

Economical Development

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Chapter One

Characteristics of an underdeveloped

Chapter 1.

The main of goal from studying this chapter to understand the following topics

- 1- Meaning of the term underdeveloped.**
- 2- Different criteria of underdevelopment.**
- 3- General poverty.**
- 4- Agriculture, the main occupation.**
- 5- Underdeveloped natural resources.**
- 6- Demographic Feature.**
- 7- Unemployment and disguised unemployment.**

- 8- Economic backwardness.**
- 9- A dualistic Economy.**
- 10- Lack of enterprise and initiative.**
- 11- Insufficient capital Equipment.**
- 12- Technological backwardness.**
- 13- Foreign trade orientation.**

Chapter One

Characteristics of an underdeveloped

Before we study the characteristics of an underdeveloped country, it is essential to understand the meaning of the term underdeveloped and the criteria of underdevelopment.

Meaning of the Term Underdeveloped

The term "underdeveloped" has been used in a variety of ways. "Undeveloped" and "underdeveloped" countries are often used as synonyms. But these two terms are easily distinguishable. An undeveloped country is one which has no prospects of development. An underdeveloped country, on the other hand, is one which has no potentialities of development. The Antarctic, the Arctic and parts of the Sahara may be termed as undeveloped, while India, Pakistan, Uganda, Columbia, Panama, etc, may be called underdeveloped. "Poor" and "backward" are also used as synonyms for "underdeveloped". A poor country does not mean a young country. Poverty simply refers to the low level of per capital income of a country. It has nothing to do with the country's culture. "Backward countries" is a static term like the term underdeveloped. So the terms poor and underdeveloped are interchangeable. A more respectable term developing countries has also come to be used in economic literature. However, Bauer regards the expression underdeveloped, developing and less developed as clearly euphemisms. The terms underdeveloped and developing are especially inappropriate euphemisms: underdeveloped because it so clearly suggests that the condition it describes is abnormal, reprehensible and also perhaps readily rectifiable. The term developing because its use leads to such contradictions as reference to the stagnation or retrogression of the developing world. According to him poor or materially backward are the most

appropriate expressions.¹ The World Bank uses the term developing Countries and divides them into low income and middle income countries. Middle income countries are further divided into lower-Middle income and upper- middle countries. Of late, a new term Third World² is being used. Ye shall be using all these terms interchangeably throughout the text.

Different Criteria of Underdevelopment

It is rather difficult to give a precise criterion of underdevelopment. Underdevelopment can be defined in many ways: by the incidence of poverty, ignorance. Or disease; by maldistribution of the national income; by administrative incompetence, by social disorganization.³ There is thus not a single definition which is so comprehensive as to incorporate all the features of an underdeveloped country. Still some of the criteria of underdevelopment are discussed below:

1-The first criterion of underdevelopment is the ratio of population to land area. But it is very difficult to ascertain whether a high or a low ratio of population to area is an indicator of underdevelopment, there are many underdeveloped countries in Africa and Latin America where there are empty spaces signifying a low ratio. While there are

¹ - P.T. Bauer Dissent on Development 1973.

² The A; I can, the Asian and the Latin American member countries of the United Nation prefer to call themselves collectively as the Third World. They do so to distinguish themselves from the economically advanced capitalist countries of the "first world and the socialist countries of the second world.

³-Hugh I. Keenleyside Obstacles and Means in International Development" in Dynamics of development, (ed) G. Hambidge, p. 8.

a number of other underdeveloped countries like India, China, Burma, Pakistan, Malaysia and many other South Asian countries which have a high ratio of population to area. This criterion is therefore, vague and superfluous.

2- Another indicator of underdevelopment is the ratio of industrial output to total output. It may also be explained as the ratio of industrial population to total population. According to this criterion, countries with a low ratio of industrial output to total output are considered underdeveloped. But this ratio tends to increase with the increase in the per capita income. Therefore, the degree of industrialization is often a consequence rather than a cause of economic prosperity in a country. In countries where agriculture is developed, tertiary or service industries tend to grow spontaneously because increasing disposable agricultural surplus creates demand for the products of the industrial sector. But when the disposable surplus agricultural income is used to subsidize uneconomic urban industry, the overall per capita income would tend to be lower.⁴ Thus, this criterion is not a valid indicator of underdevelopment.

3- The third criterion of underdevelopment is the low ratio of capital to per head of population. Nurkse defines underdeveloped countries as those which compared with the advanced countries are under equipped with capital in relation

⁴ - J Vines. The economics of Development in the Economics of underdevelopment

to their population and natural resources.⁵ But dearth of capital is not a satisfactory criterion of underdevelopment for the following reasons: (a) Capital deficiency is not related to the absolute size of a country's stock of capital but to the ratio of capital to population or to some other factor. (b) the principle of Margins! Productivity tells that where the ratio of capital to other factors is low, the marginal productivity of capital is high. But it is difficult to infer from this that in underdeveloped countries marginal productivity of capital is high since capital is scarcity. or that a high marginal productivity of capital suggests a scarcity of capital it is possible that poor organisation, low skills, unfavourable weather, etc. May tend to keep of the marginal productivity of capital low in underdeveloped countries. (c) Moreover, if capital deficiency is taken as an indicator of underdevelopment, other socio-economic factors are neglected. As Nurkse himself says, Economic development has much to do with human endowments, social attitudes, political conditions and historical accidents. Capital is a necessary but not a sufficient condition of progress.

