

Developments in technology and human capacity are resource-using activities aimed at increasing productive power in the future, similar to investment in tangible capital such as machinery and factories. The rate of economic growth depends not only on the rate of capital accumulation but also on its allocation among various investment opportunities, especially between tangible and intangible capital. What is the optimum level and allocation of investment to set developing economies on the track to sustained industrial development? What institutions and organizations are needed to mobilize and allocate investible funds in a manner compatible with the development goal?

This chapter and the next aim to undertake theoretical and empirical preparation in seeking an answer to this basic question in development policy. First, a historical perspective is developed on how the strategy geared to strengthening capital accumulation under government control and guidance became predominant among developing economies after World War II. Then, the theory underlying this strategy is tested by the method of growth accounting.

## 5.1 From Adam Smith to Marx

A strong tradition in economics since Adam Smith has been to identify capital accumulation as the engine of economic growth. The tradition assumes that the mechanism of achieving a high rate of capital accumulation is inherent in capitalistic market economies, and therefore, by fostering this mechanism, high economic growth can be realized.

### 5.1.1 Capital in Adam Smith

In his advocacy of *laissez-faire* and small government, Adam Smith (1723–90) stands opposite to the model of high accumulation under government directives. However, with his argument that a condition of economic growth is increased investment by suppressing consumption, he was a forerunner of the models of capitalist development based on high saving and high investment, including the model of Karl Marx.

Smith's *Wealth of Nations* ([1776] 1937) was a comprehensive treatment on how social and economic systems should be structured to maximize the wealth (or income) of Britain (among other nations) on the eve of its Industrial Revolution. In his theory, it is labour engaged in 'useful and productive' work that produces value to society. The number of 'useful and

productive' workers employed as well as their productivity depends on the stock of capital accumulated, as stated in his words:

The number of useful and productive labours, it will hereafter appear, is every where in proportion to the quantity of capital stock which is employed in setting them to work, and to the particular way in which it is so employed. (A. Smith [1776] 1937: lviii)

Adam Smith considered the increase in capital stock critically important in raising the productivity of labour as it advances the division of labour. In his famous example of pin manufacturing, he argued that a worker can hardly produce more than twenty pins in a day if he alone has to cover the entire production process; however, if the production process can be subdivided into eighteen distinct operations, each assigned to a specialized worker, such that one man draws out the wire, another straightens it, a third cuts it, a fourth points it, and a fifth grinds it at the top, and so on, then more than four thousand pins per worker can be manufactured.

This great increase of the quantity of work, which in consequence of the division of labour, the same number of people are capable of performing, is owing to three different circumstances; first to the increase of dexterity in every particular workman; secondly to the saving of the time which is commonly lost in passing one species of work to another; and lastly to the invention of a great number of machines which facilitate and abridge labour, and enable one man to do the work of many. (A. Smith [1776] 1937: 7)

In order to execute this division of labour, both the funds to purchase workshops, tools, and materials, and the funds for payments to labourers in advance of the sale of pins (wage fund) must be available to a capitalist-entrepreneur. The sum of these is Adam Smith's stock of capital. As this stock usable by capitalist-entrepreneurs increases, the division of labour can be advanced by employing more labourers for more differentiated operations.

According to Smith, this stock of capital in society accumulates through 'parsimony' and 'frugality' of industrious entrepreneurs in manufacturing and it diminishes through 'prodigality' and 'misconduct' of absolute monarchs, landed aristocrats, and privileged merchants. Therefore, the depletion of capital can be prevented by reducing the incomes of those spendthrifts, such as cutting pensions to courtiers, removing tax exemptions to landlords, and abolishing monopoly trade licences to merchants. The accumulation of capital can be promoted by removing undue regulations and taxation on industrial capitalist-entrepreneurs.

Removal of government regulations on production and marketing activities not only contributes to increased income of the entrepreneur class and,

thereby, increased rate of social savings, but also contributes to expansion in markets. The size of markets, together with the stock of capital, is a critical determinant of progress in the division of labour. For example, even if it is possible to produce hundreds of thousands of pins a day in a factory, such a mass production system (based on advanced division of labour) would not be adopted if market demand is too small to absorb the output. Therefore, unification of local markets into a national market through removal of regulations on domestic transactions greatly facilitates progress in the division of labour. Further, if trade monopolies and protective measures in the Mercantile System are broken, the domestic market is integrated into a large international market where major advances in the division of labour are expected. For Smith, since ‘the division of labour arises from a propensity in human nature to exchange’ (A. Smith [1776] 1937: 13), creation of a free and wide market by removal of undue regulations is the sufficient condition for progress in the division of labour, assuring sustained increases in the wealth of nations.

