poor peoples on various levels. Specifically, although research continues, the traditional concept of dualism embraces four key arguments:[12]

Dualism The coexistence of two situations or phenomena (one desirable and the other not) that are mutually exclusive to different groups of society—for example, extreme poverty and affluence, modern and traditional economic sectors, growth and stagnation, and higher education among a few amid large-scale illiteracy.

1. Different sets of conditions, of which some are "superior" and others "inferior," can coexist in a given space. Examples of this element of dualism

include Lewis's notion of the coexistence of modern and traditional methods of production in urban and rural sectors; the coexistence of wealthy, highly educated elites with masses of illiterate poor people; and the dependence notion of the coexistence of powerful and wealthy industrialized nations with weak, impoverished peasant societies in the international economy.

2. This coexistence is chronic and not merely transitional. It is not due to a temporary phenomenon, in which case, time could eliminate the discrepancy between superior and inferior elements. In other words, the international coexistence of wealth and poverty is not simply a historical phenomenon that will be rectified in time. Although both the stages-of-growth theory and the structural-change models implicitly make such an assumption, to proponents of the dualistic development thesis, growing international inequalities seem to refute it.
3. Not only do the degrees of superiority or inferiority fail to show any signs of diminishing, but they even have an inherent tendency to increase. For example, the productivity gap between workers in developed countries and their counterparts in most developing countries seems to widen.
4. The interrelations between the superior and inferior elements are such that the existence of the superior elements does little or nothing to pull up the inferior element, let alone "trickle down" to it. In fact, it may actually serve to push it down—to "develop its underdevelopment."

Conclusions and Implications

Whatever their ideological differences, the advocates of the neocolonial-dependence, false-paradigm, and dualism models reject the exclusive emphasis on traditional neoclassical economic theories designed to accelerate the growth of GDP as the principal index of development. They question the validity of Lewis-type two-sector models of modernization and industrialization in light of their questionable assumptions and developing-world history. They further reject the claims made by Chenery and others that there are well-defined empirical patterns of development that should be pursued by most poor countries. Instead, dependence, false-paradigm, and dualism theorists place more emphasis on international power imbalances and on needed fundamental economic, political, and institutional reforms, both domestic and worldwide. In extreme cases, they call for the outright expropriation of privately owned assets in the expectation that public asset ownership and control will be a more effective means to help eradicate absolute poverty, provide expanded employment opportunities, lessen income inequalities, and raise the levels of living (including health, education, and cultural enrichment) of the masses. Although a few radical neo-Marxists would even go so far as to say that economic growth and structural change do not matter, the majority of thoughtful observers recognize that the most effective way to deal with these diverse social problems is to accelerate the pace of economic growth through domestic and international reforms, accompanied by a judicious mixture of both public and private economic activity.

Dependence theories have two major weaknesses. First, although they offer an appealing explanation of why many poor countries remain underdeveloped, they give no insight into how countries initiate and sustain development. Second and perhaps more important, the actual economic experience of developing countries that have pursued revolutionary campaigns of industrial nationalization and state-run production has been mostly negative.

If we are to take dependence theory at face value, we would conclude that the best course for developing countries is to become entangled as little as possible with the developed countries and instead pursue a policy of **autarky**, or inwardly directed development, or at most trade only with other developing countries. But large countries that embarked on autarkic policies, such as China and, to a significant extent, India, experienced stagnant growth and ultimately decided to open their economies, China beginning this process after 1978 and India, after 1990. At the opposite extreme, economies such as Taiwan and South Korea, and China more recently, which have most emphasized exports to developed countries, have grown strongly. Although in many cases close ties to metropolitan countries during the colonial period apparently produced damaging outcomes—as in Peru under Spain, the Congo under Belgium, India under Great Britain, and West Africa under France—in a majority of cases, this relationship appeared to have significantly altered during the postcolonial period. Clearly, however, conflicts of interest between the developed and developing worlds, such as took center stage at the Copenhagen climate summit in December 2009 and have played a role in recent WTO and G20 meetings, are genuine and cannot be ignored.

Autarky A closed economy that attempts to be completely self-reliant.

We next consider the view that the keys to development are found in free markets. For perspective, as will be noted in later chapters, governments can succeed or fail just as markets can; the key to successful development performance is achieving a careful balance among what government can successfully accomplish, what the private market system can do, and what both can best do working together.

While the international-dependence revolution in development theory was capturing the imagination of many Western and developing country scholars, a reaction was emerging in the late 1970s and early 1980s in the form of a neoclassical free-market counterrevolution. This very different approach would ultimately dominate Western (and to a lesser extent developing country) theories of economic development during the 1980s and early 1990s.

3.5 The Neoclassical Counterrevolution: Market Fundamentalism

Challenging the Statist Model: Free Markets, Public Choice, and Market-Friendly Approaches

In the 1980s, the political ascendancy of conservative governments in the United States, Canada, Britain, and West Germany came with a **neoclassical counterrevolution** in economic theory and policy. In developed nations, this counterrevolution favored supply-side macroeconomic policies, rational expectations theories, and the privatization of public corporations. In developing

Neoclassical counterrevolution The 1980s resurgence of neoclassical free-market orientation toward development problems and policies, counter to the interventionist dependence revolution of the 1970s.

countries, it called for freer markets and the dismantling of public ownership, statist planning, and government regulation of economic activities. Neoclassicists obtained controlling votes on the boards of the world's two most powerful international financial agencies—the World Bank and the International Monetary Fund. In conjunction and with the simultaneous erosion of influence of organizations such as the International Labor Organization (ILO), the United Nations Development Programme (UNDP), and the United Nations Conference on Trade and Development (UNCTAD), which more fully represent the views of delegates from developing countries, it was inevitable that the neoconservative, free-market challenge to the interventionist arguments of dependence theorists would gather momentum.

The central argument of the neoclassical counterrevolution is that underdevelopment results from poor resource allocation due to incorrect pricing policies and too much state intervention by overly active developing-nation governments. Rather, the leading writers of the counterrevolution school, including Lord Peter Bauer, Deepak Lal, Ian Little, Harry Johnson, Bela Balassa, Jagdish Bhagwati, and Anne Krueger, argued that it is this very state intervention in economic activity that slows the pace of economic growth. The neoliberals argue that by permitting competitive **free markets** to flourish, privatizing state-owned enterprises, promoting free trade and export expansion, welcoming investors from developed countries, and eliminating the plethora of government regulations and price distortions in factor, product, and financial markets, both economic efficiency and economic growth will be stimulated. Contrary to the claims of the dependence theorists, the neoclassical counterrevolutionaries argue that the developing world is underdeveloped, not because of the predatory activities of the developed world and the international agencies that it controls, but rather because of the heavy hand of the state and the corruption, inefficiency, and lack of economic incentives that permeate the economies of developing nations. What is needed, therefore, is not a reform of the international economic system, a restructuring of dualistic developing economies, an increase in foreign aid, attempts to control population growth, or a more effective development planning system. Rather, it is simply a matter of promoting free markets and laissez-faire economics within the context of permissive governments that allow the "magic of the marketplace" and the "invisible hand" of market prices to guide resource allocation and stimulate economic development. They point both to the success of economies like South Korea, Taiwan, and Singapore as "free-market" examples (although, as we shall see later, these Asian Tigers are far from the laissez-faire neoconservative prototype) and to the failures of the public-interventionist economies of Africa and Latin America.[13]

Free markets The system whereby prices of commodities or services freely rise or fall when the buyer's demand for them rises or falls or the seller's supply of them decreases or increases.

The neoclassical counterrevolution can be divided into three component approaches: the free-market approach, the public-choice (or "new political economy") approach, and the "market-friendly" approach. **Free-market analysis** argues that markets alone are efficient—product markets provide the best signals for investments in new activities; labor markets respond to these new industries in appropriate ways; producers know best what to produce and how to produce it efficiently; and product and factor prices reflect accurate scarcity values of goods and resources now and in the future. Competition is effective, if not perfect; technology is freely available and nearly costless to absorb; information

Free-market analysis Theoretical analysis of the properties of an economic system operating with free markets, often under the assumption that an unregulated market performs better than one with government regulation.

is also perfect and nearly costless to obtain. Under these circumstances, any government intervention in the economy is by definition distortionary and counterproductive. Free-market development economists have tended to assume that developing-world markets are efficient and that whatever imperfections exist are of little consequence.

Public-choice theory, also known as the **new political economy approach**, goes even further to argue that governments can do (virtually) nothing right. This is because public-choice theory assumes that politicians, bureaucrats, citizens, and states act solely from a self-interested perspective, using their power and the authority of government for their own selfish ends. Citizens use political influence to obtain special benefits (called "rents") from government policies (e.g., import licenses or rationed foreign exchange) that restrict access to important resources. Politicians use government resources to consolidate and maintain positions of power and authority. Bureaucrats and public officials use their positions to extract bribes from rent-seeking citizens and to operate protected businesses on the side. Finally, states use their power to confiscate private property from individuals. The net result is not only a misallocation of resources but also a general reduction in individual freedoms. The conclusion, therefore, is that minimal government is the best government.[14]

Public-choice theory (new political economy approach) The theory that self-interest guides all individual behavior and that governments are inefficient and corrupt because people use government to pursue their own agendas.

The **market-friendly approach** is a variant on the neoclassical counterrevolution associated principally with the 1990s writings of the World Bank and its economists, many of whom were more in the free-market and public-choice camps during the 1980s.[15] This approach recognizes that there are many imperfections in developing-country product and factor markets and that governments do have a key role to play in facilitating the operation of markets through "nonselective" (market-friendly) interventions—for example, by investing in physical and social infrastructure, health care facilities, and educational institutions, and by providing a suitable climate for private enterprise. The market-friendly approach also differs from the free-market and public-choice schools of thought by accepting the notion that **market failures** (see Chapters 4 and 11) are more widespread in developing countries in areas such as investment coordination and environmental outcomes. Moreover, phenomena such as missing and incomplete information, externalities in skill creation and learning, and economies of scale in production are also endemic to markets in developing countries. In fact, the recognition of these last three phenomena gives rise to newer schools of development theory, the endogenous growth approach, to which we turn in Appendix 3.3 at the end of this chapter, and the coordination failure approach, discussed in Chapter 4.

