14 General long-run approaches to growth and development

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Introduction

Although the level of economic development is by no means synonymous with the level of per capita real income and product, most development economists take the position that the level of development is quite closely correlated with them.[2] Given this, a country is said to be developed if it has a high level of per capita real income or product, which requires that it has experienced a significant growth in per capita real income and product over a long period of time. To understand why development occurs and why some countries remain less developed is therefore to understand why growth occurs in some countries and why it does not in others. Development economists would like nothing better to have a unified approach and, better still, a single model which answers the question of what causes growth and development.

The search for such an approach and model has proved elusive. This quest is also arguably misguided, because there is no reason why all countries which are poor are poor for the same reason or can be characterized in the same way, or why all countries which grow experience growth for the same reason. Moreover, it is reasonable to expect that a process which is as complex as development depends on a variety of factors, and not everyone will agree about their relative importance even for a particular part of the world. Indeed, the analysis of long-run approaches to growth and development has spawned a number of different approaches and models. It is sometimes argued that there are two broad traditions of growth and development which represent different visions.[3] It has also been argued that the growth process can be examined in terms of different analytical theories and models, such as classical-Marxian models, neoclassical models, new growth theory models and models focusing on aggregate demand. Finally, growth and development can be said to depend on, and be constrained by, a number of different factors, such as saving, population growth, education, geography, entrepreneurship and international factors. Some visions and theories may stress some factors more than others, but the correlation between factors and theories is not perfect.

The purpose of this chapter is to provide a broad overview of general approaches to long-run growth and development. Its focus will be on alternative theories of growth and development in an aggregative macroeconomic closed-economy framework, considering in turn, classical-Marxian, neoclassical and aggregate demand-determined models and their relevance for stagnation in less-developed countries (LDCs). The discussion of these models will be used to shed light on different factors determining growth and stagnation which are reviewed in the final section.

Classical-Marxian growth theory

Early theories of growth, developed by the classical economists such as Adam Smith and David Ricardo and continuing in the approach of Marx, followed what can be called the surplus approach. According to this approach capitalists use their capital stock and hired labor to produce output. After workers are paid their wages, which are held down by population dynamics (with population increasing when the wage increases above its subsistence level) or by the existence of a reserve army of the unemployed, capitalists receive the surplus production as profits. Capitalists save out of their profits and invest aggressively in order to survive their competitive struggle with other capitalists, and this investment adds to the expansion of capital stock and hence to the growth of production. Assuming fixed labor–output and capital–output ratios given by b and a, with a fixed stock of capital given at K as a result of past investment, production and employment, respectively, are given by $Y = K/a$ and $L = bY$, total profit is $\Pi = Y - wL$, where w is the fixed real wage, so that total saving is given by $S = s_c\Pi$, where the fraction s_c is the exogenously-given saving rate of capitalists and S is aggregate saving, and where workers are assumed not to save. These assumptions imply that the rate of profit, r, and the rate of growth of capital, $g = (dK/dt)/K$ (assuming away depreciation, for simplicity), are given by:

$$r = (1 - wb)/a \tag{14.1}$$

and

$$g = s_c(1 - wb)/a \tag{14.2}$$

Since the output–capital ratio is fixed, total production also grows at rate g and, with a given rate of population growth, this determines the rate of growth of per capita income and production. Growth in this model is unconstrained by the availability of the supply of labor either because labor is always assumed to be unlimited supply, growing at some exogenously-fixed

rate $n \geq g$, or because labor supply growth is endogenous. If the growth of output and labor demand increases too rapidly, the adjustments in n due to endogenous labor supply (which can include immigration), and a due to endogenous technological change, can relax the labor supply constraint if and when it emerges. This model therefore views growth to be constrained by the availability of capital, which is accumulated through capitalist saving. An increase in the rate of growth is brought about by an increase in the saving rate of capitalists, s_c, by a reduction in the real wage, w (that is, a weakening in the bargaining power of workers),[4] and by technological improvements (a fall in b and a rise in a).