4- Another criterion indicates towards poverty as the main cause, of underdevelopment. Staley defines an underdeveloped country as one characterised by mass poverty which is

⁵ - OP, cit., p. I

chronic and not the result of some temporary misfortune and by obsolete methods of production and social organisation, which means that the poverty is not entirely due to poor natural resources and hence could presumably be lessened by methods already proved in other countries.⁶

This definition points towards some of the important characteristics of underdeveloped countries. That underdeveloped countries have unexploited natural resources, scarcity of capital goods and equipment. Obsolete techniques of production and defects in socio-economic organisation, none can deny. But it does not lay emphasis on the basic criterion of underdevelopment, viz., low per capita income. As Barbara Ward says, perhaps the most satisfactory method of defining property is to discuss the question simply in terms of per capita income—the average income available to citizens in the various countries.⁷

5- Thus one of the most commonly acceptable criteria of underdevelop- merit is the low per capita real income of underdeveloped countries as compared with the advanced countries. According to the United Nations experts, we use it (the term underdeveloped country) to mean countries in which per capita real income is low when compared with the per

⁶ - E. Staley, the future of underdevelopment countries, p. 13.

⁷ - The rich and poor nations

capita real incomes of the United States of America, Canada, Australia and Western Europe. But such definition which explains an underdeveloped country in terms of the low per capita level of income can by no means be considered adequate and satisfactory. For they focus attention only on one aspect of underdevelopment, viz., poverty. They do not analyse the causes of low consumption levels, of inhibited growth and of the development potential of an underdeveloped economy. Moreover, being underdeveloped in the technical sense means nothing in terms of the level of civilization, culture or spiritual values.⁸ Serious difficulties also arise while measuring per capita national income in underdeveloped countries and their comparison with the per capita incomes of the advanced countries. The data on per capita national income are often inaccurate, misleading and unreliable due to the following reasons:

- (a) There is a substantial non-monetized sector underdeveloped countries which makes the calculation of national income difficult. A great deal of what is produced in the subsistence sector is either exchanged for other goods or is kept for personal consumption. This tends to understate the national income.
- (b) There is the lack of occupational specialization in such countries which makes the calculation of national income by

⁸ - B. Higgins , Economic development, P 7.

distributive shares or by industrial origin difficult. Besides the crop, farmers often produce a variety of products like eggs, milk, articles of clothing, etc. That is never included in the national income estimates.

(c) In underdeveloped countries people are mostly illiterate and do not keep any accounts, and even if they do, they are reluctant to disclose their income correctly. In such a situation only rough estimates are possible.

(d) National income estimates include only those goods and services which are commercially used. But in underdeveloped countries people living in rural areas and manufacturing articles of consumption from rudimentary goods are able to avoid many expenses. They build their own huts garments and other necessities. Thus in underdeveloped countries, relatively fewer goods are channelised through the market, and therefore are not included in the national income estimates.

(e) The computation of national income in terms of money underestimates the real income. It does not include the real cost of producing an article, the effort or sacrifice of leisure forgone in the process of production. The income earned by two persons may be the same. But if one works for longer hours than the other, there is some justification in saying that the real income of the former is underestimated.

(f) National income estimates fail to measure adequately changes in output due to changes in the price level. Index numbers used to measure changes in the price level are simply rough approximations.

Moreover the price levels vary in different countries. Consumers' wants and preferences also differ in each country. Therefore, the national income figures of different countries are often misleading data incomparable.

(g) International comparisons of national income are inaccurate due to exchange rate conversion of different currencies into a common currency, I.e., US dollars. The use of a single currency unit for computing the total output of goods and services underestimates the national incomes of underdeveloped countries as compared with the developed ones. The rates of exchange are primarily based on the prices of internationally traded goods. But there are many goods and services in underdeveloped countries that are never traded internationally and are also priced low. It is contended that approximately correct results can be obtained only when there exists equivalence between the prevailing exchange rates and the relationship of internal prices. The equivalence is unlikely to be achieved for most countries today in view of the prevalent use of exchange controls and quantitative restrictions on trade. This makes international comparisons national incomes misleading and superfluous.

(h) The calculation of per capita income in an underdeveloped country is likely to be understated or overstated due to unreliable and erroneous population figures. The census data are never accurate in such countries.

(i) Above all, difficulties arise in the definition of income, in the differences in concepts used for the computation of national income in

various countries and calculating the contribution to national income of such governmental activities as irrigation and power projects, police and military services, etc.

Despite these limitations, per capita income is the most widely used indicator of the level of underdevelopment.

Characteristics of an underdeveloped country

In order to examine the problems of an underdeveloped country, it is useful to have in mind a general sketch of the economy of such a country. Though it is difficult to locate a representative underdeveloped country on the world map, yet it is possible to focus attention on some of its characteristics.

General poverty

An underdeveloped country is poverty-ridden. Poverty is reflected in low GNP per capita. According to the World Development Report, 1999–2000, 59.6 per cent of the world population in 1998 living in low-income economies has GNP per capita of \$ 760 or less; 25.4 per cent in middle income economies had \$761 to \$9,360; and 15.0 per cent in high-income economies had \$ 9,361 or more. The extremely low GNP

per capita of low- income economies reflects the extent of poverty in them.