Market-friendly approach The notion historically promulgated by the World Bank that successful development policy requires governments to create an environment in which markets can operate efficiently and to intervene only selectively in the economy in areas where the market is inefficient.

Market failure A market's inability to deliver its theoretical benefits due to the existence of market imperfections such as monopoly power, lack of factor mobility, significant externalities, or lack of knowledge. Market failure often provides the justification for government intervention to alter the working of the free market.

Traditional Neoclassical Growth Theory

Another cornerstone of the neoclassical free-market argument is the assertion that liberalization (opening up) of national markets draws additional domestic and foreign investment and thus increases the rate of capital accumulation. In terms of GDP growth, this is equivalent to raising domestic savings rates, which enhances **capital-labor ratios** and per capita incomes in capital-poor developing countries.

Capital-labor ratio The number of units of capital per unit of labor.

Solow neoclassical growth model Growth model in which there are diminishing returns to each factor of production but constant returns to scale. Exogenous technological change generates long-term economic growth.

The **Solow neoclassical growth model** in particular represented the seminal contribution to the neoclassical theory of growth and later earned Robert Solow the Nobel Prize in economics.[16] It differed from the Harrod-Domar formulation by adding a second factor, labor, and introducing a third independent variable, technology, to the growth equation. Unlike the fixed-coefficient, constant-returns-to-scale assumption of the Harrod-Domar model, Solow's neoclassical growth model exhibited diminishing returns to labor and capital separately and constant returns to both factors jointly. Technological progress became the residual factor explaining long-term growth, and its level was assumed by Solow and other neoclassical growth theorists to be determined exogenously, that is, independently of all other factors in the model.

More formally, the standard exposition of the Solow neoclassical growth model uses an aggregate production function in which

$$Y = K^{\alpha}(AL)^{1-\alpha} \tag{3.10}$$

where Y is gross domestic product, K is the stock of capital (which may include human capital as well as physical capital), L is labor, and A represents the productivity of labor, which grows at an exogenous rate. For developed countries, this rate has been estimated at about 2% per year. It may be smaller or larger for developing countries, depending on whether they are stagnating or catching up with the developed countries. Because the rate of technological progress is given exogenously (at 2% per year, say), the Solow neoclassical model is sometimes called an "exogenous" growth model, to be contrasted with the endogenous growth approach (discussed in Appendix 3.3). In Equation 3.10, α represents the elasticity of output with respect to capital (the percentage increase in GDP resulting from a 1% increase in human and physical capital). Since α is assumed to be less than 1 and private capital is assumed to be paid its marginal product so that there are no external economies, this formulation of neoclassical growth theory yields diminishing returns both to capital and to labor.

The Solow neoclassical growth model implies that economies will converge to the same level of income per worker "conditionally"—that is, other things equal, particularly savings rates, depreciation, labor force growth, and productivity. The Solow neoclassical growth model is examined in detail in Appendix 3.2.

According to traditional neoclassical growth theory, output growth results from one or more of three factors: increases in labor quantity and quality (through population growth and education), increases in capital (through saving and investment), and improvements in technology (see Appendix 3.1). **Closed economies** (those with no external activities) with lower savings rates (other things being equal) grow more slowly in the short run than those with high savings rates and tend to converge to lower per capita income levels. **Open economies** (those with trade, foreign investment, etc.), however, experience income convergence at higher levels as capital flows from rich countries to poor countries where capital-labor ratios are lower and thus returns on investments are higher. Consequently, by impeding the inflow of foreign investment, the heavy-handedness of many developing countries' governments, according to neoclassical growth theory, will retard growth

Closed economy An economy in which there are no foreign trade transactions or other economic contacts with the rest of the world.

Open economy An economy that practices foreign trade and has extensive financial and nonfinancial contacts with the rest of the world.

in the economies of the developing world. In addition, openness is said to encourage greater access to foreign production ideas that can raise the rate of technological progress.

Conclusions and Implications

Whereas dependence theorists (many, but not all, of whom were economists from developing countries) saw underdevelopment as an externally induced phenomenon, neoclassical revisionists (most, but not all, of whom were Western economists) saw the problem as an internally induced phenomenon of developing countries, caused by too much government intervention and bad economic policies. Such finger-pointing on both sides is not uncommon in issues so contentious as those that divide rich and poor nations.

But what of the neoclassical counterrevolution's contention that free markets and less government provide the basic ingredients for development? On strictly efficiency (as opposed to equity) criteria, there can be little doubt that market price allocation usually does a better job than state intervention. The problem is that many developing economies are so different in structure and organization from their Western counterparts that the behavioral assumptions and policy precepts of traditional neoclassical theory are sometimes questionable and often incorrect. Competitive free markets generally do not exist, nor, given the institutional, cultural, and historical context of many developing countries, would they necessarily be desirable from a long-term economic and social perspective (see Chapter 11). Consumers as a whole are rarely sovereign about what goods and services are to be produced, in what quantities, and for whom. Information is limited, markets are fragmented, and much of the economy in low-income countries is still nonmonetized.[17] There are widespread externalities of both production and consumption as well as discontinuities in production and indivisibilities (i.e., economies of scale) in technology. Producers, private or public, have great power in determining market prices and quantities sold. The ideal of competition is typically just that—an ideal with little substance in reality. Although monopolies of resource purchase and product sale are pervasive in the developing world, the traditional neoclassical theory of monopoly also offers little insight into the day-to-day activities of public and private corporations. Decision rules can vary widely with the social setting so that profit maximization may be a low-priority objective, especially in state-owned enterprises, in comparison with, say, the creation of jobs or the replacement of foreign managers with local personnel. Finally, the invisible hand often acts not to promote the general welfare but rather to lift up those who are already well-off while failing to offer opportunities for upward mobility for the vast majority.

Much can be learned from neoclassical theory with regard to the importance of elementary supply-and-demand analysis in arriving at "correct" product, factor, and foreign-exchange prices for efficient production and resource allocation. However, enlightened governments can also make effective use of prices as signals and incentives for influencing socially optimal resource allocations. Indeed, we will often demonstrate the usefulness of various tools of neoclassical theory in our later analysis of problems such as population growth, agricultural stagnation, unemployment and underemployment,

child labor, educational demands, the environment, export promotion versus import substitution, devaluation, project planning, monetary policy, microfinance, and economic privatization. Nevertheless, the reality of the institutional and political structure of many developing-world economies—not to mention their differing value systems and ideologies—often makes the attainment of appropriate economic policies based either on markets or on enlightened public intervention an exceedingly difficult endeavor. In an environment of widespread institutional rigidity and severe socioeconomic inequality, *both* markets and governments will typically fail. It is not simply an either-or question based on ideological leaning; rather, it is a matter of assessing each individual country's situation on a case-by-case basis. Developing nations need to adopt local solutions in response to local constraints.[18] Development economists must therefore be able to distinguish between textbook neoclassical theory and the institutional and political reality of contemporary developing countries.[19] They can then choose the traditional neoclassical concepts and models that can best illuminate issues and dilemmas of development and discard those that cannot. Approaches to making these distinctions and choices in key policy applications will feature centrally in Parts Two and Three.

3.6 Classic Theories of Development: Reconciling the Differences

In this chapter, we have reviewed a range of competing theories and approaches to the study of economic development. Each approach has its strengths and weaknesses. The fact that there exists such controversy—be it ideological, theoretical, or empirical—is what makes the study of economic development both challenging and exciting. Even more than other fields of economics, development economics has no universally accepted doctrine or paradigm. Instead, we have a continually evolving pattern of insights and understandings, reflecting in part improved data and emergence of new technologies and new institutions, that together provide the basis for examining the possibilities of contemporary development of the diverse nations of Africa, Asia, and Latin America.

You may wonder how consensus could emerge from so much disagreement. Although it is not implied here that such a consensus exists today or will ever emerge when such sharply conflicting values and ideologies prevail, we do suggest that something of significance can be gleaned from each of the four approaches that we have described. For example, the linear-stages model emphasizes the crucial role that saving and investment play in promoting sustainable long-run growth. The Lewis two-sector model of structural change underlines the importance of transfers of resources from low-productivity to high-productivity activities in the process of economic development, attempting to analyze the many linkages between traditional agriculture and modern industry, and clarifying recent growth experiences such as that of China. The empirical research of Chenery and his associates seeks to document precisely how economies undergo structural change while identifying

the numerical values of key economic parameters involved in that process. The thoughts of international-dependence theorists alert us to the importance of the structure and workings of the world economy and the many ways in which decisions made in the developed world can affect the lives of millions of people in the developing world. Whether or not these activities are deliberately designed to maintain developing nations in a state of dependence is often beside the point. The very fact of their dependence and their vulnerability to key economic decisions made in the capitals of North America, western Europe, or Japan (not to mention those made by the IMF and the World Bank) forces us to recognize the importance of some of the insights of the international-dependence school. The same applies to arguments regarding the dualistic structures and the role of ruling elites in the domestic economies of the developing world.

Although a good deal of conventional neoclassical economic theory needs to be modified to fit the unique social, institutional, and structural circumstances of developing nations, there is no doubt that promoting efficient production and distribution through a proper, functioning price system is an integral part of any successful development process. Many of the arguments of the neoclassical counterrevolutionaries, especially those related to the inefficiency of state-owned enterprises and the failures of development planning (see Chapter 11), and the harmful effects of government-induced domestic and international price distortions (see Chapters 7, 12, and 15), are as well taken as those of the dependence and structuralist schools. By contrast, the unquestioning exaltation of free markets and open economies along with the universal disparagement of public-sector leadership in promoting growth with equity in the developing world is open to serious challenge. As the chapters in Parts Two and Three reveal, successful development requires a skillful and judicious balancing of market pricing and promotion where markets can exist and operate efficiently, along with intelligent and equity-oriented government intervention in areas where unfettered market forces would lead to undesirable economic and social outcomes. Great strides have been made in modern development economic analysis in clarifying the logic of how well-formulated government policy can facilitate the development of markets and shared growth, as will be explained in Chapter 4.