This approach found resonance in early development economics. The idea that growth in LDCs is constrained by the availability of capital and requires increases in the rate of capital formation is found in early theories of development. For instance, it is found in the so-called Harrod–Domar equation which is $g = sa$, where s is the overall saving rate of the economy, which follows from equation (14.2), by suppressing income distributional considerations and noting that $s = s_c(1-wb)$.[5] Growth in LDCs is low because of low saving rates (the poor countries cannot save much, so they remain poor, as an often-discussed vicious circle story has it), and because of low productivity of capital due to inefficiency, inappropriate technology or backward technology. The policy implication for this approach is that the saving rate of the economy had to be expanded (often through government planning and intervention in the economy), and the capital-output ratio had to be reduced by increases in efficiency, the use of more labor-intensive techniques, or technological change.[6] The approach is also closely related to Lewis's (1954) dual-economy model with surplus labor, which justifies the fixed real wage by the assumption of unlimited supplies of labor or disguised unemployed in a non-capitalist subsistence sector. Lewis also emphasized the importance of raising saving, as well as the problem of a reduction in profit and saving due to increases in w brought about by the disappearance of surplus labor, or by increases in the terms of trade of subsistence agricultural products which squeeze profits in the capitalist industrial sector because it requires the payment of a higher wage in terms of industrial goods (although this takes us beyond our one-sector framework). Lewis's model, however, was optimistic about growth prospects in LDCs because of the existence of surplus labor. Finally, neo-Marxist development economists like Baran (1957) analyzed the growth prospects of LDCs in terms of the surplus approach, arguing that domestic saving and investment is reduced by the dissipation of the surplus due to high consumption by LDC capitalists due to international demonstration effects, other unproductive spending and investment by them, and to the leakage of surplus abroad (in an open economy context). They typically drew a revolutionary implication

from this approach, arguing for the necessity of a socialist revolution to increase saving and investment and increase growth.

The implications of this capital-based approach have attracted a fair amount of criticism. Many LDCs which increased their saving significantly failed to record significant growth, experiencing, instead, increases in their capital–output ratio. It was argued that the capital-based approach, especially in its planning version, failed to take into account the importance of technological change, efficiency and incentives. From a different perspective it was argued that increases in saving did not necessarily promote investment if there were insufficient incentives due to the lack of aggregate demand (itself brought about by a rise in saving and a fall in consumption demand). The characteristic of the model which, however, was most responsible for its displacement was the assumption of surplus labor which, paradoxically, was an assumption which is appropriate for many labor-abundant LDCs. The neoclassical approach which displaced it, although mostly in applications to developed economies, assumed that labor is fully employed.

Old and new neoclassical growth theory

Solow's (1956) model, the paradigmatic neoclassical growth model, assumes that labor is fully employed, and also that capital and labor can be substituted in production in the smooth production function:

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

which exhibits diminishing returns to factors and constant returns to scale. The constant returns to scale assumption implies that the production function can be written in intensive form as:

$$y = f(k) \tag{14.3}$$

where $y = Y/L$ and $k = K/L$, per worker or per capita output and capital per worker. The wage and the rental adjust to maintain the full employment of labor and capital. A fraction s of total income is assumed to be saved (no distinction is made between saving from wages and profits) and automatically invested (as in the classical-Marxian model), so that $S = sY = I$. The fixed saving-rate assumption has been modified in subsequent models by the assumption of intertemporal substitution by consumers, either in an infinite horizon or overlapping–generations framework, without any fundamental changes in results about the determinants on long-run growth. Capital accumulates due to investment, so that $dK/dt = I$ (assuming away depreciation) and labor supply and employment (because labor is fully

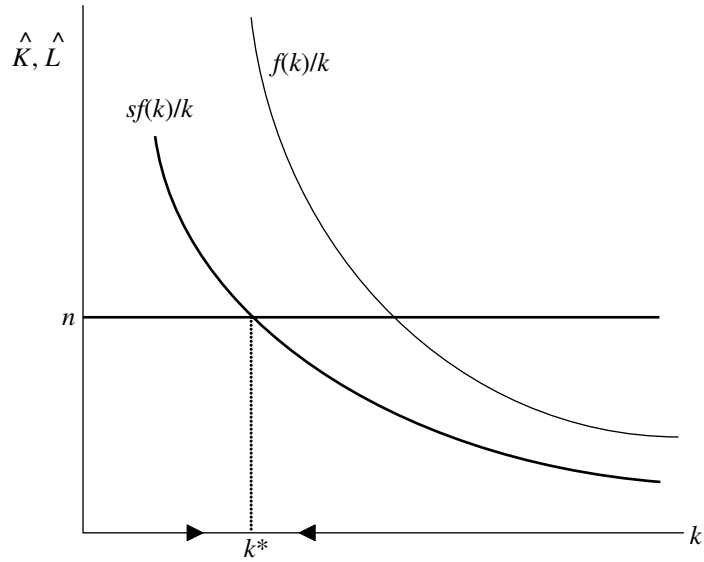

Figure 14.1 Neoclassical growth model

employed) grows at the exogenously fixed rate n. The dynamics of the model can be examined in terms of the rate of change of k. We have:

$$\hat{k} = \hat{K} - \hat{L} = I/K - n = sY/K - n = sy/k - n = sf(k)/k - n.$$

The dynamics are shown in Figure 14.1, where the $f(k)/k$ line which shows the average product of capital, is negatively sloped due to diminishing returns, and is assumed to have the two axes as asymptotes (obeying the so-called Inada conditions which require both capital and labor to be essential for production). The capital growth curve is shown by the line $sf(k)/k$. Starting from any initial level, k will change over time to the steady-state position shown by k^*, where capital grows at the same rate as labor supply, so that k is constant, so that per capita income, y, also becomes constant.

Growth can be accommodated in this model by measuring labor in efficiency units and assuming that the efficiency factor of labor, E, grows at a given rate, say λ. We can reinterpret y as output per worker in efficiency units, or Y/EL, and $k = K/EL$. At steady state, k and y will attain their equilibrium values, but output per worker, Y/L, will grow at the rate λ to keep y constant. The model implies that a rise in the saving rate, s, will shift up the $sf(k)/k$ in Figure 14.1 and increase the steady-state value of k, and hence y. There is thus a level effect on per capita output (for a given efficiency of

labor), but the steady-state growth rate of per capita output is unchanged at λ. Thus, in this model the rate of growth is given by the exogenously given rate of growth of labor's efficiency factor. In most extensions of the Solow model which endogenize the rate of technological change, for instance, due to learning by doing, or through research activity, the growth rate is still determined by exogenous parameters, and is not affected by the rates of saving and investment.[7]

Empirical studies, usually using cross-country data, found that long-run average growth is positively affected by the rates of saving and investment, apparently contradicting the implication of the Solow model that an increase in the saving rate does not increase the economy's steady-state growth rate. The model also implies that if two countries with different initial levels of income have identical parameters and technology, the richer country with a higher capital–labor ratio and per capita output initially will be closer to the common steady state for the countries, and grow at a slower rate. This seemed to contradict the empirical finding of divergence of income between rich and poor countries (although the model can be made consistent with this observation by assuming different parameter values for the two countries, for instance, a higher saving rate for the rich country). The discrepancies between the model and empirical result, as well as the unease with explaining growth in terms of exogenous technological factors, led to the development of new or endogenous growth theories by Romer (1986), Lucas (1988) and others.

This approach, which continues to follow the neoclassical tradition of assuming full employment, but departs from the assumption of diminishing returns to capital, the produced means of production, has now come to dominate growth theory. The essence of the approach can be shown with the simple AK model with the production function:

$$Y = AK$$

where A is the productivity of capital. This production function states that output increases proportionately with capital, without exhibiting diminishing returns, and is not affected by the amount of labor employed. Continuing with all of the other assumptions of the Solow model, we obtain:

$$\hat{k} = sA - n.$$

Assuming that $sA > n$, starting from any initial value of k, the economy grows at the rate given by $\hat{y} = \hat{k} = sA - n$. An increase in the rate of saving (and investment), s, implies a permanent increase in the rate of growth of

the economy. Since capital, the produced means of production, is not subject to diminishing returns, an increase in the rate of capital accumulation raises the rate of growth of the economy in the long run. In fact, the absence of diminishing returns to the produced means of production is not necessary for this result; all that is necessary is that there is a lower bound to its average product which exceeds the rate of growth of labor supply.

Several interpretations of the AK production function can be given, following key contributions to the new growth literature.[8] Romer (1986) takes investment to increase not only capital in the usual sense of private capital goods, but also the stock of knowledge, which is a public good and which increases the efficiency factor of labor, the two effects together implying non-diminishing returns to capital. Lucas (1988) can be interpreted as referring broadly to investment so as to include both physical and human capital; the growth of human capital increases the efficiency of labor, implying non-diminishing returns to capital. Yet other models countered diminishing returns to produced means of production by allowing increasing product variety and increasing returns within firms which produce these products (as distinct from externalities and public goods). The models with this form of increasing returns have to introduce imperfect competition to limit the size of firms, and this market power allows the consideration of innovative activity driven by profit-maximizing producers of knowledge who obtain temporary profits from new products (see Aghion and Howitt, 1998). New innovations, in turn, increase the stock of knowledge on which future innovators can draw, but make obsolete products developed by earlier innovators.