Further, the World Bank Report pointed out vast income disparities among nations. Among the low- income countries were Nepal and Tanzania with GNP per capita of \$210, Nigeria \$300, Uganda \$ 330, Bangladesh \$350, Ghana \$390, India \$430, Pakistan \$480, Zimbabwe \$610, Indonesia \$680 and China \$750, Some of the middle- income group countries were Sri Lanka with GNP per capita of \$810, Philippines \$1,050, Kenya \$1,310, Namibia \$1,940, Russian Federatisuch2,300, South Africa \$2880, and Malaysia \$3,600. Of the high income countries, Luxembourg led with GNP per capita of \$43,570, followed by Switzerland \$40,080, Norway \$34,330, Denmark \$33,260, Japan \$32,380, Singapore 30,060, United States \$29,340 and so on.

However, it is not relative poverty but absolute poverty that is more important in assessing such economies. Absolute poverty is measured not only by low income but also by malnutrition, poor health, clothing, shelter, and lack of education. Thus absolute poverty is reflected in low living standards of the people. In such countries, food is the major item of consumption and about 80 per cent of the income is spent on it as compared with 20 per cent in advanced countries. People mostly take cereals and other starches to the total absence of nutritional foods, such as meat, eggs, fish and dairy products. For instance, the per capita consumption of protein in LDCs is 52grams per day as compared with 105 grams in developed countries. The per capita fat consumption in LDCs is 83 grams daily as against 133 grams in developed countries.

As a result, the average daily calorie intake per capita hardly exceeds 2,000 in underdeveloped countries.

The rest of the consumption of such countries consists mainly of a fetched hut and almost negligible clothing. People live in extremely insanitary conditions. More than 1,200 million people in the developing entries do not have safe drinking water and more than 1,400 million have no sanitary waste disposal. Of every 10 children born, two die with in a jar, another three die before the age of five, and only five survive to the age of 40 years. The reasons are poor nutrition, unsafe water, poor imitation, uninformed parents and lack of immunisation. Services like Education and health hardly flourish. Recent data reveal that there is a doctor for 2,083 persons in India, for 5,555 persons in Bangladesh, for 10,000 persons in Nepal, and for 870 persons in China, as against 410 persons for the developed countries. Most developed countries are expanding educational facilities rapidly. Still such efforts fall short of the manpower requirements of these economies. In many low- income countries about 70 per cent of the primary school age children go to school. At the secondary level, enrolment rates are lower than 20 per cent in these countries, while enrolment in higher education hardly comes up to 3 per cent. Moreover, the type of education being imparted to the majority of the school and college going children is ill- suited to the development needs of such countries. Thus the vast majority of the people in LDCs are ill- fed, ill- clothed, ill- housed and ill- educated. The number of people in absolute poverty in LDCs excluding China is estimated at about 1,000 million. Half of them live in South Asia, mainly

in India and Bangladesh; a sixth live in East and Southeast Asia, mainly in Indonesia; another sixth in sub-Saharan Africa; and the rest in Latin America, North Africa and the Middle East. Poverty is, therefore, the basic malady of an underdeveloped country which is involved in misery-go-round. Prof. Cairncross is justified in saying that the underdeveloped countries are the slums of the world economy.⁹

Agriculture, the Main Occupation

In underdeveloped countries two-thirds or more of the people live in rural areas and their main occupation is agriculture. There are four times as many people occupied in agriculture in some underdeveloped countries as there are in advanced countries. In low-income countries like China, Kenya, Myanmar and Vietnam, more than 71 per cent of the population is engaged in agriculture while the percentage for the United States, Canada and West Germany are 3,3 and 4 respectively. This heavy concentration in agriculture is a symptom of poverty. Agriculture, as the main occupation, is mostly unproductive. It is carried on in an old fashion with absolute and outdated methods of production. The average land holdings are as low as 1 to 3 hectares which usually support 10 to 15 people per hectare. As a result, the yield from land is precariously low and the peasants continue to live at a bare subsistence level.

Such countries mainly specialize in the production of raw materials and foodstuffs, yet some also specialize in nonagricultural primary

⁹ - A.K. Cairncross, Factors in Economic Development, p 15.

production, i.e., minerals. For example, Sri Lanka specializes in tea, rubber and coconut products; Malaysia in rubber, tin and palm oil; Indonesia in rubber, oil and tin; Pakistan in cotton; Bangladesh in jute; India in tea; and Brazil in coffee. An underdeveloped country is thus a primary sector economy. Besides the primary sector there is the underdeveloped secondary sector with a few simple, light and small consumer goods industries and an equally underdeveloped tertiary sector, i.e., transport, commerce, banking and insurance services. In some of the low-income countries such as Bangladesh, Ethiopia, Nepal, Uganda, Ghana and Tanzania the share of agriculture in GDP continues to be more than 40 per cent and the share of industry and manufacturing less than 20 per cent.

A Dualistic Economy

Almost all underdeveloped countries have a dualistic economy. One is the market economy, the other is the subsistence economy. One is in and near the towns, the other is in the rural areas. One is developed, the other is less developed. Centered in the towns, the market economy is ultra-modern with all the amenities of life, viz., the radio, the car, the bus, the train, the telephone, the picture house, the palatial buildings, the schools and the colleges. Here too government offices, the business houses, the banks and a few factories are visible. The subsistence economy is backward and is mainly agriculture-oriented.