In summary, each of the approaches to understanding development has something to offer. Their respective contributions will become clear later in the book when we explore in detail both the origins of and possible solutions to a wide range of problems such as poverty, population growth, unemployment, rural development, international trade, and the environment. They also inform contemporary models of development and underdevelopment, to which we turn in the next chapter.

Case Study 3

Schools of Thought in Context: South Korea and Argentina

A closer examination of two countries confirms the conclusion that each of the first four broad approaches to development—stages of growth, structural patterns of development, dependence, and neoclassical—provides important insights about development processes and policy. South Korea and Argentina are reasonably well matched for such a comparison; for example, both are midsize in population (41 million in Argentina and 50 million in South Korea in 2011), and both were long classified as middle-income countries. But South Korea, now designated by the World Bank as a high-income country with about $31,000 PPP in 2008, has nearly double the per capita income of Argentina, with about $17,000 PPP in 2011, whereas 30 years earlier the reverse was true. Can the four classic approaches to development explain this reversal?

South Korea

Stages of Growth South Korea confirms some linear-stages views, albeit in a limited way. Its share of investment in national income has been among the highest in the world, and this is a crucial part of the explanation of the nation's rapid ascent. To understand just how rapid this ascent has been, consider that the country did not even rate a mention in Rostow's *Stages of Economic Growth* in 1960, when the book was published, and few of the "preconditions for takeoff" were in place. Investment has been very high since then, but as a share of GNI, the investment ratio, at 15%, was still below takeoff levels in 1965. Yet it rose dramatically to 37% of GNI by 1990 and remained close to 40% in the 2000–2007 period (though the ratio has fallen in the last few years). Still, South Korea's ascent has seemed to epitomize Rostow's notion of an economy in the midst of a "drive to maturity," well on its way toward mastering the range of currently available technologies; and appears to be entering an "age of high mass consumption."

Rostow claimed that maturity is attained some 60 years after takeoff begins, but he never denied unique experiences for each country, and it may well be that the gap between traditional and advanced technology can actually be crossed more quickly at later stages of development. The larger the productivity gap is between countries, the quicker income can grow once takeoff has been achieved. South Korea certainly meets the "maturity" criterion of becoming integrated with the world economy through new types of exports and imports. Although the fact that India, rather than South Korea, was picked by Rostow for takeoff shows the limits of the predictive powers of the stages theory, the case of South Korea nonetheless offers some confirmation of their value.

Structural Patterns South Korea also confirms some patterns-of-development structural-change models. In particular, South Korea's rise over the past generation has been characterized by rapidly increasing agricultural productivity, shifts of labor from agriculture to industry, the steady growth of the capital stock and of education and skills, and the demographic transition from high to low fertility. These changes have occurred while South Korea's per capita income has grown by more than 7% annually for the whole 1965–1990 period. Even in the 1990–2002 period, as a more mature economy and in the face of the Asian financial crisis of 1997–1998, the economy grew at a 5.8% rate. In 2002–2011, it grew at less than 4% on average, still substantially higher than most other high-income countries. In the late 1940s and 1950s, South Korea carried out a thoroughgoing land reform, so agriculture was not neglected;

but otherwise its growth through rapid expansion of the percentage of the labor force in industry has broadly conformed with the Lewis model of development. After about 1970, productivity growth in agriculture also increased rapidly, owing in part to a successful integrated rural development program.

Dependence Revolution But South Korea poses a serious challenge to the dependence revolution models. Here is a poor country that became tied in with the international economy: It was strongly dependent in international relations—it was a Japanese colony until 1945 and thereafter wholly dependent on maintaining the goodwill of the United States for defense against invasion by North Korea. It received a large part of its national budget in the form of U.S. aid in the 1950s and both exported and imported a great deal from developed countries, especially the United States and Japan. The shape of the nation's development was thus "conditioned" in large part by export opportunities to developed countries, and dependence theory would predict that retarded development opportunities should result. Yet South Korea today is an OECD member and is widely considered a "graduate" to developed-country status. Of course, dependence theorists could and do claim that South Korea is an exception because of the magnitude of aid it received and the self-interests of the advanced countries in seeing its full successful development because of its role as a bulwark against communism. And the Korean government pursued some particular policies that the dependence school would by and large applaud, including carrying out an extremely active industrial upgrading policy, sharply limiting the role of multinational corporations and deliberately establishing indigenous industries as an alternative, and using debt rather than direct foreign equity investment to finance extraordinary levels of investment. South Korea also implemented one of the most ambitious land reform programs in the developing world and placed strong emphasis on primary rather than university education, two policies of exceptional importance. But this does not explain how South Korea was able to adopt such policies to break out of dependence in the first place.

Neoclassical Counterrevolution South Korea likewise poses a strong challenge to the neoclassical counterrevolution models. The nation was highly interventionist at home and in international trade, with the government making extensive use of development planning, using a wide range of tax breaks and incentives to induce firms to follow government directives and interventions, setting individual company export targets, orchestrating efforts in various industries to upgrade the average technological level, coordinating foreign technology licensing agreements, using monopoly power to get the best deal from competing multinationals, and generally inducing firms to move rapidly up the ladder of (dynamic) comparative advantage (see Chapter 12). These policies addressed real technology and skill-raising market failure problems of development, and at least prior to the 1997 Asian currency crisis, from which Korea quickly recovered, very few cases of glaring government failure can be pointed to in this experience. Of course, it does confirm that firms respond to economic incentives. But it may also be claimed with at least equal force that South Korea provides a compelling example of government's role in overcoming coordination failures, as examined in Chapter 4 and applied to South Korea in the end-of-chapter case study for Chapter 12.

Argentina

In contrast, for Argentina, stages and patterns theories illuminate relatively little economic history, whereas the dependence revolution and neoclassical counterrevolution theories together offer important insights. It remains unclear whether Argentina has now relaunched onto a new growth episode following its 2002 default, as growth has been erratic, foreign exchange reserves falling, and political uncertainty returning.

Stages of Growth The history of Argentina poses a strong challenge to the linear-stages approach. Rostow defined *takeoff* as "the interval when the old blocks and resistances to steady growth are finally overcome.…Growth becomes its normal condition." In 1870, Argentina ranked 11th in the world in per capita income (ahead of Germany); today, it is not even in the top 60. Although Rostow said that in determining a country's stage, technology absorption, not income per inhabitant, is what matters, he dated Argentina's preconditions for takeoff as an extended period before 1914 and concluded that takeoff "in some sense" began in World War I, but "in the mid 1930s…a sustained takeoff was inaugurated, which by and large can now [1960] be

judged to have been successful," concluding that "in Latin America the takeoff has been completed in two major cases (Mexico and Argentina)." Rostow attributes the fact that preconditions were there for some time before takeoff to excessive import of foreign capital over too long a period without increasing domestic savings. (But South Korea was also a heavy foreign borrower until recently.) Argentina certainly met Rostow's criterion of developing manufacturing sectors at a rapid rate.

But now let's look at what happened in Argentina since Rostow put the country forward as an example. According to World Bank data, Argentina had a *negative* growth rate throughout the 1965–1990 period, and in the 1980s, domestic investment shrank at a –8.3% rate, falling back well below Rostow's threshold takeoff investment levels. Although Argentina grew at 3.6% in 1990–2001, it defaulted on its debt in 2002, and the economy shrank 11%, followed by a recovery and resumed if erratic growth. Argentina's share of investment in GDP from 2000 to 2007 was 17%, well under half that of South Korea. Like many other Latin American and African countries in the 1970s, 1980s, and 1990s, Argentina demonstrated that development progress is not irreversible and that sustained growth can come to an end. It remains unclear whether Argentina has now relaunched onto a new growth episode following its 2002 default, as growth has been erratic, foreign exchange reserves falling, and political uncertainty returning.

Structural Patterns Argentina did exhibit many of the usual structural patterns of development as agricultural productivity rose, industrial employment grew (albeit slowly), urbanization took place, fertility fell, and so on. But the fact that many structural regularities of development were observed even as living standards in the country stagnated illustrates some of the shortcomings of relying too much on selected pieces of data without the assistance of guiding theory on how the parts fit together.

Dependence Revolution In contrast to South Korea, the case of Argentina offers some vindication for dependence theories in that the country relied to a large extent on exporting primary goods, and the real prices of these goods fell compared to imports. Multinational corporations played a large role, and Argentina was unable to create its own viable manufacturing *export* industries, ultimately having to submit to stringent structural-adjustment programs, sell state industries to foreign companies, and other constraints. Dependence theorists can claim with some justification that Argentina's conditioned development fell victim to developed-country economic interests, especially those of British and American corporations.

Neoclassical Counterrevolution But Argentina also offers some vindication for neoclassical counterrevolution theory in that faulty interventionist restrictions, inefficient state enterprise, bias against production for exports, and unnecessary red tape ended up hurting industry and entrepreneurship. Government policy consistently seemed to support privileged interests rather than broad goals of development, and government failure was usually worse than market failure in the country. In the mid-1990s, a large-scale liberalization and privatization program seemed to be beginning to reinvigorate growth in Argentina. Unfortunately, by 2002, four years of recession culminated in economic implosion as the economy collapsed under the weight of rising internal fiscal and external trade deficits, caused in part by the linking of the peso to a strong U.S. dollar. Dependence theorists claimed vindication. The recovery and comparatively rapid growth since 2004, despite Argentina's 2002 debt default, showed that single explanations for development success and failure are rarely adequate. Yet Argentina's economic recovery remains vulnerable—for example, growth dropped from about 9% in 2010 and 2011 to under 2% in 2012—and political institutions remain somewhat unsettled.