While Adam Smith strongly advocated free market competition, he recognized the importance of public goods for the support of the market mechanism, such as national defence, police and judicial systems, public infrastructure construction, and education. However, his strong repulsion against the Mercantile System led him to argue that the supply of public goods should be privatized as much as possible (e.g. private schools and toll-roads). It must be recognized, however, that his plan for small government was made after Britain had been unified into a nation with a wide domestic market based on military force and bureaucracy of the absolute monarch, and decent public infrastructure such as roads and canals had been constructed, based on government revenue derived from Mercantilism. If his theory had been formed earlier in the transition period from feudalism to absolutism, his proposed policies would no doubt have been different.

### *5.1.2 Ricardo revisited*

The proposition that a mechanism of suppressing conspicuous consumption and increasing investment in ‘useful and productive’ activities is necessary for promoting economic growth is but one important pillar of Adam Smith’s theory. In subsequent developments of the English Classical School, this mechanism is used as a central pillar of economic growth theory.

A representative example is Ricardo’s model as explained earlier (Section 3.3.2). In his model, consumption of labourers—the majority of the population—is in the long run reduced to a minimum subsistence level under

the ruthless force of the Malthusian population law. Surplus of industrial product above labourers' subsistence accrues to capitalists who have a high propensity to save and invest. This mechanism guarantees that high rates of capital accumulation and output growth will be sustained.

One force that would stop this growth process was identified by Ricardo as increases in food prices due to population pressure on limited land resources resulting in increased nominal wage rates. If this force were allowed to increase, social surplus (total product minus labour and capital costs) would be captured by the class of landlords who are prone to conspicuous consumption. In order to sustain the high rates of capital accumulation and economic growth, Ricardo advocated liberalization of cereal food imports as a means to prevent social surplus from being monopolized by 'prodigal' landed élites.

### 5.1.3 *The Marx model of capitalist development* \*

Karl Marx (1818–83) created a unique theory of capitalist economic development. As he had initially learned economics from the English Classical School, the structure of his theory, laid out in *Das Kapital* ([1867–94] 1909–12), is similar to Ricardo's, even though underlying assumptions and policy implications are diametrically opposed.

The basic similarity of Marx's model to Ricardo's is that labour supply to the modern industrial sector is infinitely elastic at an institutionally determined subsistence wage rate, which works as a basic support for rapid capital accumulation. However, Marx rejects the Malthusian population law as the mechanism for producing the infinitely elastic labour-supply curve. Instead, Marx based his explanation on the existence of the 'surplus' labour force beyond productively employed workers in the industrial sector, called the 'industrial reserve army'. The reserve army consists of lumpenproletariat in urban slums who stake out a bare living from various informal activities (from petty trade to pilferage), while seeking formal employment in the industrial sector. As such, they are readily available to accept employment at the subsistence wage rate upon recruitment by industrial employers. Therefore, as long as this reserve army exists, the industrial wage rate is prevented from rising above the subsistence level.

The basic assumption of the Marxian model is that the industrial reserve army will never be exhausted, as it is reproduced in the capitalistic development process. The original sources of the reserve army were small peasants

\* Readers not interested in technical analysis of economics may skip explanations with the use of Figure 5.1 in this section.

and self-employed manufacturers using traditional production methods who were overcome by modern capitalistic enterprises and were compelled to seek employment in the labour market. The number of people ousted from traditional occupations continued to increase as the capitalist sector expanded, replenishing the industrial reserve army. On the other hand, capitalists always try hard to substitute capital for labour through largescale mechanization. As a result, employment in the modern industrial sector increases more slowly than the speed of capital accumulation and output growth. This slow employment growth in the modern sector is sufficiently counteracted by additional entries to the reserve army from the traditional sector. Thus, Marx considered that the horizontal labour supply curve to capitalist entrepreneurs is not the product of natural population law, but the consequence of capitalism incessantly reproducing the industrial reserve army.