Dualism is also characterised by the existence of an advanced industrial system and an indigenous backward agricultural system. The

industrial sector uses, capitals intensive techniques and produces variety of capital goods and durable consumer goods. The rural sector is engaged in producing agricultural commodities with traditional techniques. Both perpetuate unemployment and disguised unemployment. There is also financial dualism consisting of the unorganized money market charging very high interest rates on loans and the unorganized money market with low interest rates and abundant credit facilities. This aggravates economic dualism between the traditional sector and the modern industrial sector.

In many underdeveloped countries, there are foreign-directed enclaves thus making a triplistic economy. They are highly capitalistic and are found in petroleum, mining and plantations. The native hired labour working in these plantations and mines spends a considerable part of its, wages on imported consumer goods. The standard of living of the workers working there differs from that of their brethren living in the subsistence sector.

The dualistic or triplistic nature of the economy is not conducive to healthy economic progress. The primary sector inhibits the growth of the secondary and the tertiary sectors by putting a limit on their expansion and development.

Underdeveloped Natural Resources

The natural resources of an underdeveloped country are underdeveloped in the sense that they are either unutilized or underutilized or misutilized. A country may be deficient in natural resources, but it cannot be so in the absolute sense. Although a country may be poor in resources, it is just possible that in the future it may become rich in resources as a result of the discovery of presently unknown resources or because new uses may be found for the known resources. Thus instead of saying that underdeveloped countries are absolutely deficient in natural resources, it is more appropriate to say that they have not been successful in overcoming the scarcity of natural resources by appropriate changes in technology and social and economic organization. Generally speaking, they are not deficient in land, mineral, water, forest or power resources. Africa possesses considerable reserves of copper, tin, bauxite, and gold; Asia is rich in petroleum, iron, bauxite, manganese, mica and tin; and Latin America's reserves of petroleum, iron, zinc, and copper are immense. The forest wealth of Africa and South America still remains unpenetrated and unexplored. Thus underdeveloped countries do possess resources but they remain unutilized underutilized or misutilized due to various inhibitions such as their inaccessibility, lack of technical knowledge, non-availability of capital and the small extent of the market.

Demographic features

Underdeveloped countries differ greatly in demographic position and trends. Diversity exists in the size, density, age-structure and the rate of growth of population. But there appears to be one common feature, a

rapidly increasing population which adds a substantial number to the total population every year. with their low per capita incomes and low rates of capital formation, it becomes difficult for such countries to support this additional number. And when output increases due to improved technology and capital formation, it is swallowed up by increased population. As a result, there is no marked improvement in the living standards of the masses. Warning about the increase in numbers, Keenleyside writes: "the womb is slower than the bomb but it may prove just as deadly. Suffocation rather than incineration may mark the end of the human story."¹⁰

Almost all the underdeveloped countries possess high population growth potential characterized by high birth-rate and high but declining death-rate. The advancement made by medical science has results in the discovery of marvelous drugs and the introduction of better methods of public health and sanitation which have reduced mortality and increased fertility Declining death-rates and increasing birth-rates give a very high natural growth rate of population. The average annual growth rate of population in developing countries is 2 per cent as compared with about 0.7 per cent in developed countries. This rapid increase in numbers aggravates the shortage of capital in such economies because large investments are required to be made to equip the growing labour force even with obsolete equipment.

¹⁰ - H.L. Keenleyside, in Dynamics of Development, (ed) G, Hambidge, p. 9.

An important consequence of high birth-rate is that a larger proportion of the total population is in younger age groups. The percentage of population under 15 years of age is about 40 in developing countries, compared with only 20 to 25 per cent in developed countries. Moreover, 90 per cent of the dependents are children in LDCs whereas their percentage is only 66 in developed countries. A large percentage of children in the population entail a heavy burden on the economy which implies a large number of dependents who do not produce at all but do consume. With many dependents to support, it becomes difficult for the workers to save for purposes of investment in capital equipment. It is also a problem for them to provide their children with the education and bare necessities of life that are essential for the country's economic and social progress in the long run.

Underdeveloped countries have also a shorter life expectancy which means a smaller fraction of their population is available as an effective labour force. Average life expectancy at birth is roughly 51 years in low income countries whereas in the developed countries it is 75 years. Low life expectancy means that there are more children to support and few adults to provide for them which inhibits the rate of economic growth.

Lastly, in the majority of underdeveloped countries, the density of agricultural population is very high in relation to the area of cultivated land. In Egypt, in the inhabited area of the valley of the Nile, the density of population is 600 persons per sq. Km. Though in other underdeveloped countries it is much less, yet their density is increasing rapidly with the growth of population. The problem is becoming serious

in the river deltas of Asia and Africa and in the density populated islands of Malaysia, Indonesia, and Sri Lanka. Shortage of land in relation to an excessively large agricultural population leads to overcrowding, over-cropping and soil exhaustion thereby impeding economic progress.

Unemployment and Disguised Unemployment

In underdeveloped countries there is vast open unemployment and disguised unemployment. The unemployment is spreading with urbanisation and the spread of education. But the industrial sector has failed to expand along with the growth of labour force thereby increasing urban unemployment. Then there are the educated unemployed who fail to get jobs due to structural rigidities and the lack of manpower planning. With the present average annual growth rate of 4.5 per cent in urban population, 20 per cent of the labour force in urban areas is unemployed.