Summary

It is interesting that as South Korea provides a challenge to both dependence and neoclassical theory—the starkest opposites in many ways—Argentina can be viewed more as a vindication for these two theories. And whereas South Korea serves more to confirm linear stages of growth and conclusions about structural patterns of development, Argentina poses challenges to their universal importance. Yet each of these four approaches has added something vital to our understanding of development experiences and prospects in just these two countries. South Korea also illustrates the role of government in overcoming coordination failures, while Argentina illustrates how government can become part of a bad equilibrium, topics explored in depth in the next chapter. ■

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Concepts for Review

Autarky
Average product
Capital-labor ratio
Capital-output ratio
Center
Closed economy
Comprador groups
Dependence
Dominance
Dualism
False-paradigm model
Free market
Free-market analysis
Harrod-Domar growth model
Lewis two-sector model
Marginal product
Market failure
Market-friendly approach
Necessary condition
Neoclassical counterrevolution
Neocolonial dependence model
Net savings ratio
Open economy
Patterns-of-development analysis
Periphery
Production function
Public-choice theory
Self-sustaining growth
Solow neoclassical growth model
Stages-of-growth model of development
Structural-change theory
Structural transformation
Sufficient condition
Surplus labor
Underdevelopment

Questions for Discussion

1. Explain the essential distinctions among the stages-of-growth theory of development, the structural-change models of Lewis and Chenery, and the theory of international dependence in both its neo-Marxist and false-paradigm conceptualizations. Which model do you think provides the best explanation of the situation in most developing nations? Explain your answer.
2. Explain the meaning of *dualism* and *dual societies.* Do you think that the concept of dualism adequately portrays the development picture in most developing countries? Explain your answer.
3. Some people claim that international dualism and domestic dualism are merely different manifestations of the same phenomenon. What do you think they mean by this, and is it a valid conceptualization? Explain your answer.
4. What is meant by the term *neoclassical counterrevolution*? What are its principal arguments, and how valid do you think they are? Explain your answer.
5. Given the diversity of developing countries, do you think that there could ever be a single, unified theory of development? Explain your answer.
6. Is the neoclassical, free-market theory necessarily incompatible with dependence theory? How might these two approaches work together?
7. In what ways do developing countries depend on rich countries? In what ways is the opposite true?

Notes

1. *The Stages of Economic Growth: A Non-Communist Manifesto,* 3rd Edition by W. W. Rostow. Copyright © 1960, 1971, 1990 Cambridge University Press. Reprinted with permission.
2. This model is named after two economists, Sir Roy Harrod of England and Professor Evesey Domar of the United States, who separately but concurrently developed a variant of it in the early 1950s.
3. In traditional presentations, including of this text, the symbol k has been used for this capital-*output* ratio, rather than the symbol c as used here. However, we use the symbol c to make sure it is not misidentified with the use (also traditional) of the symbol k in the Solow growth model (which stands there for the capital-*labor* ratio), discussed later in this chapter. Note also that in practice a developing economy may utilize capital inefficiently, that is, more than strictly required from an engineering standpoint.
4. To see this simply, note that $Y \quad K/c$, so $\Delta Y \quad (1/c)$ ΔK. But ΔK by definition is net investment, I^N, which is given by gross investment, I^G, less allowance for depreciation, which in turn is given by the rate of depreciation times the capital stock, δK. That is, ΔK $I^G - \delta K$. But gross investment is identically equal to gross savings, S^G. So $\Delta Y \quad (1/c)[S^G - \delta K]$. (Note that the gross savings rate, s^G, is given by S^G/Y.) Dividing both sides by Y and simplifying gives $\Delta Y/Y \quad s^G/c - \delta$, the result in the text.
5. W. Arthur Lewis, "Economic development with unlimited supplies of labour," *Manchester School* 22 (1954): 139–191; John C. H. Fei and Gustav Ranis, *Development of the Labor Surplus Economy: Theory and Policy* (Homewood, Ill.: Irwin, 1964). See also Ragnar Nurkse, *Problems of Capital Formation in Underdeveloped Countries* (New York: Oxford University Press, 1953).
6. For interesting applications to the recent growth experience of China, see Nazrul Islam and Kazuhiko Yokota, "Lewis growth model and China's industrialization," *Asian Economic Journal* 22 (2008): 359–396; Xiaobo Zhang, Jin Yang, and Shenglin Wang, "China has reached the Lewis turning point," IFPRI discussion paper No. 977 (Washington, D.C.: International Food Policy Research Institute, 2010). Cai Fang, "A turning point for China and challenges for further development and reform," *Zhongguo shehui kexue (Social Sciences in China)*, 3 (2007) 4–12; and Huang Yiping and Jiang Tingsong, *What Does the Lewis Turning Point Mean for China? A Computable General Equilibrium Analysis,* China Center for Economic Research Working Paper 2010-03, March 2010. See also Gary Fields, "Dualism in the labor market: A perspective on the Lewis model after half a century," *Manchester School* 72 (2004): 724–735. Research on models of structural change continues; for an interesting contribution, see Douglas Gollin, Stephen L. Parente, and Richard Rogerson, "The food problem and the evolution of international income levels," *Journal of Monetary Economics* 54 (2007): 1230–1255.
7. See Hollis B. Chenery, *Structural Change and Development Policy* (Baltimore: Johns Hopkins University Press, 1979); Hollis B. Chenery and Moshe Syrquin, *Patterns of Development, 1950–70* (London: Oxford University Press, 1975); Moshe Syrquin, "Patterns of structural change," in *Handbook of Development Economics*, eds. Hollis B. Chenery and T. N. Srinivasan (Amsterdam: Elsevier, 1989), vol. 1, pp. 205–273; and Hollis B. Chenery, Sherman Robinson, and Moshe Syrquin, *Industrialization and Growth: A Comparative Study,* (New York: Oxford University Press, 1986). For a succinct summary of research by Simon Kuznets, see his "Modern economic growth, findings and reflections," *American Economic Review* 63 (1973): 247–258.
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9. See Paul Baran, *The Political Economy of Neo-Colonialism* (London: Heinemann, 1975). An outstanding literature review is contained in Keith Griffin and John Gurley, "Radical analysis of imperialism, the Third World, and the transition to socialism: A survey article," *Journal of Economic*

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10. A provocative and well-documented application of this argument to the case of Kenya can be found in Colin Leys, *Underdevelopment in Kenya: The Political Economy of Neo-Colonialism* (London: Heinemann, 1975).
11. Theotonio Dos Santos, "The crisis of development theory and the problem of dependence in Latin America," in *Underdevelopment and Development*, ed. Henry Bernstein (Harmondsworth, England: Penguin, 1973), pp. 57–80. See also Benjamin J. Cohen, *The Question of Imperialism: The Political Economy of Dominance and Dependence* (New York: Basic Books, 1973).
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16. The Solow model is set forth in Robert Solow, "A contribution to the theory of economic growth," *Quarterly Journal of Economics* 70 (1956): 65–94.
17. For a discussion of these and related issues, see Heinz W. Arndt, "'Market failure' and underdevelopment," *World Development* 16 (1988): 210–229.
18. On identifying and addressing local constraints, see Ricardo Hausmann, Dani Rodrik, and Andrés Velasco, "Growth diagnostics," *One Economics, Many Recipes: Globalization, Institutions, and Economic Growth*, by Dani Rodrik (Princeton, N.J.: Princeton University Press, 2007). See Chapter 4 for more details.
19. An additional approach, reviewed in Chapter 2, is the new institutionalism. It has been alternatively

viewed as a component of the neoclassical counterrevolution or of the postneoclassical mainstream development economics. The institutions include property rights, prices and market structures, money and financial institutions, firms and industrial organization, and relationships between government and markets. The basic message of the new institutionalism is that even in a neoclassical world, the success or failure of development efforts will depend on the nature, existence, and proper functioning of a country's fundamental institutions. The origins of the new institutionalism can be found in the theory of institutions pioneered by the work of Nobel laureate Ronald Coase. See Ronald H. Coase, "The institutional structure of production," *American Economic Review* 82 (1992): 713–719; Oliver E. Williamson, "The institutions and governance of economic development and reform," in *Proceedings of the World Bank Annual Conference on Development Economics, 1994* (Washington, D.C.: World Bank, 1995); and Jean-Jacques Laffont, "Competition, conformation and development," *Annual World Bank Conference on Development Economics, 1998* (Washington, D.C.: World Bank, 1999). Writings of Nobel laureate Douglass North have been particularly influential, notably *Institutions, Institutional Change, and Economic Performance* (New York: Cambridge University Press, 1990).

Appendix 3.1

Components of Economic Growth

Three components of economic growth are of prime importance:

1. Capital accumulation, including all new investments in land, physical equipment, and human resources through improvements in health, education, and job skills
2. Growth in population and hence eventual growth in the labor force
3. Technological progress—new ways of accomplishing tasks

In this appendix, we look briefly at each.

Capital Accumulation

Capital accumulation results when some proportion of present income is saved and invested in order to augment future output and income. New factories, machinery, equipment, and materials increase the physical **capital stock** of a nation (the total net real value of all physically productive capital goods) and make it possible for expanded output levels to be achieved. These directly productive investments are supplemented by investments in what is known as social and **economic infrastructure—**roads, electricity, water and sanitation, communications, and the like—which facilitates and integrates economic activities. For example, investment by a farmer in a new tractor may increase the total output of the crops he can produce, but without adequate transport facilities to get this extra product to local commercial markets, his investment may not add anything to national food production.

Capital accumulation Increasing a country's stock of real *capital* (net *investment* in fixed assets). To increase the production of capital *goods* necessitates a reduction in the production of consumer goods.

Capital stock The total amount of physical goods existing at a particular time that have been produced for use in the production of other goods and services.

Economic infrastructure The amount of physical and financial capital embodied in roads, railways, waterways, airways, and other transportation and communications, plus other facilities such as water supplies, financial institutions, electricity, and public services such as health and education.