Even though the underlying mechanisms are thus different, both Marx and Ricardo shared the common view that the infinitely elastic labour supply at the subsistence wage rate is the basic mechanism supporting high capital accumulation and economic growth in the modern industrial economy. However, because strong motivation on the part of capitalists to save labour by means of increased use of capital is assumed by Marx, the income share of capital increases at the expense of labour's share, implying an inherently inequalizing tendency in the capitalist economy.

The Marxian model is reconstructed in the terms of modern economics in Figure 5.1. This figure corresponds to the left-hand diagram of Figure 3.5

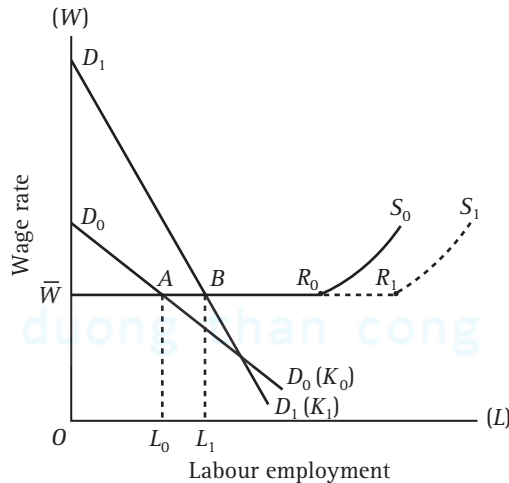


FIG. 5.1 The Marx model of capitalist economic development

which models Ricardo's theory. It represents the labour market for the modern capitalist sector ('industry' in the Ricardo model represented by Figure 3.5) in terms of a Marshallian partial equilibrium model, with the vertical and horizontal axes measuring the wage rate and employment respectively. In both figures, line  $DD$  represents a labour demand curve, corresponding to a schedule of labour's marginal value product for an initial stock of capital.

The above assumptions are the same for Figures 5.1 and 3.5. Further, the labour supply curve ( $S$ ) drawn horizontally at the subsistence wage rate ( $\bar{W}$ ) in Figure 5.1 is similar to the long-run labour supply curve ( $LS$ ) in Figure 3.5. However, while Ricardo's labour supply is assumed to be indefinitely horizontal in the long run owing to the Malthusian population law, Marx's begins to rise from a certain point ( $R_0$ ) which represents exhaustion of the industrial reserve army.

Assume that in an initial period ( $0$ ) a labour demand curve for the modern capitalist sector is located at line  $D_0D_0$  corresponding to capital stock ( $K_0$ ). The initial equilibrium is established at point  $A$  with labour employed by  $OL_0$  at the subsistence wage rate  $OW$ . However, according to Marx's assumption, the number of labourers seeking employment in the modern industrial sector measured by  $WR_0$  is larger than  $OL_0$ . Those unable to find employment stake out bare subsistence on informal activities in urban slums, awaiting the opportunity to be employed in the capitalist sector. This population, as measured by  $AR_0$ , is the industrial reserve army of Marx's definition. Therefore, increases in labour demand corresponding to capital accumulation do not result in an increase in the wage rate until point  $R_0$  is reached.

Unlike Ricardo's long-run labour supply curve, which is indefinitely horizontal, Marx's curve begins to rise from point  $R_0$  implying that capitalists have to offer higher wage rates to attract labourers when the reserve army is exhausted. However, in his model the reserve army is never drained. First, in the process of capitalist development, small self-employed producers in traditional agriculture and cottage industries are overcome by modern capitalist enterprises and fall to the rank of industrial reserve army. In terms of Figure 5.1, corresponding to an increase in capital stock from  $K_0$  to  $K_1$ , as capitalists invest a major portion of their initial profit area ( $AD_0\bar{W}$ ), the output of their enterprises expands from area  $AD_0OL_0$  to  $BD_1OL_1$ . Outcompeted by this expansion in capitalist production, traditional self-employed producers and their family members are forced to seek employment in the capitalist sector, resulting in the elongation of the horizontal portion of labour supply curve to  $R_1$ .

Also, unlike Ricardo's case, Marx assumes the growth of industrial employment to be slower than the speed of capital accumulation. Ricardo had

developed his theory in the late eighteenth century during the Industrial Revolution when automation (based on new power sources such as the steam engine) had not yet been highly developed. In his image, capital invested in the development of a factory production system was mainly used as the wage fund. Therefore, at a fixed subsistence wage-rate, employment was considered to increase parallel to increased capital stock.