New growth theory has apparently made the neoclassical model more consistent with the data. Growth depends on the rates of saving and investment, and the absence of diminishing returns gives poor countries no growth advantages over richer ones, and in fact, increasing returns to capital can do just the reverse. Moreover, it has the theoretical advantage of making the long-run rate of growth depend on the determinants of technological change, such as government policy, spending on technological change, and the patent system. However, both types of models assume that labor is fully employed along the growth path, which does not appear to reflect well the empirical reality of unemployed and underemployed labor in many LDCs. To this extent they may be in fact taking a step back from the classical approach.

There has been some criticism of the standard neoclassical growth theory without market imperfections and with the full employment of resources, but from those who remain neoclassical in the sense of using optimizing underpinnings of behavior but introducing market imperfections systematically into the analysis. Banerjee and Duflo (2005)

summarize evidence which suggests that there are many kinds of market imperfections in LDCs, including those in credit and insurance markets due to imperfect information, externalities, and incomplete contracts within and between generations. These distortions can result in across-the-board inefficiency, but also differences in efficiency across firms. Given such differences in efficiency across firms, Banerjee and Duflo (2005) argue that it is incorrect to use the aggregate production function (which assumes that efficiency differences across agents are removed by market forces), and advocate the use of disaggregated models which take into account various kinds of market imperfections.

Growth and aggregate demand

It may be supposed that the existence of surplus labor in LDCs – a feature accepted by most early development economists – made aggregate demand an important issue for them, but this was not the case. In fact, it was argued that the Keynesian approach was irrelevant for LDCs, which were characterized as subsistence economies, unlike capitalist economies in which hired labor is used for production for the purpose of making profits and where savers and investors were different individuals and institutions (see Rao, 1952 [1958]; Das-Gupta, 1954). Moreover, it was argued that supply constraints due to shortages of wage goods (consisting of agricultural products), capital goods, working capital and skilled labor, and foreign exchange and government controls, rather than demand constraints, limit production and growth in LDCs (see Rao, 1952 [1958]; Kalecki, 1976). Demand constraints were also argued to be irrelevant because of high population levels (which meant that there were many consumers) and low levels of consumption which left many consumption 'needs' unmet (Das-Gupta, 1954).[9] Note that the irrelevance of aggregate demand was not related to labor shortages and full employment as is implicitly the case in neoclassical models.

In the 1970s and 1980s, partly perhaps as a result of changes in the structures of many LDCs which made many of them 'semi-industrialized' in the sense of having large capitalist sectors within subsistence economies, and partly because of the perceived failures of earlier development theories to deal with the problems of demand deficiencies, theories in which aggregate demand issues took center stage – drawing on the analysis of not only Keynes (1936), but also Marx (1867) and Kalecki's (1971) work on advanced capitalist economies – emerged in the development literature (see, for instance, Rakshit, 1982, 1989; Taylor, 1983; Dutt, 1984). Some, in fact, argued that the fragmented nature of commodity markets and credit markets (which reduce the ability of credit markets and within-country trade in goods to overcome demand deficiencies), and the importance of

assets such as land, gold and other precious metals and food stocks which allow potential investors in LDCs to divert their assets to unproductive channels in the face of economic uncertainty, arguably make aggregate demand issues highly relevant for LDCs.

A simple model of growth determined by aggregate demand can be represented as follows. Planned investment as a ratio of capital stock depends positively on the rate of profit (which increases both the availability of finance and profit expectations, and possibly also the rate of capacity utilization, which shows the degree of buoyancy of markets), and saving, as in the classical Marxian approach, is a fraction s_c of profits while workers do not save, imply that $S/K = s_c\, r$. The saving and investment functions are shown in Figure 14.2 where the standard stability condition that saving adjusts more to changes in the profit rate than does investment, is assumed. We return to the assumption of fixed coefficients of production, since factor substitution does not have a major role to play in this approach. Labor is assumed to be unlimited supply. One interpretation of the model assumes that the economy fully utilizes its capital, and planned investment and saving are brought into equality through changes in the price level. Thus, if planned investment exceeds saving, there is an excess demand for goods which increases the price level, and with the money wage constant or at least not adjusting fully to the price change, r increases, taking the economy to saving–investment equality (Robinson, 1962). Price flexibility,