There are less direct ways to invest in a nation's resources. The installation of irrigation systems may improve the quality of a nation's agricultural land by raising productivity per hectare. If 100 hectares of irrigated land can produce the same output as 200 hectares of nonirrigated land using the same other inputs, the installation of such irrigation is the equivalent of doubling the quantity of nonirrigated land. Use of chemical fertilizers and the control of insects with pesticides may have equally beneficial effects in raising the productivity of existing farmland. All these forms of investment are ways of improving the quality of existing land resources. Their effect in raising the total stock of productive land is, for all practical purposes, indistinguishable from the simple clearing of hitherto unused arable land.

Similarly, investment in human resources can improve its quality and thereby have the same or even a more powerful effect on production as an increase in human numbers. Formal schooling, vocational and on-the-job training programs, and adult and other types of informal education may all be made more effective in augmenting human skills as a result of direct investments in buildings, equipment, and materials (e.g., books, film projectors, personal computers, science equipment, vocational tools, and machinery such as lathes and grinders). The advanced and relevant training of teachers, as

well as good textbooks in economics, may make an enormous difference in the quality, leadership, and productivity of a given labor force. Improved health can also significantly boost productivity. The concept of investment in human resources and the creation of **human capital** is therefore analogous to that of improving the quality and thus the productivity of existing land resources through strategic investments.

All of these phenomena and many others are forms of investment that lead to capital accumulation. Capital accumulation may add new resources (e.g., the clearing of unused land) or upgrade the quality of existing resources (e.g., irrigation), but its essential feature is that it involves a trade-off between present and future consumption—giving up a little now so that more can be had later, such as giving up current income to stay in school.

Population and Labor Force Growth

Population growth, and the associated eventual increase in the labor force, have traditionally been considered a positive factor in stimulating economic growth. A larger labor force means more productive workers, and a large overall population increases the potential size of domestic markets. However, it is questionable whether rapidly growing supplies of workers in developing countries with a surplus of labor exert a positive or a negative influence on economic progress (see Chapter 6 for an in-depth discussion of the pros and cons of population growth for economic development). Obviously, it will depend on the ability of the economic system to absorb and productively employ these added workers—an ability largely associated with the rate and kind of capital accumulation and the availability of related factors, such as managerial and administrative skills.

Given an initial understanding of these first two fundamental components of economic growth and disregarding for a moment the third (technology), let us see how they interact via the **production possibility curve** to expand society's potential total output of all goods. For a given technology and a given amount of physical and human resources, the production possibility curve portrays the *maximum* attainable output combinations of any two commodities—say, rice and radios—when all resources are fully and efficiently employed. Figure A3.1.1 shows two production possibility curves for rice and radios.

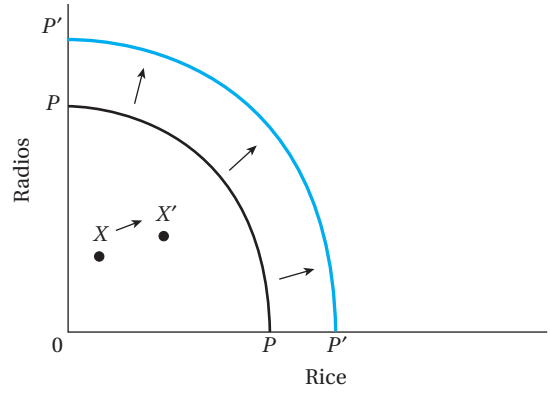
Production possibility curve
A curve on a graph indicating alternative combinations of two commodities or categories of commodities (e.g., agricultural and manufactured goods) that can be produced when all the available factors of production are efficiently employed. Given available resources and technology, the curve sets the boundary between the attainable and the unobtainable.

Initial possibilities for the production of rice and radios are shown by the curve PP. Now suppose that without any change in technology, the quantity of physical and human resources were to double as a result of either investments that improved the quality of the existing resources or investment in new resources—land, capital, and, in the case of larger families, labor. Figure A3.1.1 shows that this doubling of total resources will cause the entire production possibility curve to shift uniformly outward from PP to $P'P'$. More radios and more rice can now be produced.

Because these are assumed to be the only two goods produced by this economy, it follows that the gross domestic product (the total value of all goods and services produced) will be higher than before. In other words, the process of economic growth is under way.

Note that even if the country in question is operating with underutilized physical and human resources, as at point X in Figure A3.1.1, a growth

FIGURE A3.1.1 Effect of Increases in Physical and Human Resources on the Production Possibility Frontier



of productive resources can result in a higher total output combination, as at point X', even though there may still be widespread unemployment and underutilized or idle capital and land. But note also that there is nothing deterministic about resource growth leading to higher output growth. This is not an economic law, as attested by the poor growth record of many contemporary developing countries. Nor is resource growth even a necessary condition for *short-run* economic growth because the better utilization of idle existing resources can raise output levels substantially, as portrayed in the movement from X to X' in Figure A3.1.1. Nevertheless, in the *long run*, the improvement and upgrading of the quality of existing resources and new investments designed to expand the quantity of these resources are principal means of accelerating the growth of national output.

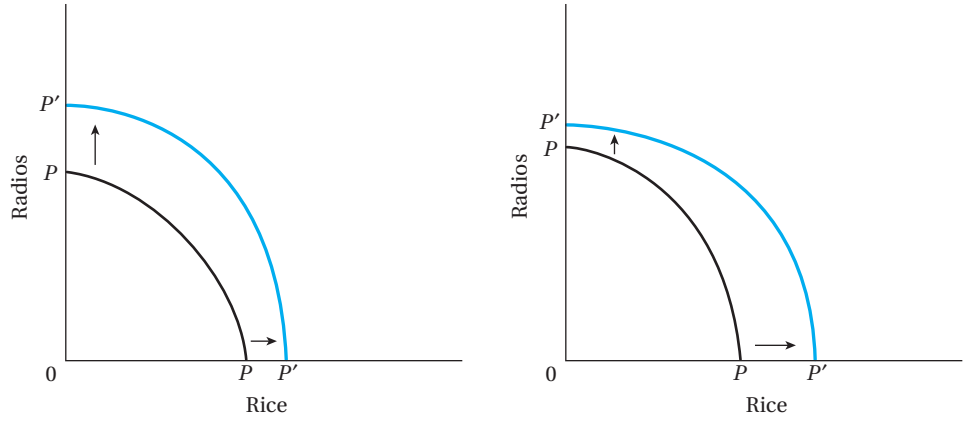
Now, instead of assuming the proportionate growth of *all* factors of production, let us assume that, say, only capital or only land is increased in quality and quantity. Figure A3.1.2 shows that if radio manufacturing is a relatively large user of capital equipment and rice production is a relatively land-intensive process, the shifts in society's production possibility curve will be more pronounced for radios when capital grows rapidly (Figure A3.1.2a) and for rice when the growth is in land quantity or quality (Figure A3.1.2b). However, because under normal conditions both products will require the use of both factors as productive inputs, albeit in different combinations, the production possibility curve still shifts slightly outward along the rice axis in Figure A3.1.2a when only capital is increased and along the radio axis in Figure A3.1.2b when only the quantity or quality of land resources is expanded.

Technological Progress

It is now time to consider the third, and to many economists the most important, source of economic growth, **technological progress**. In its simplest form, technological progress results from new and improved ways of accomplishing traditional tasks such as growing crops, making clothing, or building

Technological progress Increased application of new scientific knowledge in the form of inventions and innovations with regard to both physical and human capital.

FIGURE A3.1.2 Effect of Growth of Capital Stock and Land on the Production Possibility Frontier



(a) Growth in capital stock (b) Growth in land resources

a house. There are three basic classifications of technological progress: neutral, laborsaving, and capital-saving.

Neutral technological progress Higher output levels achieved with the same quantity or combination of all factor inputs.

Neutral technological progress occurs when higher output levels are achieved with the same quantity and combinations of factor inputs. Simple innovations like those that arise from the division of labor can result in higher total output levels and greater consumption for all individuals. In terms of production possibility analysis, a neutral technological change that, say, doubles total output is conceptually equivalent to a doubling of all productive inputs. The outward-shifting production possibility curve of Figure A3.1.1 could therefore also be a diagrammatic representation of neutral technological progress.

By contrast, technological progress may result in savings of either labor or capital (i.e., higher levels of output can be achieved with the same quantity of labor or capital inputs). Computers, the Internet, automated looms, high-speed electric drills, tractors, mechanical ploughs—these and many other kinds of modern machinery and equipment can be classified as products of **laborsaving technological progress**. Technological progress since the late nineteenth century has consisted largely of rapid advances in laborsaving technologies for producing everything from beans to bicycles to bridges.

Laborsaving technological progress The achievement of higher output using an unchanged quantity of labor inputs as a result of some invention (e.g., the computer) or innovation (such as assembly-line production).

Capital-saving technological progress Technological progress that results from some invention or innovation that facilitates the achievement of higher output levels using the same quantity of inputs of capital.

Capital-saving technological progress is a much rarer phenomenon. But this is primarily because most of the world's scientific and technological research is conducted in developed countries, where the mandate is to save labor, not capital. In the labor-abundant (capital-scarce) developing countries, however, capital-saving technological progress is what is needed most. Such progress results in more efficient (lower-cost) labor-intensive methods of production—for example, hand- or rotary-powered weeders and threshers, foot-operated bellows pumps, and back-mounted mechanical sprayers for small-scale agriculture. The indigenous development of low-cost, efficient, labor-intensive (capital-saving) techniques of production is one of the essential

ingredients in any long-run employment-oriented development strategy (see Appendix 5.1).

Technological progress may also be labor- or capital-augmenting. **Labor-augmenting technological progress** occurs when the quality or skills of the labor force are upgraded—for example, by the use of videotapes, televisions, and other electronic communications media for classroom instruction. Similarly, **capital-augmenting technological progress** results in the more productive use of existing capital goods—for example, the substitution of steel for wooden plows in agricultural production.

Labor-augmenting technological progress Technological progress that raises the productivity of an existing quantity of labor by general education, on-the-job training programs, and so on.

Capital-augmenting technological progress Technological progress that raises the productivity of capital by innovation and inventions.