In contrast, by the mid-nineteenth century when Marx developed his theory, automatic steam-powered machines were in common use, and a share of such fixed capital items in total capital stock increased. As a result, relative to rapid capital accumulation and output growth, employment increased rather slowly. This labour-saving effect of machine capital embodying new industrial technology is represented by a shift in labour demand from line  $D_0D_0$  to  $D_1D_1$ . A change in the labour demand curve to a more steeply sloping one implies a technical change biased towards the labour-saving and capital-using direction in the Hicks definition (Appendix A.2). With this bias the technological progress embodied in new machinery, the increase in employment from  $OL_0$  to  $OL_1$  became slower than the growth of output from area  $AD_0OL_0$  to  $BD_1OL_1$ .

Thus, Marx envisioned that, with the ability of the modern capitalist production system to ruin traditional self-employed producers, together with the labour-saving bias in industrial technology, the industrial reserve army would never be exhausted. High rates of profit and capital accumulation in the capitalist economy are guaranteed by maintenance of low wage rates under the pressure of the ever-existing reserve army. In his view, the industrial reserve army is bound to be reproduced since it is the supporting arch for development of the capitalist economy.

The process of capitalist development, as described by Marx, necessarily involves rapid increases in inequality of income distribution. Unlike Ricardo's case—where the wage rate can rise in the short run (along  $SS$  in Figure 3.5) until the population adjusts to demand increases in the process of capital accumulation—no such possibility exists for industrial workers in Marx's world since they are under the constant threat of being replaced by reserve army constituents. Labourers' income is reduced relative to capitalists' by the labour-saving effect of modern industrial technology. This tendency is illustrated in Figure 5.1, in which the labourers' wage share income in total savings output decreases from  $A\bar{W}OL_0/AD_0OL_0$  to  $B\bar{W}OL_1/BD_1OL_1$ , while the share of capitalists' profit rises from  $AD_0\bar{W}/AD_0OL_0$  to  $BD_1\bar{W}/BD_1OL_1$ .<sup>1</sup>

Marx predicted that the increasing inequality in the capitalist economy would fuel hostility between the labourer and capitalist classes, eventually leading to a violent revolution in which capitalism based on private



ownership of capital by a few would be transformed into socialism based on public (or the people's) ownership.<sup>2</sup> This prediction did not materialize in the history of advanced industrial economies. In Western Europe and North America, real wage rates have risen and the income share of labour (labour's share of total national income) has increased since the late nineteenth century (Section 6.1).

However, the Marxian model gives an important insight into the problem faced by today's developing economies. Many developing economies have attempted to achieve rapid development by concentrating investment in the modern industrial sector. In some cases, significant success has been recorded in the growth of industrial production. However, increases in employment have typically been much slower than output growth owing to concentration of investment in modern machinery and equipment embodying labour-saving technologies developed in high-income countries. On the other hand, the rate of increase in the labour force has been high under explosive population growth. Where labour absorption in the agricultural sector reaches the saturation point under the rapidly closing land frontiers, labour tends to be pushed from rural to urban areas. The swollen urban population beyond limited employment in the modern industrial sector of high-capital intensity has accumulated as lumpenproletariat in urban slums. Growing inequality and social instability visible in these economies are similar to the situation observed by Marx in mid-nineteenth century Europe. How to overcome this problem in developing economies during their early phase of industrialization is a question that needs to be resolved before they can advance to higher phases of development (Chapter 7).

A comment may be added on Marx's neglect of the possibility of the 'food problem' of the Ricardo-Schultz type (or 'the Ricardian Trap' in Chapter 3, Section 3). He did not envisage the problem of food supply shortage to result in increases in the cost of living and the wage rate of workers, presumably because he assumed that advanced industrial economies like England could obtain a cheap supply of food and materials from overseas. Also, Marx assumed that, while small peasants may be outcompeted by large-scale capitalist farms to drop out into urban slums, their holdings would be combined in larger and more efficient farms under management by capitalist entrepreneurs leading to increases in the domestic food supply.

As Marx had observed increased food imports in England after the repeal of the Corn Laws (1840) and the establishment of large-scale commercial farming, he would have felt no need to worry about the food problem. Absence of concern about the food problem in Marx's theory of capitalist development seems to reflect the decline in its importance as industrialization



advanced. Alternatively stated, it reflects the tendency of successful industrial development to free the economy from the constraint of natural resources.