But underemployment or disguised or concealed unemployment is a notable feature of underdeveloped countries. Such unemployment is not voluntary but involuntary. People are prepared to work but they are unable to find work throughout the year due to the lack of complementary factors. Such unemployment is found among rural landless and small farmers due to the seasonal nature, of farm operations and inefficient land and equipment to keep them fully employed. A person is said to be disguised unemployed if his contribution to output is less than what he can produce by working for normal hours per day. His marginal productivity is nil or negligible, and

by withdrawing such labourers farm output can be increased. In the 1950s, economists estimated the number of disguised unemployed at 25 – 30 per cent of rural labour force. Now it is agreed that it doesn't exceed 5 per cent, even though precise estimates are not available

There are also other types of underemployed persons in such countries. A person is considered to be underemployed if he is forced by unemployment to take a job that he thinks is not adequate for his purpose, or not commensurate with his training , Further, there are those who work full time in terms of hours per day but earn very little to rise above the poverty level. They are hawkers, petty traders, workers in hotels and restaurants and in repair shops, etc., in urban areas. Open and disguised unemployed in urban and rural areas are estimated at 30–35 per cent of the labour force in LDCs.

Economic backwardness

In underdeveloped countries particular manifestations of economic backwardness are low labour efficiency, factor immobility limited

specialization in occupation and in trade, economic ignorance, values and social structure that minimize the incentives for economic change.¹¹

The basic cause of backwardness is to be found in low labour productivity as compared with the developed countries. This low labour efficiency results from general poverty which is reflected in low nutritional standards, ill health, illiteracy and lack of training and occupational mobility, etc.

There is also occupational immobility of labour due to the joint family system and the caste system. Certain cultural and psychological factors are more dominant than wage rates in determining the supply of labour the joint family system makes people lethargic and stay-at-home. In many underdeveloped countries, certain occupations are reserved for members of some particular caste, religion, race, tribe or sex. In Latin America, cloth making falls within the exclusive jurisdiction of woman. In India, a janitor always belongs to a particular caste. According to Stephen Enke, underdeveloped countries have what might be termed "an uneconomic culture." Primarily, this means that traditional attitudes discourage the full utilization of human resources. More specifically. It means that men are less likely to strive for extra consumption in underdeveloped countries people are mostly illiterate. Ignorant conservative, superstitious and fatalists. Poverty in such countries is abysmal, but it is considered to be God-given, something preordained. It is never attributed to personal lack of thrift and industry.

¹¹ - Meier and Baldwin, op. Cit., p. 293.

There is extensive prevalence of child labour and women's status and position in society are inferior to men. Dignity of labour is conspicuously absent. Government jobs, even of a clerical nature, have more prestige than manual work. People are ranked not according to their capacity to do a particular job but by age, sex, caste, clan and kinship. They are governed by customs and traditions. Individualistic spirit is absent. Exchange by barter is widespread and money economy is hardly understood. The value system minimizes the importance of economic incentives, material rewards, independence and rational calculation. It inhibits the development and acceptance of new ideas and objectives and fails to compare the cost and advantages of alternative methods to achieve objectives. In short, the cultural value system within many poor countries is not favourable to economic achievement and the people remain economically backward.¹²

Lack of Enterprise and initiative

Another characteristic feature of underdeveloped countries is the lack of entrepreneurial ability. Entrepreneurship is inhibited by the social system which denies opportunities for creative faculties. The force of custom, the rigidity of status and the distrust of new ideas and of the exercise of intellectual curiosity, combine to create an atmosphere inimical to experiment and innovation. The small size of the market, lack of capital, absence of private property, absence of freedom of contract and of law and order hamper enterprise and initiative.

¹² - Ibid., pp.298-99

Besides, there exist a few entrepreneurs who are engaged in the manufacture of some consumer goods, and plantations and mines that tend to become monopolistic and quasi- monopolistic. They develop personal and political contacts with the government officials, enjoy a privileged position, and receive preferential treatment in finance taxation, exports, imports, etc. It is they who start new industries and thus found individual business empires which inhibit the growth of fresh entrepreneurship within the country.

The thin supply of entrepreneurs in such countries is also attributed to the lack of infrastructural facilities which add to the risk and uncertainty of new entrepreneurship. LDCs lack in properly developed means of transport communications, cheap and regular power supply, availability of sufficient raw materials, trained labour, well- developed capital and money markets, etc.

Further, entrepreneurship is hindered by technological back development underdeveloped countries. This reduces output per man and the products are of substandard quality. Such countries do not possess the necessary technical know- how and capital to evolve their own techniques which may be output- increasing and labour- absorbing. Mostly they have to depend upon imported capital- intensive techniques which do not fit in their factor endowments.

No wonder LDCs lack dynamic entrepreneurship which Schumpeter regarded as the focal point in the process of economic development

Insufficient capital equipment

Insufficiency of capital equipment is another general characteristic of such countries; underdeveloped countries are characterized as capital – poor or low saving and low– investing economies. There is not only an extremely small capital stock but the current rate of capital formation is also very low. In most underdeveloped countries gross investments is only 5–6 per cent of GNP whereas in advanced countries it is about 15–20 per cent. Such low rates of the growth of capital stock are hardly enough to provide a rapidly growing population at 2–2.5 per cent per annum. let alone invest in new capital projects. In fact, these countries find it difficult to cover even depreciation of capital and replace the existing capital equipment

The root cause of this capital deficiency is the problem of under saving or more precisely, that of under–investment in productive instruments capital of income being very low, people on the bare edge of subsistence cannot save much thereby leasing very little for further investment. There are extreme inequalities in the distribution of income in such countries. but this does not mean that the volume of savings available for capital formation is high. In fact large savings are possible only in the case of 3–5 per cent of the people at the top of the income pyramid. Moreover, the persons at the peak of the income pyramid are traders and landlords who have a tendency to invest in unproductive channels such as in gold, jewellery, precious stones, idle inventories, luxurious real estates and money markets abroad etc.