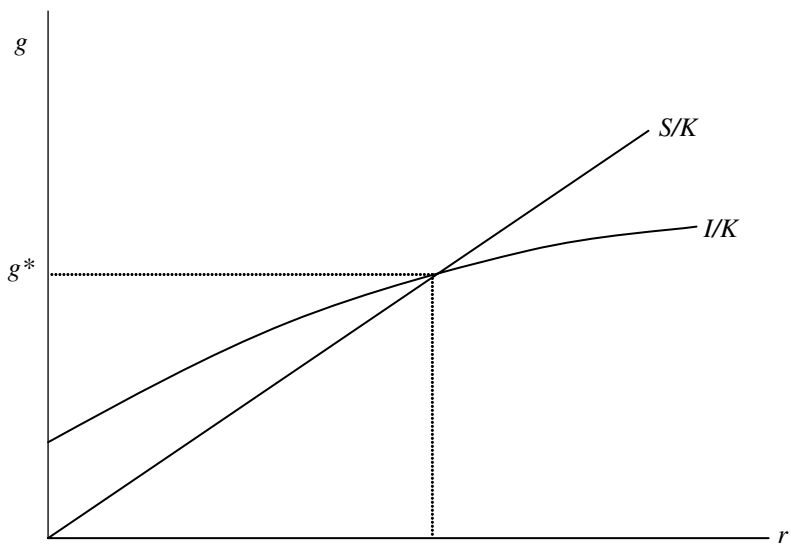

Figure 14.2 Growth model with aggregate demand

as assumed in this interpretation, has often been argued to be inconsistent with the oligopolistic structure of many LDC industrial sectors, which are sometimes seen as having excess capacity due to the lack of demand. This suggests a second interpretation of the model, in which firms set the price as a mark-up on wage costs, so that:

$$P = (1 + z)\, bW, \tag{14.4}$$

where z is exogenously given, dependent on the degree of industrial concentration and on the relative bargaining position of workers à la Kalecki, and where firms who normally maintain excess capacity and adjust their production according to demand, make investment plans depending on both the rate of profit and the rate of capacity utilization. When investment exceeds saving, firms increase output and raise capacity utilization, which increases the rate of profit, which is given by:

$$r = (z/(1 + z)\, Y/K, \tag{14.5}$$

resulting in saving–investment equality and the clearing of the goods market. Both interpretations of the model imply that aggregate demand is the main force behind growth. If there is an increase in autonomous investment by firms, the rate of capital accumulation increases by increasing saving either by squeezing real wages and increasing forced saving, or by increasing output. Thus, business psychology and animal spirits have an important influence on growth. Increasing the saving rate, however, pushes up the saving function and reduces the rate of growth by depressing consumption demand. In the second interpretation of the model an increase in the mark-up, z, reduces the real wage as shown by equation (14.4), and also pushes the investment function downward because for a given profit rate a higher mark-up implies a lower rate of capacity utilization (see equation 14.5) and lower investment, and therefore reduces the rate of accumulation and growth. Thus, an improvement in income distribution raises the rate of growth, an effect to which we return below.

It should be noted that models of long-run development in LDCs which stress aggregate demand issues do not neglect all other constraints. Many of them prominently feature the agricultural sector (often with non-capitalist forms of production organization), and introduce foreign exchange constraints by introducing export functions and exogenously-given capital inflows, full capacity constraints, and fiscal constraints with upper limits to public sector borrowing limits (see Taylor, 1983, 1991). Sufficiently high levels of aggregate demand can theoretically make the economy 'hit' some of these constraints. But their incorporation does not

make aggregate demand issues irrelevant (see Dutt, 1997). First, many of the constraints may not usually bind, so that at most times aggregate demand factors will determine the growth path of the economy. Second, many of the constraints may be affected by changes in aggregate demand or factors that affect aggregate demand. For instance, changes in government investment expenditure will affect agricultural growth (as well as that of manufacturing) by affecting the amount of infrastructure, thereby easing the agricultural constraint. Moreover, changes in growth determined by aggregate demand can imply faster technological change which has a positive effect on exports and foreign capital inflows, both of which can ease the foreign exchange constraint. Third, the uncertainty generated by the instability of the growth process caused by the existence of a multiplicity of constraints may make aggregate demand more relevant for the growth process (Bagchi, 1988). What they do imply, however, is that it is not appropriate to relegate aggregate demand issues to the short run and to assume that short- and long-run behavior of the economy are unrelated. It is quite possible that sharply contractionary fiscal and monetary policies may reduce output in the short run and negatively affect investment, infrastructural investment and technological change, and slow down the long-run growth of the economy.