#### 5.1.4 *The Marx model and the efficiency wage theory\**

For its radical reformist implications, the Marx model has been attacked from the various fronts of social sciences. Economists' criticism has centered on the inconsistencies between predictions from the model and historically observed facts, especially in the trends of wage rates and factor shares, which shall be discussed in detail in Section 6.1. Also, there are a number of apparent theoretical inconsistencies for the eyes of scholars trained in neoclassical economics. The foremost is the question of why the wage rate offered by capitalists remains positive and constant despite the existence of the industrial reserve army. Why don't capitalists bit down the wage rate of their employees to a market-clearing level, despite competition from a large number of unemployed or semi-unemployed laborers, whose level of income from various informal activities in slums is supposed to be much lower than the wage earned by those employed in capitalists' firms?

The modern theory of "efficiency wage" seems to be able to answer this question. This theory assumes a relationship in which laborers' efficiency or productivity increases corresponding to increases in the wage they receive. Under this relationship, it is profitable for a capitalist employer to offer to his employees the wage rate higher than the market-clearing rate to the extent that the value of their enhanced productivity is larger than the increased wage payment. The original version of this theory advanced by Harvey Leibenstein (1957) is based on the positive relationship between the productivity of laborers and their intake of nutrition. He argues that in low-income economies the market-clearing wage rate is usually too low for laborers to purchase a sufficient diet for rendering adequate work services. This condition gives employers the incentive to pay to their employees a sufficiently high wage for purchasing the adequate diet, even if many other laborers outside his workshop stand ready to be employed at a lower wage. Clearly, this Leibenstein hypothesis is one possible explanation of Marx's horizontal labor supply curve with the existence of the industrial reserve army, considering the very low levels of income and living of industrial workers in the era of industrial revolution (J.G. Williamson, 1991).

Another plausible explanation can be found in an efficiency wage model developed by Carl Shapiro and Joseph Stiglitz (1984). Their model is built on

\* Readers not interested in technical detail may skip this section.

the assumption that an employer can reduce the cost of supervising his workers by paying a higher-than-market-clearing wage. The laborers who are receiving the higher wage should fear of losing the present job and falling down to the status of being employed elsewhere at the market-clearing wage rate. This fear should suppress their incentive to cheat the employer against employment contracts, either formal or informal, by doing such acts as shirking, damaging machines by careless use and stealing goods produced in the shop. In this way the employer's cost of supervision can be saved. Theoretically, an employee will not cheat so long as the expected gain from his cheating is smaller than the expected loss from being fired upon possible discovery of his opportunistic behaviors. According to Paul Milgrom and John Roberts (1992: 251), the Shapiro-Stiglitz condition of a laborer's being conscientious and honest with his employer can be expressed by the following inequality:

$$z < (w - m)pn \quad (5.1)$$

where the left-hand side ( $z$ ) is a laborer's expected gain from cheating and the right-hand-side is the expected loss from the discovery of his cheating with  $w$  denoting the wage he is now receiving,  $m$  denoting the income he expects to earn if dismissed by the present employer,  $p$  denoting the probability of his cheating to be detected, and  $n$  denoting the number of periods for which the present employment contract is supposed to be renewed. Note that  $z$ ,  $w$  and  $m$  in equation (5.1) are assumed to be the values that are discounted for possible differences in their time dimensions. So long as this equation holds, it would not pay for the laborer to cheat.

The minimum wage that can deter laborers' cheating can be obtained by solving the equality between the left-hand side and the right-hand side of equation (5.1) as

$$\text{Min } w = m + z/pn, \quad (5.2)$$

which is called an "efficient wage." In terms of this equation the employer can induce his laborers to work conscientiously by raising the wage payment above the market-clearing wage ( $m$ ) by  $z/pn$  or, alternatively, by intensifying supervision to increase the probability to detect their cheating ( $p$ ). To the extent that labor supervision is costly, the employer has an incentive to pay a higher wage to his present employees than that sufficient to recruit alternatives from the market. This power of the high wage to reduce the labor supervision cost should be especially strong, where unemployment prevails so that the expected income of employees from alternative employment ( $m$ ) is very low. Given the very poor standard of living of lumpenproletariat in