Another reason as to why the saving ratio does not rise with the increased level of incomes in the long run is the demonstration effect .In everybody there is a great urge to keep up with the joneses. That is, to imitate the standard of living of our prosperous neighbours. Similarly,

there is a tendency on the part of the people of the underdeveloped countries to emulate the higher consumption standards of advanced countries .as a result of the demonstration effect, the rise in incomes is spent on increased expenditure on conspicuous consumption and thus savings are almost static or negligible. This demonstration effect is usually caused by foreign films, magazines and visits abroad.

This tendency to emulate the consumption patterns of advanced countries is to be found not only in the case of private individuals but also in the case of government. The governments in LDCs emulate social security programmes found in developed countries. viz mini mum wage legislation, health insurance, pension and provident fund schemes, etc ., but these measures put obstacles in the way of entrepreneurship and thus retard capital formation . It is not surprising writes Haberler. That poor and backward economies when they wake up and set their minds to develop in a hurry and catch up with mote developed economies are tempted to overspend and live beyond their means thus such countries suffer from chronic capital deficiency and the factors responsible for this are not only economic but also socio-political in nature

Technological backwardness

Underdeveloped countries are also in the backward state of technology .their technological backwardness is reflected ,firstly in high

average cost of production despite low money wages secondly , in high labour output and capital output ratios as a rule , and on the average ,given constant factor prices thus reflecting a generally low productivity of labour and capital ; thirdly in the predominance of unskilled and untrained workers ; and lastly in the large amount of capital equipment required to produce a national output deficiency of capital hinders the process of scrapping off the old techniques and the installation of modern techniques. Illiteracy and absence of a skilled labour are the other major hurdles in the spread of techniques in the backward economy. Thus it may be pointed out that technological backwardness is not only the cause of economic backwardness, but it is also the result of it.

This technological backwardness is due to technological dualism which implies the use of different production functions in the advanced sector and the traditional sector of the economy. The existence of such dualism has accentuated the problem of structural or technological unemployment in the industrial sector and disguised unemployment in the rural sector. Underdeveloped countries are also characterised by structural disequilibrium at the factor level which leads to technological unemployment. This technological unemployment arises from mal- allocation of resources, the structure of demand and technological restraints.

Foreign trade orientation

Underdeveloped economies are generally foreign trade oriented .this orientation is reflected in exports of primary products and imports of consumer goods and machinery .the percentage share of

fuels ,minerals, metals , and other primary products in the merchandise exports of the majority of LDCs , as revealed by the recent World Bank data is on the average about 80 per cent . for instance , the share of Ethiopia is 99 per cent , of Burma 97 per cent , of Uganda 99 per cent , of Indonesia 96 per cent , of Malaysia 80 per cent ,Algeria 100 per cent , and of Kenya 86 per cent

This too much dependence on exports of primary products leads to serious repercussions on their economies. Firstly the economy concentrates mainly on the production of primary exports to the comparative neglect of the other sectors of the economy. Secondly, the economy becomes particularly susceptible to fluctuations in the international prices of the export commodities. A depression abroad brings down their demand and prices. As a result, the entire economy is adversely affected. lastly .too much dependence on a few export commodities 1 the utter neglect of other consumption goods has made these economic highly dependent on imports .imports generally consist of few manufactured articles ,primary commodities , machinery and transport equipment , and even food. Coupled with these is the operation of the demonstration effect which tends to raise the propensity to import sti further.

Of late there has been a secular decline in the income terms of trade (capacity to import) of the underdeveloped countries so that they are faced with the balance of payments difficulties .an underdeveloped country 's weak export capacity relatively to its strong import needs reflected in its persistent external indebtedness. for instance, the gross inflow of public medium and long –term loans to Mexico was 72,2 million dollars and the repayment of principal was 7,502 million dollars in 1985

The foreign trade orientation also manifests itself through the flow of foreign capital to underdeveloped countries. It plays a dominant role in developing and expanding the export sector. It also controls and manages those services which are ancillary to the export sector. In this way, foreign capital has tended to monopolize its position in certain selected fields like minerals, plantations, and petroleum. In underdeveloped countries, the multinational corporations (MNCs) from the developed countries have spread themselves in developing countries, manufacturing export-oriented plantations, petroleum, and mining. Such a widespread hold of foreign capital drains the resources of the developing countries. The foreigners are interested only in maximizing their gains at the expense of the developing countries.