We can use our production possibility curve for rice and radios to examine two very specific examples of technological progress as it relates to output growth in developing countries. In the 1960s, agricultural scientists at the International Rice Research Institute in the Philippines developed a new and highly productive hybrid rice seed, known as IR-8, or "miracle rice." These new seeds, along with later further scientific improvements, enabled some rice farmers in parts of South and Southeast Asia to double or triple their yields in a matter of a few years. In effect, this technological progress was "embodied" in the new rice seeds (one could also say it was "land-augmenting"), which permitted higher output levels to be achieved with essentially the same complementary inputs (although more fertilizer and pesticides were recommended). In terms of our production possibility analysis, the higher-yielding varieties of hybrid rice could be depicted, as in Figure A3.1.3, by an outward shift of the curve along the rice axis with the intercept on the radio axis remaining essentially unchanged (i.e., the new rice seeds could not be directly used to increase radio production).

In terms of the technology of radio production, the invention of transistors has probably had as significant an impact on communications as the development of the steam engine had on transportation. Even in the remotest parts of Africa, Asia, and Latin America, the transistor radio has become a prized possession. The introduction of the transistor, by obviating the need

FIGURE A3.1.3 Effect of Technological Change in the Agricultural Sector on the Production Possibility Frontier

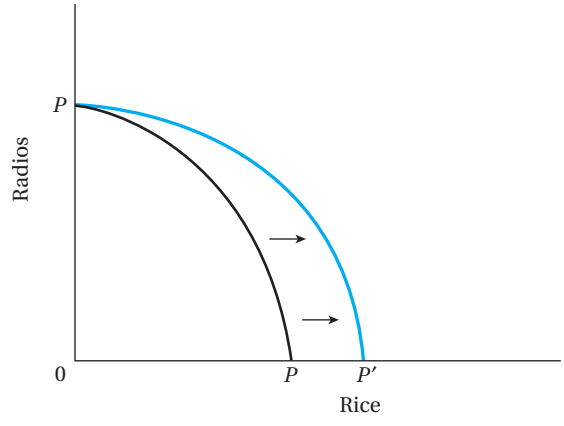
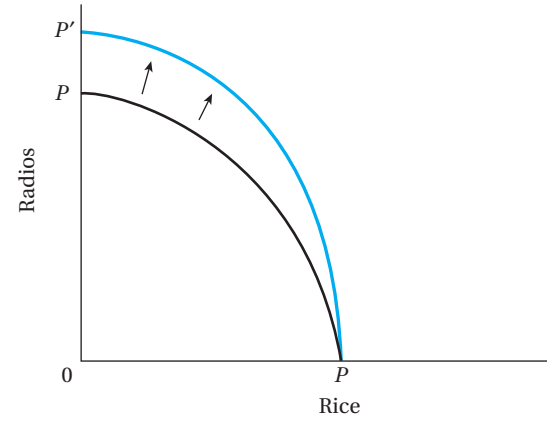


FIGURE A3.1.4 Effect of Technological Change in the Industrial Sector on the Production Possibility Frontier



for complicated, unwieldy, and fragile tubes, led to an enormous growth of radio production. The production process became less complicated, and workers were able to increase their total productivity significantly. Figure A3.1.4 shows that as in the case of higher-yielding rice seeds, the technology of the transistor can be said to have caused the production possibility curve to rotate outward along the vertical axis. For the most part, the rice axis intercept remains unchanged (although perhaps the ability of rice paddy workers to listen to music on their transistor radio while working may have made them more productive!).

Conclusion

The sources of economic progress can be traced to a variety of factors, but by and large, investments that improve the quality of existing physical and human resources, increase the quantity of these same productive resources, and raise the productivity of all or specific resources through invention, innovation, and technological progress have been and will continue to be primary factors in stimulating economic growth in any society. The production possibility framework conveniently allows us to analyze the production choices open to an economy, to understand the output and opportunity cost implications of idle or underutilized resources, and to portray the effects on economic growth of increased resource supplies and improved technologies of production.

Appendix 3.2

The Solow Neoclassical Growth Model

The Solow neoclassical growth model, for which Robert Solow of the Massachusetts Institute of Technology received the Nobel Prize, is probably the best-known model of economic growth.[1] Although in some respects Solow's model describes a developed economy better than a developing one, it remains a basic reference point for the literature on growth and development. It implies that economies will conditionally converge to the same level of income if they have the same rates of savings, depreciation, labor force growth, and productivity growth. Thus, the Solow model is the basic framework for the study of convergence across countries (see Chapter 2). In this appendix, we consider this model in further detail.

The key modification from the Harrod-Domar (or *AK*) growth model, considered in this chapter, is that the Solow model allows for substitution between capital and labor. In the process, it assumes that there are diminishing returns to the use of these inputs.

The aggregate production function, $Y = F(K, L)$ is assumed characterized by constant returns to scale. For example, in the special case known as the Cobb-Douglas production function, at any time t we have

$$Y(t) = K(t)^{\alpha}(A(t)L(t))^{1-\alpha} \qquad \text{(A3.2.1)}$$

where Y is gross domestic product, K is the stock of capital (which may include human capital as well as physical capital), L is labor, and $A(t)$ represents the productivity of labor, which grows over time at an exogenous rate.

Because of constant returns to scale, if all inputs are increased by the same amount, say 10%, then output will increase by the same amount (10% in this case). More generally,

$$\gamma Y = F(\gamma K, \gamma L)$$

where γ is some positive amount (1.1 in the case of a 10% increase).

Because γ can be any positive real number, a mathematical trick useful in analyzing the implications of the model is to set $\gamma = 1/L$ so that

$$Y/L = f(K/L, 1) \text{ or } y = f(k) \qquad \text{(A3.2.2)}$$

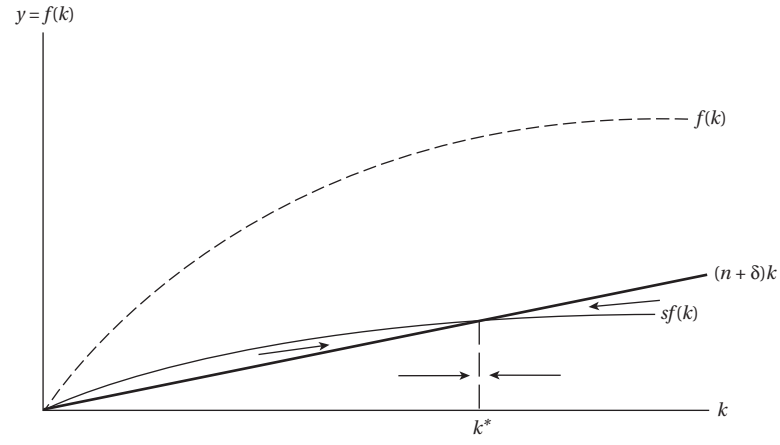
Lowercase variables are expressed in per-worker terms in these equations. The concave shape of $f(k)$—that is, increasing at a decreasing rate—reflects diminishing returns to capital per worker, as can be seen in Figure A3.2.1.[2] In the Harrod-Domar model, this would instead be a straight, upward-sloping line.

This simplification allows us to deal with just one argument in the production function. For example, in the Cobb-Douglas case introduced in Equation A3.2.1,

$$y = Ak^{\alpha} \qquad \text{(A3.2.3)}$$

This represents an alternative way to think about a production function, in which everything is measured in quantities per worker. Equation A3.2.3 states that output per worker is a function that depends on the amount of capital per worker. The more capital with which each worker has to work, the more output that worker can produce. The labor force grows at rate n per year, say,

FIGURE A3.2.1 Equilibrium in the Solow Growth Model



and labor productivity growth, the rate at which the value of A in the production function increases, occurs at rate λ. The total capital stock grows when savings are greater than depreciation, but capital per worker grows when savings are also greater than what is needed to equip new workers with the same amount of capital as existing workers have.

The Solow equation (Equation A3.2.4) gives the growth of the capital-labor ratio, k (known as capital deepening), and shows that the growth of k depends on savings $sf(k)$, after allowing for the amount of capital required to service depreciation, δk, and after capital widening, that is, providing the existing amount of capital per worker to net new workers joining the labor force, nk. That is,

$$\Delta k = sf(k) - (\delta + n)k \tag{A3.2.4}$$

Versions of the Solow equation are also valid for other growth models, such as the Harrod-Domar model.

For simplicity, we are assuming for now that A remains constant. In this case, there will be a state in which output and capital per worker are no longer changing, known as the *steady state*. (If A is increasing, the corresponding state will be one in which capital per effective worker is no longer changing. In that case, the number of effective workers rises as A rises; this is because when workers have higher productivity, it is as if there were extra workers on the job.) To find this steady state, set $\Delta k = 0$:

$$sf(k^*) = (\delta + n)k^* \tag{A3.2.5}$$

The notation k^* means the level of capital per worker when the economy is in its steady state. That this equilibrium is stable can be seen from Figure A3.2.1.[3]

The capital per worker k^* represents the steady state. If k is higher or lower than k^*, the economy will return to it; thus k^* is a stable equilibrium. This stability is seen in the diagram by noting that to the left of k^*, $k < k^*$. Looking at the diagram, we see that in this case, $(n + \delta)k < sf(k)$. But now looking at the Solow equation (Equation A3.2.4), we see that when $(n + \delta)k < sf(k)$, $\Delta k > 0$. As a result, k in the economy is growing toward the equilibrium point k^*. By similar reasoning to the right of k^*, $(n + \delta)k > sf(k)$, and as a result, $\Delta k < 0$

(again refer to Equation A3.2.4), and capital per worker is actually shrinking toward the equilibrium k^*.[4] Note that in the Harrod-Domar model, $sf(k)$ would be a straight line, and provided that it was above the $(n + \delta)k$ line, growth in capital per worker—and output per worker—would continue indefinitely.

Equation (A3.2.5) has an interpretatation that the savings per worker, $sf(k^*)$, is just equal to δk^*, the amount of capital (per worker) needed to replace depreciating capital, plus nk^*, the amount of capital (per worker) that needs to be added due to population (labor force) growth.