Low-level equilibrium traps

The theories discussed in the preceding sections all determine the rate of growth of the economy. They can be used to explain low levels, or the lack, of growth in countries in terms of some parameters of the model. For instance, in the new growth theory approach, countries will experience persistent underdevelopment or low rates of growth if they have a low saving rate, a low level of productivity and a high rate of growth of labor supply or population. If these parameters could be changed, the countries would be able to grow faster. The models help us to understand what parameters affect growth and development and how. However, they must be supplemented with some explanation of why the parameters take the values that they do. An alternative approach to understanding stagnation is to develop models which produce low-growth equilibria endogenously in the sense that the long-run growth rate of the economy – whether it is high or low – depends on the initial state of the economy. The approach therefore explains why economies with a similar structure can end up growing or stagnating, depending on where they start from and their structure. Models representing this approach are called models with low-level equilibrium traps or poverty traps.

These models can be interpreted as modifying the models discussed earlier, for instance, by endogenizing some of their parameters, or by

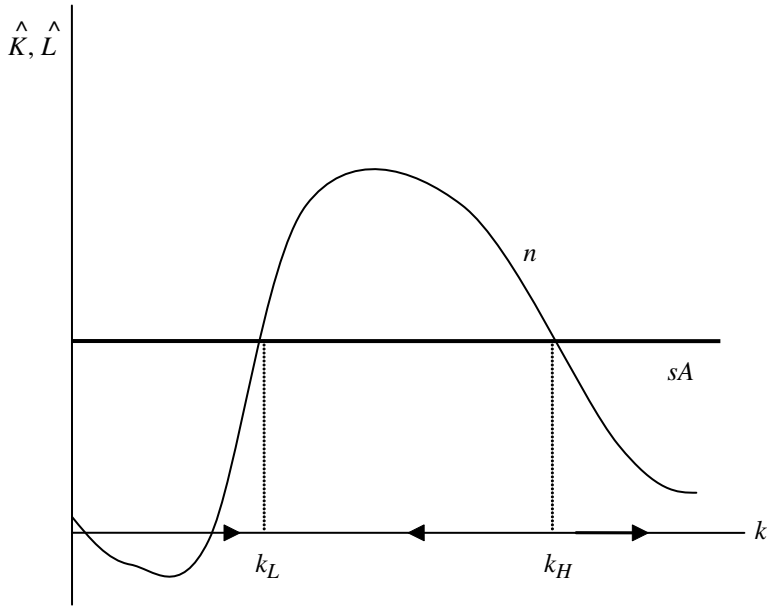

Figure 14.3 Model with a low-level equilibrium trap

introducing additional features into them. For instance, the new growth theory model can be modified to make the rate of growth of population depend on the level of per capita income. Under the assumption that the rate of population growth is low (because of high death rates) at low levels of income (and hence, capital–labor ratios), rises with increases in income (because death rates fall), and then falls (because birth rates fall with increases in income), the modified new growth theory model can be illustrated as in Figure 14.3. The low-level equilibrium trap is shown by k_L, while the critical minimum level of k is k_H. If the economy starts at an initial state of $k < k_H$, it will move towards the equilibrium at k_L, at which the rate of per capita income growth is zero: increases in growth increase population, and this serves to reduce the capital–labor ratio. However, if it starts above k_H, it will enjoy sustained growth because growth reduces the rate of population growth below the rate of capital formation. The economy can break out of the low-level trap if it can increase its saving rate significantly, pushing up the sA line sufficiently to make k_H lower than k. The model has the attractive property that any increase in the saving rate will not be able to achieve this result; a critical minimum increase is required.

Many other examples of neoclassical models – with similar multiple equilibria with a low-level equilibrium trap and a critical minimum level

above which the economy can experience sustained growth or approach a high-growth equilibrium – are available, capturing other relevant aspects of the development process. The presence of increasing returns at higher levels of k can make the capital growth line slope upwards beyond a certain scale at which strong external economies kick in and thereby produce a U-shaped capital growth curve (exhibiting initially diminishing and subsequently increasing returns to capital). With a constant n the model may then have multiple equilibria with a low-level trap. Increases in consumption from very low levels when income increases can also cause the capital growth curve to slope downwards for a stretch, followed by a positive slope due to rising saving rates. Other examples include credit and insurance market imperfections due to imperfect information, low productivity caused by low levels of nutrition and human capital, and institutional and organizational factors, such as corruption, incomplete property rights and kinship ties (see Azariadis and Stachurski, 2005). These mechanisms produce low-level poverty traps: if per capita income is initially below a critical minimum level the economy will converge to a poverty trap, while if the economy happens to attain a level beyond that critical minimum, it sets off into self-sustained growth (or to a higher equilibrium).