Exercises

Question on chapter one

Characteristics of an underdeveloped country

Part A True – false questions

Circle whether the following statements are true (T) or false (F)

- 1- An undeveloped country is one which has no prospects of development.
- 2- An underdeveloped country is one which has no potentialities of development.
- 3- Poor and backward are also used as synonyms for undeveloped.
- 4- Poverty refers to the low level of per capita income of a country.
- 5- The ratio of population to land area is a superfluous criterion for definition of underdevelopment.
- 6- The ratio of industrial output to total output is a valid indicator of underdevelopment.
- 7- Capital indicator is a necessary but not a sufficient of progress.
- 8- Incidence poverty is one of the most commonly acceptable criteria of under develop- merit.
- 9- Underdeveloped countries have a relative poverty not absolute poverty.
- 10- Absolute poverty is measured only by low income.
- 11- In underdeveloped countries two – third or less of the people live in rural areas.
- 12- Agriculture is mostly unproductive; it is carried on in an old fashion.
- 13- The heavy concentration in agriculture is referred to poverty.
- 14- The subsistence economy is backward and is mainly agriculture-oriented.
- 15- In many underdeveloped countries, there are foreign directed enclaves thus making a triplistic economy.
- 16- The dualistic nature of the economy conducive to healthy economic progress.
- 17- An underdeveloped countries have been successful in overcoming the scarcity of natural resources.

- 18- Increasing in output is swallowed up by increased population.
- 19- Declining death rates and increasing birth rates give a very high natural growth rate of population.
- 20- Unemployed people are prepared to work but they are unable to find work throughout the year.
- 21- Disguised unemployed his marginal productivity is negligible.
- 22- The basic cause of backwardness is to be found in low labor productivity.
- 23- People are ranked according to their capacity to do a particular job.
- 24- The root cause of capital deficiency is the problem of under saving and under investment.
- 25- Absolute poverty is measured only by low income.
- 26- The underdeveloped countries are the slums of the world economy.
- 27- In underdevelopment countries most of the people live in rural areas.
- 28- The dualistic nature of the economy is a conducive to healthy economic progress.
- 29- In underdeveloped countries, the Economic growth can be swallowed up increased population.
- 30- I underdevelopment countries, the heavy concentration in agriculture is a symptom of poverty.
- 31- Underdeveloped countries are not been successful in overcoming the scarcity of natural resources.
- 32- The basic cause of backwardness is to be found in low labor productivity.
- 33- The demonstration effect means that the saving ratio does not rise with the increased level of income in the long run.
- 34- Almost all developed countries have a dualistic economy.
- 35- The subsistence economy (dualistic economy) is backward and is mainly agriculture – oriented.

- 36- The disguised unemployment is related to developed countries.
- 37- A person is said to be disguised unemployed if his contribution to output is less than what he can produce.
- 38- Marginal productivity, in case of disguised unemployment, is nil or negligible.
- 39- The basic cause of backwardness is to be found in high labor productivity compared with the developed countries.
- 40- Entrepreneurship is hindered by technological backwardness in underdeveloped countries.
- 41- In LCDs, the foreign trade orientation is reflected in exports consumer goods and machinery, and imports of primary product.
- 42- The foreign trade orientation manifests itself through the flow of foreign capital to LDCs.
- 43- The principal factor affecting the development of an economy is structural change.
- 44- The economic growth is related to a quantitative sustained increase in countries per capital output.
- 45- Economic development is related to qualitative changes in economic wants, goods, and institutions.

Part B : multiple – choice questions

Circle the appropriate answer:

- 1-is one which has no prospects of development
 - A) An undeveloped country b) An underdeveloped country
 - c) A developing country d) Non of the above

- 2-is one which has no potentialities of development
 - A) An undeveloped country b) An underdeveloped country
 - c) A developing country d) Non of the above

- 3- Underdeveloped countries have.....

- a) unexploited natural resources
- b) scarcity of capital goods and equipment
- c) obsolete techniques of production
- d) all of the above

4- Absolute poverty is measured not only by low income but also by:

- a) malnutrition
- b) poor health
- c) lack of education
- d) all of these

5- Absolute poverty is reflected in.....

- a) low GNP per capita.
- b) low income per capita.
- c) low living standards of the people
- d) all of the above

6- Absolute poverty is measured not only by low income but also by:

- a) lack of technical Knowledge
- b) lack of specialization of occupation.
- c) small of extent market
- d) all of the above

7- The increase in the number of deaths in underdeveloped countries is due to:

- a) uniformed parents
- b) lack of immunization
- c) poor nutrition
- d) all of the above

8-..... saying that underdeveloped countries are the slums of the world economy

- a) Prof. Cairncross
- b) Kreenleyside
- c) Stephen enake
- d) Marx

9- The market economy is

- a) In and near the towns
- b) in the rural areas
- c) is developed
- d) a and c

e) b and c

10- The subsistence economy is

- a) in and near the towns
- b) the rural area
- c) is less developed
- d) a and c

e) b and c

11- A dualistic economy is characterized by the existence of

- a) the market economy and the subsistence economy.
- b) an advanced industrial system and an indigenous backward agriculture system.

c) a and b

d) a only

12- Dual economies are countries

- a) with double capital and labor
- b) with a modern manufacturing sector as well as traditional agriculture sector
- c) that specialize in labor-intensive products more than capital-intensive products
- d) with foreign –owned and domestically-owned capital.

13- In LDCs, the natural resource are:

- a) Unutilized
- b) underutilized
- c) Misutilized
- d) all of the above

e) non of the above

14- In LDCs, the underutilized natural resources due to:

- a) lack of technical Knowledge
- b) the large extent of the market
- c) b only
- d) A and b

15- LDCs are characterized as

- a) capital-poor economy
- b) low-saving economy
- c) low investing economy
- d) all of the above

16- The poorest region of the world is

- a) the middle east
- b) sub-saharan Africa
- c) Asia
- d) Latin America

17- Of the world's population, what portions lives in developing countries?