The Solow model has a (single) equilibrium income per worker, again given by Equation (A3.2.5) above. In contrast, the Harrod Domar equilibrium is (constant, balanced) growth—there is no equilibrium income per worker. Essentially, this is because $f(k)$—and hence $sf(k)$—does not exhibit diminishing returns; rather, it is a straight line. That is, growth continues as long as the line $sf(k)$ stays above the line $(\delta + n)k$.

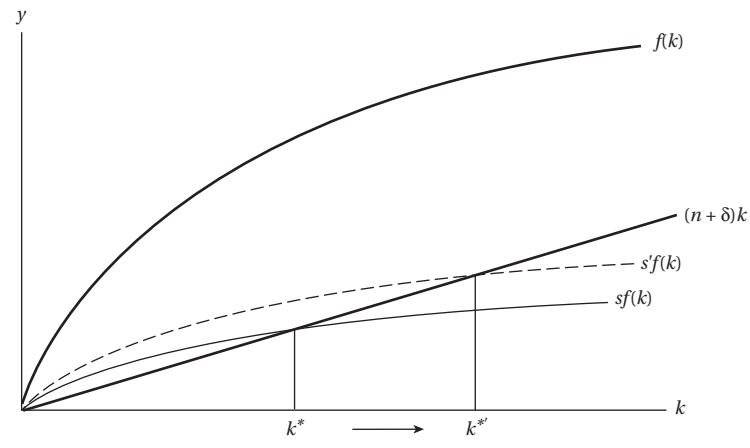
It is instructive to consider what happens in the Solow neoclassical growth model if we increase the rate of savings, s. A temporary increase in the rate of output growth is realized as we increase k by raising the rate of savings. We return to the original steady-state growth rate later, though at a higher level of output per worker in each later year. The key implication is that unlike in the Harrod-Domar (AK) analysis, in the Solow model an increase in s will not increase growth in the long run; it will only increase the equilibrium k^*. That is, after the economy has time to adjust, the capital-labor ratio increases, and so does the output-labor ratio, but not the rate of growth. The effect is shown in Figure A3.2.2, in which savings is raised to s'. In contrast, in the Harrod-Domar model, an increase in s raises the growth rate. (This is because in the Harrod-Domar model, $sf(k)$ becomes a straight line from the origin that does not cross $(n + \delta)k$; and so, as we assume that $sf(k)$ lies above $(n + \delta)k$, growth continues at the now higher Harrod-Domar rate—a result that was represented, for example, in the comparison of Equations 3.8 and 3.9.)

Note that the neoclassical growth model (Equation A3.2.5 and Figure A3.2.1) implies that while economies will (conditionally) converge to the same level of income per worker *other things equal*, it does not imply unconditional convergence. This can be seen clearly in Figure A3.2.2: We can interpret the alternative savings rates (s and s') in the figure as corresponding to those prevailing in two different countries; the country with the higher savings rate converges to a higher equilibrium income per worker.

Note carefully that in the Solow model, an increase in s does raise equilibrium output per person—which is certainly a valuable contribution to development—just not the equilibrium rate of growth. And the growth rate does increase temporarily as the economy kicks up toward the higher equilibrium capital per worker. Moreover, simulations based on cross-national data suggest that if s is increased, the economy may not return even halfway to its steady state for decades.[5] That is, for practical purposes of policymaking in developing countries, even if the Solow model is an accurate depiction of the economy, an increase in savings may substantially increase the growth rate for many decades to come. (Both theoretically and empirically, the link between the rate of savings and the rate of growth remains controversial.)

Finally, it is possible that the rate of savings (and hence investment) is positively related to the rate of technological progress itself so that the growth of A depends on s. This could be the case if investment uses newer-vintage

FIGURE A3.2.2 The Long-Run Effect of Changing the Savings Rate in the Solow Model



capital and hence is more productive, if investment represents innovation in that it solves problems faced by the firm, and if other firms see what the investing firm has done and imitate it ("learning by watching"), generating externalities. This leads to a model between the standard Solow model and the endogenous growth models such as the one examined in Appendix 3.3.

Notes

1. Robert M. Solow, "A contribution to the theory of economic growth," *Quarterly Journal of Economics* 70 (1956): 65–94.
2. Note that the symbol k is used for K/L and not for K/Y, as it is used in many expositions (including previous editions of this text) of the *AK* or Harrod-Domar model.
3. Readers with more advanced mathematical training may note that Figure A3.2.1 is a phase diagram, which applies given that the Inada conditions hold: that the marginal product of k goes to infinity as k goes to zero and goes to zero as k goes to infinity (this follows from Inada conditions assumed separately for capital and labor inputs). This diminishing-returns feature drives results of the Solow model.
4. Note that in the Solow model with technological progress, that is, growth of A, the capital-labor ratio grows to keep pace with the effective labor force, which is labor power that is augmented by its increasing productivity over time.
5. See N. Gregory Mankiw, David Romer, and David N. Weil, "A contribution to the empirics of economic growth," *Quarterly Journal of Economics* 107 (1992): 407–437. This article shows that when human capital is accounted for, as well as physical capital, the Solow model does a rather good job of explaining incomes and growth across countries. For a critical view, see William Easterly and Ross Levine, "It's not factor accumulation: Stylized facts and growth models," *World Bank Economic Review* 15 (2001): 177–219, with the reply by Robert M. Solow, "Applying growth theory across countries," *World Bank Economic Review* 15 (2001): 283–288. For time-series evidence that the Solow model does a good job of explaining even the case of South Korean growth, see Edward Feasel, Yongbeom Kim, and Stephen C. Smith, "Investment, exports, and output in South Korea: A VAR approach to growth empirics," *Review of Development Economics* 5 (2001): 421–432.

Appendix 3.3

Endogenous Growth Theory

Motivation for Endogenous Growth Theory

The mixed performance of neoclassical theories in illuminating the sources of long-term economic growth has led to dissatisfaction with traditional growth theory. In fact, according to traditional theory, there is no intrinsic characteristic of economies that causes them to grow over extended periods of time. The literature is instead concerned with the dynamic process through which capital-labor ratios approach long-run equilibrium levels. In the absence of external "shocks" or technological change, which is not explained in the neoclassical model, all economies will converge to zero growth. Hence, rising per capita GNI is considered a temporary phenomenon resulting from a change in technology or a short-term equilibrating process in which an economy approaches its long-run equilibrium.

Any increases in GNI that cannot be attributed to short-term adjustments in stocks of either labor or capital are ascribed to a third category, commonly referred to as the **Solow residual**. This residual is responsible for roughly 50% of historical growth in the industrialized nations.[1] In a rather ad hoc manner, neoclassical theory credits the bulk of economic growth to an exogenous or completely independent process of technological progress. Though intuitively plausible, this approach has at least two insurmountable drawbacks. First, using the neoclassical framework, it is impossible to analyze the determinants of technological advance because it is completely independent of the decisions of economic agents. And second, the theory fails to explain large differences in residuals across countries with similar technologies.

Solow residual The proportion of long-term economic growth not explained by growth in labor or capital and therefore assigned primarily to exogenous technological change.

According to neoclassical theory, the low capital-labor ratios of developing countries promise exceptionally high rates of return on investment. The free-market reforms impressed on highly indebted countries by the World Bank and the International Monetary Fund should therefore have prompted higher investment, rising productivity, and improved standards of living. Yet even after the prescribed liberalization of trade and domestic markets, many developing countries experienced little or no growth and failed to attract new foreign investment or to halt the flight of domestic capital. The frequently anomalous behavior of developing-world capital flows (from poor to rich nations) helped provide the impetus for the development of the concept of **endogenous growth theory** or, more simply, the **new growth theory**.

Endogenous growth theory (new growth theory) Economic growth generated by factors within the production process (e.g., increasing returns or induced technological change) that are studied as part of a growth model.

The new growth theory provides a theoretical framework for analyzing endogenous growth, persistent GNI growth that is determined by the system governing the production process rather than by forces outside that system. In contrast to traditional neoclassical theory, these models hold GNI growth to be a natural consequence of long-run equilibrium. The principal motivations of the new growth theory are to explain both growth rate differentials across countries and a greater proportion of the growth observed. More succinctly, endogenous growth theorists seek to explain the factors that determine the size of λ, the rate of growth of GDP that is left unexplained and exogenously determined in the Solow neoclassical growth equation (i.e., the Solow residual).

Models of endogenous growth bear some structural resemblance to their neoclassical counterparts, but they differ considerably in their underlying assumptions and the conclusions drawn. The most significant theoretical differences stem from discarding the neoclassical assumption of diminishing marginal returns to capital investments, permitting increasing returns to scale in aggregate production, and frequently focusing on the role of externalities in determining the rate of return on capital investments.[2] By assuming that public and private investments in human capital generate external economies and productivity improvements that offset the natural tendency for diminishing returns, endogenous growth theory seeks to explain the existence of increasing returns to scale and the divergent long-term growth patterns among countries. And whereas technology still plays an important role in these models, exogenous changes in technology are no longer necessary to explain long-run growth.

A useful way to contrast the new (endogenous) growth theory with traditional neoclassical theory is to recognize that many endogenous growth theories can be expressed by the simple equation $Y = AK$, as in the Harrod-Domar model. In this formulation, A is intended to represent any factor that affects technology, and K again includes both physical and human capital. But notice that there are no diminishing returns to capital in this formula, and the possibility exists that investments in physical and human capital can generate external economies and productivity improvements that exceed private gains by an amount sufficient to offset diminishing returns. The net result is sustained long-term growth—an outcome prohibited by traditional neoclassical growth theory. Thus, even though the new growth theory reemphasizes the importance of savings and human capital investments for achieving rapid growth, it also leads to several implications for growth that are in direct conflict with traditional theory. First, there is no force leading to the equilibration of growth rates across closed economies; national growth rates remain constant and differ across countries, depending on national savings rates and technology levels. Furthermore, there is no tendency for per capita income levels in capital-poor countries to catch up with those in rich countries with similar savings and population growth rates. A serious consequence of these facts is that a temporary or prolonged recession in one country can lead to a permanent increase in the income gap between itself and wealthier countries.