urban slums at the time of the industrial revolution, Marx's horizontal labor supply curve for the capitalist sector at the positive and constant wage rate under the existence of the industrial reserve army could be justified in terms of the Shapiro-Stiglitz model. Also, it is important to note that, compared with informal economic activities in the slum, employment in the modern industrial sector is usually more regular and longer-term for the need of developing employees' firm-specific skills, such as coordination among workers in the use of a large machine. For the larger value of  $n$  corresponding to the longer duration of employment, capitalists in the modern sector should have had the advantage to achieve a large saving of supervision cost by paying to their employers only a modest premium above the income expected from alternative employment in the informal sector. This possibility is not inconsistent with the great efforts by employers to supervise laborers under the capitalist system as emphasized by Samuel Bowles (1985). Even if  $(w - m)$  is large, inequality in equation (5.1) cannot hold under a very small probability of the capitalists to detect employees' moral hazards ( $p$ ). The equilibrium should lie at the minimum cost point along the trade-off between raising the wage rate ( $w$ ) and increasing the supervision cost for raising  $p$ .

The Leibenstein and the Shapiro-Stiglitz models can be regarded as complementary explanations rather than substitutes to Marx's hypothesis. The efficiency wage of Leibenstein is the minimum for workers to buy a sufficient diet for rendering adequate labor services for the employer. In low-income economies under the over-riding demand for adequate food consumption, the guarantee of adequate diet to employees may well have been established as a social norm that the employer must adhere as a legitimate patron. If so, violation of this norm is likely to stimulate countervailing actions from the side of employees, such as shirking, and damaging and stealing of the employer's properties, with the result of raising the cost of labor supervision along the logic of Shapiro and Stiglitz. Indeed, Marx himself considered the fixed wage rate in the capitalist sector is not the biological minimum for sustaining human life but is influenced by cultural and institutional factors. If we interpret Marx's institutionally fixed wage as determined as a social norm, it is likely to find a good deal of application to the understanding of labor relations in developing economies, which shall be discussed later in Chapter 9.

## 5.2 Development Theories and Policies after World War II

Both Classical and Marxian economics identified the mechanism of suppressing consumption as a basis of high rates of capital accumulation and

economic growth inherent in capitalist market economies. In contrast, in the development theories that became dominant during the quarter century following World War II, this market mechanism was considered insufficient for achieving high accumulation and growth in newly independent developing economies, because they were too poor to mobilize sufficient savings. This view was based on the classical assumption that the saving rate is zero at the subsistence income level and rises exponentially in response to increases in income per capita.

Under this assumption, poor developing economies at a near-subsistence income level can hardly expect to escape from the vicious circle between low saving and low income if resource allocations are left to the free market. The policy prescription envisaged then was to use government orders and regulations to suppress consumption, or to require that investible funds be set aside before consumption, as critically reviewed by T. N. Srinivasan (1990) and Anne Krueger (1995). Such a theoretical perspective was influential in inducing many developing economies to adopt development strategies inclined towards the socialist model (based on central planning and directives).

### 5.2.1 *The theory of balanced growth*

A theory which had a major impact on this policy was the 'theory of balanced growth' by Rosenstein-Rodan (1943) and Ragner Nurkse (1952, 1953). This was based on the recognition that newly independent economies after World War II could not expect economic growth, based on rapid increases in primary commodity exports, as experienced from the nineteenth century until the start of the World Depression in 1929. This export pessimism led to the conclusion that there was no other option for these economies but to undertake development by manufacturing hitherto imported industrial commodities. It was feared, however, that this industrialization strategy would be so hampered by small domestic markets that large-scale production of any commodity from a modern industrial plant would produce more than its market could absorb. Therefore, for modern industrial development to be viable, various industries should be simultaneously promoted so that they would create markets for each other (e.g. employees of the shoe manufacturer would purchase shirts while those of the shirt manufacture would purchase shoes)—a perspective recently being renovated as the theory of 'strategic complementarity' among various industries (Murphy *et al.*, 1989; Bardhan, 1995: 2292–6), which will be discussed later in Section 8.4.2.

This 'balanced growth' or simultaneous development of many industries would require mobilization of large amounts of resources at one time.

According to Rosenstein-Rodan and Nurkse, poor developing economies were characterized by a large surplus of labour employed at zero marginal cost in the traditional sector (similar to the assumption of the dual economy model in Section 3.3.3). Under this assumption of disguised unemployment, the labour supply would create no major bottleneck to a 'great leap forward' in industrialization.