Models rooted in the classical or Keynesian tradition can also produce multiple equilibria and low-level equilibrium traps. Ros (2000) combines features of the classical approach of Lewis (1954) with increasing returns to show how the interaction of surplus labor and external economies can produce multiple equilibria and a low-level equilibrium trap. A simple extension of the model of growth and aggregate demand, which assumes that the investment function is non-linear, also implies multiple equilibria. For example, an investment function that is upward-rising but S-shaped, capturing the idea that at low levels of profit increases in profit have a small effect on desired investment but that as profits increase the response is stronger, can imply a low-level trap and a high growth equilibrium. The low growth equilibrium results from pessimistic self-fulfilling expectations.

Constraints on growth and development

The models discussed in the previous sections emphasize different determinants of, and constraints on, long-run growth and development. The determinants of growth emphasized in these models include saving rates and investment parameters, technological parameters, the rate of growth of labor supply and income distribution. The different models imply that these determinants need not affect economic growth in the same way in all economies. For instance, efforts to increase the saving rate will increase the rate of growth in economies that are saving-constrained and where diminishing returns to capital is not strong, but may have an adverse effect on

growth in demand-constrained economies, or no long-run effect with strong diminishing returns to capital in supply-constrained economies. To illustrate such issues further we discuss briefly the role of two determinants of growth – technological factors and income distribution – in some of the models discussed above.

New growth theory stresses various sources of technological change, including learning by doing, education and human capital formation, and profit-seeking innovative activity, and shows that faster technological change speeds up growth. A common implication of these models is that given the public goods nature of technological change (see Romer, 1986), there will be underinvestment in the creation of knowledge in the free market economy compared to what is socially optimal; the implication is that government intervention can raise the rate of growth by speeding up technological change. A few models, however, suggest that it is also possible for the free-enterprise economy to overinvest in research and development, because the private research firm does not take into account its business-stealing effect, that is, the fact it takes business away from firms which profited from an invention made obsolete by its invention (see Aghion and Howitt, 1998).

In demand-led models, technological change is often seen as being driven by demand growth. Aggregate demand growth, by speeding up economic growth, can increase the rate of productivity growth due to learning by doing or due to the fact that technological change, especially technological diffusion of a labor-saving variety, can be speeded up due to the emergence of labor scarcity. On the consequences of technological change this approach implies a more ambiguous role to technological change than in the neoclassical and new growth theory approaches. For instance, it is possible that faster technological change can reduce the rate of growth of labor demand, and thereby increase unemployment, rather than increase growth, and higher unemployment may even have the effect of reducing the share of wages in income and reducing aggregate demand and growth. On the other hand, technological change can have the effect of increasing investment demand because firms install new machinery to take advantage of newer production methods, and also increasing consumption demand due to product innovation, thereby increasing aggregate demand and economic growth. Thus, it is possible for there to be a two-sided synergistic relation between capital accumulation and technological change.

Technological change played a central role in Schumpeter's (1911 [1934]) theory of economic growth and development. In this theory, technological progress, involving – for instance – new production techniques, new products, new managerial methods and new sources of supply of inputs, occurred because of the efforts of profit-seeking entrepreneurs who created

new technology, who earned profits from temporary monopoly power, and whose creations would be destroyed by new innovations in the future. Schumpeter's ideas have had an influence on both new growth theory (see Aghion and Howitt, 1998) and demand-based approaches, and have also spawned other evolutionary approaches to growth (see Nelson and Winter, 1982).

It may be argued that these approaches to technological change have limited applicability to LDCs in which technological change is more a matter of importing technology than creating it. However, since the distinction between technology creation, on the one hand, and diffusion and transfer, on the other, is not as great as thought earlier (see Bell and Pavitt, 1993), and since the effects of technological change raise similar issues in advanced countries and LDCs, they have great relevance for LDCs.

On the role of income distribution, it may be supposed that since saving positively affects economic growth in new growth models, faster growth would result from increasing inequality, since the rich do most of the saving. If there are investment indivisibilities – for instance, large set-up costs for new industries – and if there are credit market imperfections, concentration of wealth among a few can, indeed, increase investment and the rate of growth. However, a number of models suggest that a more equal income distribution can increase growth (see Aghion and Howitt, 1998). For instance, if there are no credit markets (or if these markets are imperfect), investors with higher endowments of wealth will invest more than those with less. If there are diminishing returns to capital, a misallocation of capital and a low level of aggregate output will result, which can result in a lower rate of technological change and growth (if aggregate output affects technological change due to learning by doing). Other models, such as those which consider cooperation between the rich and poor and in which inequality leads to less cooperation, shirking and free-riding by the poor, or in which inequality leads median voters to push for growth-reducing redistribution, produce similar results.