But perhaps the most interesting aspect of endogenous growth models is that they help explain anomalous international flows of capital that exacerbate wealth disparities between developed and developing countries. The potentially high rates of return on investment offered by developing economies with low capital-labor ratios are greatly eroded by lower levels of **complementary investments** in human capital (education), infrastructure, or research and development (R&D).[3] In turn, poor countries benefit less from the broader social gains associated with each of these alternative forms of capital expenditure.[4] Because individuals receive no personal gain from the positive externalities created by their own investments, the free market leads to the accumulation of less than the optimal level of complementary capital. (We examine these issues further in Chapter 4.)

Complementary investments
Investments that complement and facilitate other productive factors.

Where complementary investments produce social as well as private benefits, governments may improve the efficiency of resource allocation. They can do this by providing public goods (infrastructure) or encouraging private

investment in knowledge-intensive industries, where human capital can be accumulated and subsequent increasing returns to scale generated. Unlike the Solow model, new growth theory models explain technological change as an endogenous outcome of public and private investments in human capital and knowledge-intensive industries. Thus, in contrast to the neoclassical counterrevolution theories examined in Appendix 3.2, models of endogenous growth suggest an active role for public policy in promoting economic development through direct and indirect investments in human capital formation and the encouragement of foreign private investment in knowledge-intensive industries such as computer software and telecommunications.

The Romer Model

Romer endogenous growth model An endogenous growth model in which technological spillovers are present; the economy-wide capital stock positively affects output at the industry level, so there may be increasing returns to scale at the economy-wide level.

To illustrate the endogenous growth approach, we examine the **Romer endogenous growth model** in detail because it addresses technological spillovers (in which one firm or industry's productivity gains lead to productivity gains in other firms or industries) that may be present in the process of industrialization. Thus, it is not only the seminal model of endogenous growth but also one of particular relevance for developing countries. We use a simplified version of Romer's model that keeps his main innovation—in modeling technology spillovers—without presenting unnecessary details of savings determination and other general equilibrium issues.

The model begins by assuming that growth processes derive from the firm or industry level. Each industry individually produces with constant returns to scale, so the model is consistent with perfect competition; and up to this point it matches assumptions of the Solow model. But Romer departs from Solow by assuming that the economy-wide capital stock, $\overline{K}$, positively affects output at the industry level so that there may be increasing returns to scale at the economy-wide level.

Public good An entity that provides benefits to all individuals simultaneously and whose enjoyment by one person in no way diminishes that of anyone else.

It is valuable to think of each firm's capital stock as including its knowledge. The knowledge part of the firm's capital stock is essentially a **public good**, like A in the Solow model, that is spilling over instantly to the other firms in the economy. As a result, this model treats learning by doing as "learning by investing." You can think of Romer's model as spelling out—endogenizing—the reason why growth might depend on the rate of investment (as in the Harrod-Domar model). In this simplification, we abstract from the household sector an important feature of the original model, in order to concentrate on issues concerning industrialization.[5] Formally,

$$Y_i = AK_i^{\alpha} L_i^{1-\alpha} \overline{K}^{\beta} \tag{A3.3.1}$$

We assume symmetry across industries for simplicity, so each industry will use the same level of capital and labor. Then we have the aggregate production function:

$$Y = AK^{\alpha+\beta} L^{1-\alpha} \tag{A3.3.2}$$

To make endogenous growth stand out clearly, we assume that A is constant rather than rising over time; that is, we assume for now that there is

no technological progress. With a little calculus,[6] it can be shown that the resulting growth rate for per capita income in the economy would be

$$g - n = \frac{\beta n}{1 - \alpha - \beta} \tag{A3.3.3}$$

where g is the output growth rate and n is the population growth rate. Without spillovers, as in the Solow model with constant returns to scale, $\beta = 0$, and so per capita growth would be zero (without technological progress).[7]

However, with Romer's assumption of a positive capital externality, $(\beta > 0)$, we have that $g - n > 0$ and Y/L is growing. Now we have endogenous growth, not driven exogenously by increases in productivity. If we also allowed for technological progress, so that λ in the Solow model is greater than zero, growth would be increased to that extent.[8]

Criticisms of Endogenous Growth Theory

An important shortcoming of the new growth theory is that it remains dependent on a number of traditional neoclassical assumptions that are often inappropriate for developing economies. For example, it assumes that there is but a single sector of production or that all sectors are symmetrical. This does not permit the crucial growth-generating reallocation of labor and capital among the sectors that are transformed during the process of structural change.[9] Moreover, economic growth in developing countries is frequently impeded by inefficiencies arising from poor infrastructure, inadequate institutional structures, and imperfect capital and goods markets. Because endogenous growth theory overlooks these very influential factors, its applicability for the study of economic development is limited, especially when country-to-country comparisons are involved. For example, existing theory fails to explain low rates of factory capacity utilization in low-income countries where capital is scarce. In fact, poor incentive structures may be as responsible for sluggish GNI growth as low rates of saving and human capital accumulation. Allocational inefficiencies are common in economies undergoing the transition from traditional to commercialized markets. However, their impact on short- and medium-term growth has been neglected due to the new theory's emphasis on the determinants of long-term growth rates. Finally, empirical studies of the predictive value of endogenous growth theories have to date offered only limited support.[10]

Notes

1. Oliver J. Blanchard and Stanley Fischer, *Lectures on Macroeconomics* (Cambridge, Mass.: MIT Press, 1989).
2. For a short history of the evolution of theoretical models of growth, see Nicholas Stern, "'The determinants of growth," *Economic Journal* 101 (1991): 122–134. For a more detailed but technical discussion of endogenous growth models, see Robert Barro and Xavier Sala-i-Martin, *Economic Growth*, 2nd ed. (Cambridge, Mass.: MIT Press, 2003), and Elhanan Helpman, "Endogenous macroeconomic growth theory," *European Economic Review* 36 (1992): 237–268.
3. See Paul M. Romer, "Increasing returns and long-run growth," *Journal of Political Economy* 94 (1986): 1002–1037; Robert E. Lucas, "On the mechanics of

economic development," *Journal of Monetary Economics* 22 (1988): 3–42; and Robert Barro, "Government spending in a simple model of endogenous growth," *Journal of Political Economy* 98 (1990): 5103–5125.

4. For a concise technical discussion of the importance of human capital as a complementary input, see Robert B. Lucas, "Why doesn't capital flow from rich to poor countries?" *AEA Papers and Proceedings* 80 (1990): 92–96.
5. The specific functional form in Equation A3.3.1, known as Cobb-Douglas production functions, will be assumed for simplicity.
6. By the chain rule,

$$\dot{Y} = \frac{dY}{dt} = \frac{\partial Y}{\partial K}\frac{\partial K}{\partial t} + \frac{\partial Y}{\partial L}\frac{\partial L}{\partial t}$$

By the exponent rule, we know that

$$\frac{\partial Y}{\partial K} = A(\alpha + \beta)K^{\alpha+\beta-1}L^{1-\alpha}$$

$$\frac{\partial Y}{\partial L} = AK^{\alpha+\beta}(1 - \alpha)L^{1-\alpha-1}$$

Combining these three equations, we have

$$\dot{Y} = dY/dt = [AK^{\alpha+\beta}L^{1-\alpha}]\left[(\alpha + \beta)\frac{\dot{K}}{K} + (1 - \alpha)\frac{\dot{L}}{L}\right]$$

The first term in brackets in the preceding expression is of course output, Y. For a steady state, $\dot{K}/K$, $\dot{L}/L$, and $\dot{Y}/Y$ are all constant. From earlier discussion of the Harrod-Domar and Solow models, we know that

$$\dot{K} = I - \delta K = sY - \delta K$$

where δ stands for the depreciation rate.

Dividing this expression through by K, we have

$$\frac{\dot{K}}{K} = \frac{sY}{K} - \delta$$

For $\dot{K}/K$ constant in the preceding expression, we must have Y/K constant. If this ratio is constant, we have

$$\frac{\dot{K}}{K} = \frac{\dot{Y}}{Y} = g, \text{ a constant growth rate}$$

So from the expression for dY/dt above, for the aggregate production function, with $\dot{L}/L = n$, which is also a constant, we have

$$\begin{aligned}\frac{\dot{Y}}{Y} &= (\alpha + \beta)\frac{\dot{K}}{K} + (1 - \alpha)\frac{\dot{L}}{L} \rightarrow g \\ &= (\alpha + \beta)g + (1 - \alpha)n \rightarrow g - n \\ &= \left[\frac{(1 - \alpha) + (\alpha + \beta) - 1}{1 - (\alpha + \beta)}\right]n\end{aligned}$$

which is Equation A3.3.3. This may also be expressed as

$$g = \frac{n(1 - \alpha)}{1 - \alpha - \beta}$$

7. Recall that there is no technological progress, so λ in the Solow model is zero.
8. In a more complex model, decisions about, and effects of, factors such as research and development investment can be modeled explicitly. Firms would decide on general investment and R&D investment. The effect of the latter on overall output would enter in a manner similar to $\overline{K}$ in Equation A3.3.1. For a discussion and references, see Gene M. Grossman and Elhanan Helpman, "Endogenous innovation in the theory of growth" in the symposium on new growth theory in the *Journal of Economic Perspectives* 8 (1994): 3–72.
9. Syed Nawab Haider Naqvi, "The significance of development economics," *World Development* 24 (1996): 977.
10. For an excellent review and empirical critique of the new growth theory, see Howard Pack, "Endogenous growth theory: Intellectual appeal and empirical shortcomings," *Journal of Economic Perspectives* 8 (1994): 55–72. See also articles by Paul M. Romer and Robert M. Solow in the same issue. For an argument that endogenous theory performs well in explaining differences in growth rates among countries, see Barro and Sala-i-Martin, *Economic Growth*. An excellent survey of quantitative growth research disputing this claim and indicating widening gaps between rich and poor countries can be found in Jonathan Temple, "The new growth evidence," *Journal of Economic Literature* 37 (1999): 112–156.