The key to the success of the balanced growth strategy would, of course, be to mobilize sufficient funds for simultaneous development of many industries. Large-scale capital imports from advanced economies, as experienced in the era of colonialism for the purpose of development in primary commodity production, could not be expected after independence. At the same time, the domestic saving rate was typically low in poor developing economies. Thus, the theory of balanced growth left no alternative for development in newly independent nations other than to establish a mechanism of forced saving under government command.

### 5.2.2 Application of the Harrod-Domar model\*

A similar prescription was also derived from the Harrod-Domar model. In the 1940s Roy Harrod (1948) and Evsey Domar (1946) separately developed a macro-dynamic model through an extension of Keynes's theory. The model's original intent was to identify the source of instability in the growth of developed economies where effective demand is normally exceeded by supply capacity. In the 1950s and 1960s this model was applied to economic planning in developing economies. The basic equation in the Harrod-Domar model is very simple, as expressed by:

$$g = s/c \quad (5.3)$$

where  $g = \dot{Y}/Y$  is the growth rate of national income  $Y$  where  $\dot{(\cdot)}$  on a variable represents its absolute change,  $s = S/Y$  is the ratio of saving  $S$  to income,  $c = \dot{K}/\dot{Y}$  is the marginal capital-output ratio (or capital coefficient) which measures additional capital investment required to produce one additional unit of national income. In the model  $c$  is assumed to be a technologically given constant and, therefore, equal to average capital-output ratio ( $K/Y$ ). It can easily be verified that equation 5.3 holds under the assumption of Keynesian equilibrium between saving ( $S$ ) and investment ( $I = \dot{K}$ ).

Under the assumption of constant  $c$ ,  $g$  increases proportionally with  $s$ . Because  $s$  is considered to increase proportionally with income per capita,  $s$  is bound to be low and, hence,  $g$  will be low in low-income economies if savings

\* Readers not interested in the technical analysis of economics may skip this section.

and investment are left to private decisions in the free market. The model implies, therefore, that the promotion of investment by government planning and command is needed to accelerate economic growth in low-income economies. In fact, the Harrod–Domar model provided a framework for economic planning in developing economies, such as India’s Five-Year Plan (Mahalanobis, 1955; Srinivasan, 1990).<sup>3</sup>

### 5.2.3 *The model of low-equilibrium trap\**

These models, which consider economic growth to be totally dependent on investment in tangible capital, were combined with the population theory to produce a model of a vicious circle between low per capita income and low saving in low-income economies, alternatively called the models of the ‘low-equilibrium trap’, ‘critical minimum effort’, and ‘big push’ (Leibenstein, 1954; Nelson, 1956). A model of this type is structured in Figure 5.2 to be consistent with the Harrod–Domar model.

The upper section of Figure 5.2 shows the relationship between the population growth rate ( $\dot{N}/N$ ) and income per capita ( $Y/N$ ). Since per capita income is largely proportional to the wage-rate, the curve of ( $\dot{N}/N$ ) in Figure 5.2 corresponds to the  $G\bar{W}H$  curve in Figure 3.3, and  $m$  in Figure 5.2 corresponds to  $\bar{W}$  in Figure 3.3, with  $\underline{om}$  measuring the subsistence level of per capita income at which the population growth rate is zero.

The middle section depicts the relationship between the saving rate ( $s = S/Y$ ) and per capita income ( $Y/N$ ). As conventionally assumed,  $s$  rises exponentially as  $Y/N$  increases. The saving rate curve is drawn to cut the horizontal axis through  $m$ , implying that people consume all their income at the subsistence level. The conclusion will be little affected by assuming that the cut-through point slightly deviates from  $m$ .

The lower section analyses the determination of income per capita and its growth rate by combining the relationships in the upper and the middle sections. In this diagram, the population growth curve ( $\dot{N}/N$ ) is moved down as it is, and the saving-rate curve is moved down after being divided by the capital–output ratio ( $c$ ). The value of  $s/c$  is equivalent to the income growth rate ( $\dot{Y}/Y$ ) according to the basic equation in the Harrod–Domar model.<sup>4</sup>

Point  $m$  in the lower diagram represents a stable equilibrium. If  $Y/N$  declines below  $\underline{om}$ , population decreases faster than total income, so that per capita income will be pushed back towards point  $m$ . On the other hand, even if per capita income rises above point  $m$  to point  $h$  for some reason (e.g. bumper crops or increased foreign aid), the population growth rate ( $\underline{hb}$ )

\* Readers not interested in the technical analysis of economics may skip this section.