Income distribution affects growth in classical-Marxian models because of the assumption that the propensity to save out of profit is greater than that to save out of wage income. In the classical-Marxian model a rise in the profit share increases saving and capital accumulation, and therefore the rate of growth; thus inequality helps growth. However, in demand-led growth models, a rise in the share of profits due to, for instance, a rise in the price–cost mark-up charged by firms, has the effect of making the distribution of income less equal and reducing the rate of growth of capital stock and output. This occurs because the shift in income distribution towards profits increases saving, thereby reducing consumption and aggregate demand, reducing capacity utilization and hence the rate of investment and

growth (see Dutt, 1984, 1990). Such models, however, need not necessarily have this implication. For instance, if investment depends both on capacity utilization and the profit mark-up (since both are likely to affect profit expectations), a rise in the mark-up can increase both the profit share and the rate of investment and growth because of the direct effect of the mark-up on investment (Bhaduri and Marglin, 1990).

Space limitations prevent me from discussing other determinants of growth and development. In conclusion, I note two types of omissions. First, I have focused on models and on economic constraints which are often endogenous to the process of growth and development and hence sometimes called proximate determinants, and not discussed what some have called fundamental factors. Included in the list of such factors are institutional and geographical variables. Although this distinction is usually made in the context of the estimation of growth equations to avoid the problem of simultaneity, it is also relevant for the understanding of growth processes and for formulating appropriate policies for growth and development. For instance, if saving and investment rates – proximate determinants in some of the models – need to be increased to increase growth, it may be necessary to change institutions which strengthen property rights or cultural norms among entrepreneurs which encourage long-term investment that may be considered more fundamental factors. We have not examined institutional and cultural features here.[10] Second, the analysis has been conducted for the most part using a one-sector, closed-economy framework. This implies that I have not examined growth problems related to sectoral issues, such as agricultural and environmental constraints, or open-economy considerations, such as foreign exchange constraints and the relation between trade, technological change and growth.[11] The models discussed here, however, can be suitably modified to examine these omitted factors.

Notes

1. I am grateful to Jaime Ros and Lance Taylor for their helpful comments on earlier drafts of this chapter.
2. Some would argue that development involves much more than the goal of economic growth as measured by the level of real per capita income, such as improvements in income distribution, and the fulfillment of the basic needs and capabilities of people. Some would also argue that development involves other changes in the economy, such as those in the sectoral composition of output and trade.
3. For instance, Chakravarty (1980) distinguishes between the Mill–Marshall and Marx–Schumpeter traditions, which – from today's perspective – can be called the orthodox and heterodox visions. See Taylor (2004, Chapter 11) for a more detailed historical discussion of alternative views.
4. Although the classical economists, especially Marx, often assumed the real wage to be given by subsistence requirements, they interpreted subsistence broadly to include historical, moral and political factors, which makes it possible for the real wage to be changed by the state of what Marx called the class struggle.

5. This model is closer to that of Domar (1946) than to that of Harrod (1939), who assumed an independent investment function in the form of an accelerator, thereby bringing in effective demand into the model, an issue which is discussed below. In this model, all saving is automatically invested.
6. Higher labor intensity implies that *b* rises when *a* falls. It is implicitly being assumed that the rise in *b* does not offset the growth enhancing effect of a fall in *a* which, as can be seen from equation (14.1) implies that capitalist firms only adopt technological changes if their rate of profit rises. Or it is assumed that there is no difference in the saving rate of workers and capitalists, so that a rise in the wage share does not reduce the overall saving rate, as assumed in this model.
7. Some extensions of the Solow model in which the share of saving allocated to education and research and development affects the rate of technological change allow long-run growth to be endogenously determined. See, for instance, Uzawa (1965).
8. For a fuller discussion, see Chapter 15 in this volume on new growth theory.
9. These arguments are, of course, erroneous because they ignore effective demand issues.
10. There is no presumption that these factors are necessarily more fundamental than other more narrowly economic factors, and may in fact respond to changes in the level of development relatively quickly. They are discussed elsewhere in this *Handbook*, especially in Chapter 61 on institutions and Chapter 62 on culture.
11. These issues are discussed elsewhere in this *Handbook*, especially in Chapter 17 on sectoral interactions, Chapter 18 on open economy issues, Chapter 28 on the environment and Chapter 36 on trade.

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