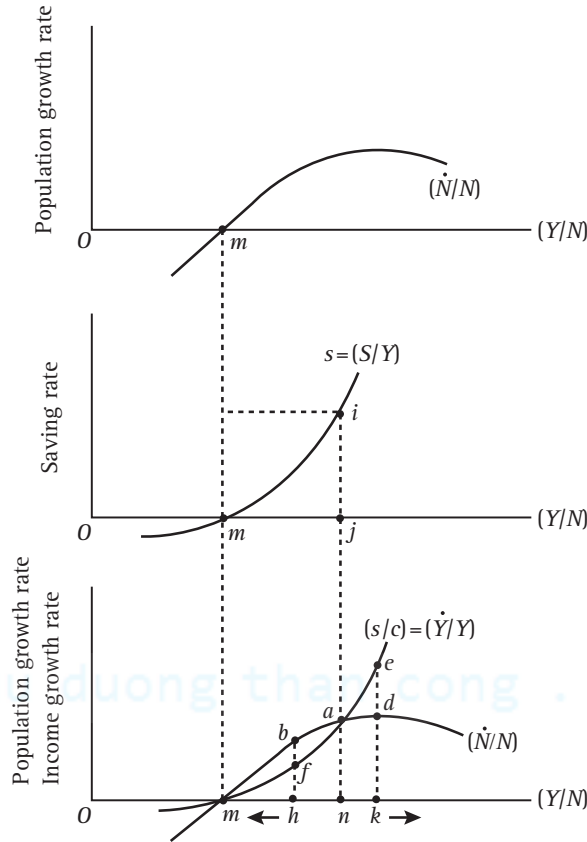


FIG. 5.2 The model of low-equilibrium trap

becomes higher than the income growth rate ( $hf$ ), so that income per capita will be pulled down to point  $m$ . Thus, economies located at point  $m$  would not be able to escape this subsistence income level with modest increases in investment that they may be able to mobilize because any growth in per capita income from such modest efforts will be eaten up by increased population, and thereby pushed back to the subsistence level. This vicious circle between low-income level and economic stagnation is aptly called the 'low-equilibrium trap'.

Escape from this trap is not possible with cumulative increases in modest investment over an extended period. In order to achieve sustained growth, investment large enough to push the economy beyond point  $n$  must be attempted at one time. Once the economy goes beyond the threshold ( $n$ ) to reach point  $k$ , the income growth rate ( $ke$ ) becomes higher than the



population growth rate ( $kd$ ) so that growth in income per capita becomes self-sustainable.

In order to escape from the low-equilibrium trap to sustained economic growth, it is necessary to mobilize a high saving rate, as represented by  $ji$  at the subsistence income level ( $om$ ), in which no saving is generated if left to the market mechanism. This extraordinary jump in the mobilization of saving and investment is a 'critical minimum effort' for low-income economies to accomplish. The model implies that, if large-scale capital imports as experienced during the colonial era are unlikely to be forthcoming to newly independent economies, no development alternative is left for them but to set aside necessary investible funds from meagre income by forcing people to tighten their belts on hungry stomachs.

#### 5.2.4 *Development theories and policy choice*

It is not certain how much these development theories (with heavy emphasis on capital accumulation) influenced policy choice in developing economies. Yet, many newly independent nations adopted policies to expand the sector producing investment goods—at the expense of the production of consumption goods and services—by such means as direct investment by state enterprises, government-directed credits, regulations on marketing, and discriminatory taxation. The agricultural exploitation policy (as explained in Section 4.3) was a part of this strategy. Export tax on agricultural commodities and high marketing margins of farm products by state monopoly procurement were an important source of government revenue for industrial investment. Lowered agricultural product prices caused by these policies suppressed farmers' income and consumption. At the same time, lowered food prices kept the cost of living and the wage rate of industrial workers low and thereby kept capital profit and investment incentives high.

In the former Soviet Union and other socialist economies the strategy of high capital accumulation by government command and planning was strongly and thoroughly executed. That the Soviet economy appeared relatively successful in achieving a high rate of growth until the 1960s had attracted developing countries to the socialist system. Another factor had been a rejection in developing economies of market economies, which had been imposed upon them by colonial powers and viewed as a mechanism of exploitation, especially where market channels had been controlled by ethnic minorities (such as Indians in Africa and Chinese in South-East Asia). Among economic professionals, too, high regard for Keynesian intervention policies, coupled with the classical and Marxian traditions, made the postwar