- a) approximately 35%
- b) approximately 80%
- c) nearly 10 billion people
- d) less than 1 billion people

18- In which of the following countries would you expect material lifestyles to be most like those in the United States?

- a) Nigeria
- b) Japan
- c) India
- d) Mali

19- Which of the following could be considered critical questions in development economics?

- a) How do the poorest 2/3 of the world live?
- b) What are the major theories of economic development?
- c) What factors affect labor skills in the third world?
- d) all of the above are correct.

20- Which of the following characteristics are most likely found in developing countries?

- a) high population growth rates
- b) large number of people living in poverty
- c) very traditional methods of agricultural production.
- d) all of the above
- e) none of the above

21- Which of the following could not be considered a major economic system?

a) capitalism

b) communism

c) socialism

d) physical quality of life index

e) none of the above

22- Economic development refers to

a) economic growth

b) economic growth plus changes in output distribution and economic structure

c) improvement in the well – being of the urban population.

d) sustainable increases in gross national product.

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Chapter Two

Obstacles to economic development

Chapter2

Obstacles to economic development

The main of goal to studying this chapter to understand the following topics

- 1- Vicious circles of poverty**
- 2- Low rate of capital formation**
- 3- Sociocultural constraints**
- 4- Agricultural constraint**
- 5- Human resources constraint**
- 6- Foreign Exchange constraint**

Chapter Two

Obstacles to economic development

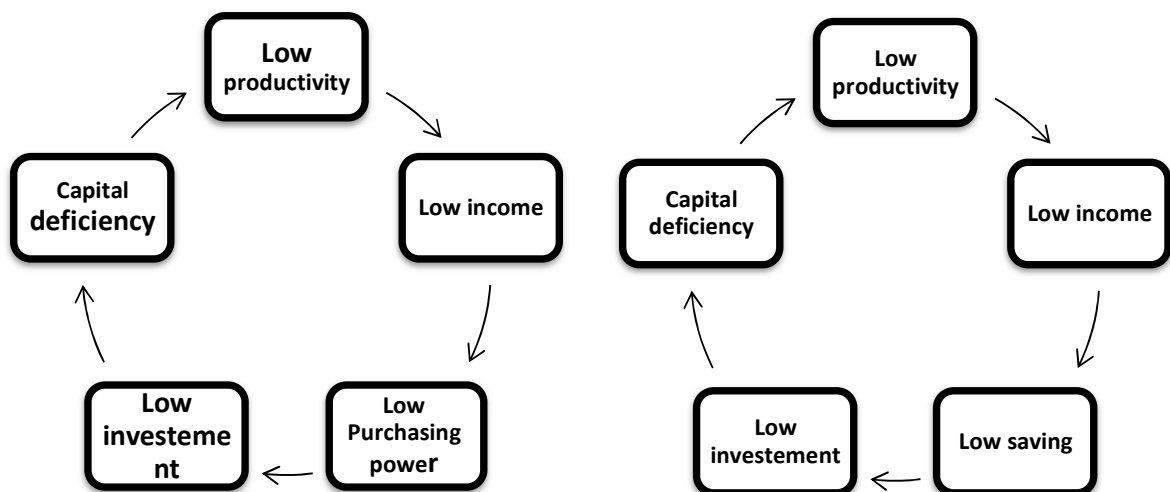
The basic characteristics of underdeveloped country discussed in the preceding chapter might as we regarded as the obstacles to economic development though the general characteristics of underdeveloped are not common to all the underdeveloped countries abroad answer to the question why a poor country is implicit in these characteristics. A number of characteristics are both the cause and consequently poverty. The following factors analyses the mutual can relationships that inhibit development.

Vicious circles of the poverty

There are circular relationships known as the vicious circles of poverty that tend to perpetuate the low development in LDCs. Nurkse explains the idea in words, it implies a circular constellation of forces t to act and react upon one of another in such a to keep a poor country in a state of poverty. For ex a poor man may not have enough to eat, being in his health may be weak, being physically weak. His w capacity is low. Which means that he is poor. Which in turn means that he is poor. Which in turn means that he will not have enough to eat, and so on. A situation of this sort relating to a country as a whole. Can be summed up in the trite proposition: A country is poor because it is poor¹³

¹³ - R. Nurkse, op cit., p. 4

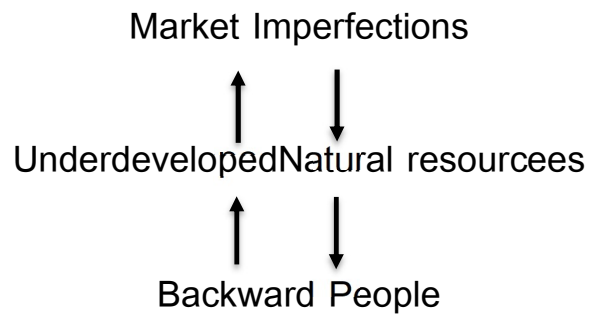
The basic vicious circle stems from the fact that in LDCs total productivity is low due to deficiency of capital, market imperfections, economic backwardness and underdevelopment. However the vicious circles operate both on the demand side and the supply side. The demand side of the vicious circle is that the low level of real income leads to low level of demand which, in turn, leads to a low level of rate of investment and hence back to deficiency of capital. Low productivity and low income. This is shown in Fig1. Low productivity is reflected in low real income. The low level of real income means low saving. the low level of saving leads to a low investment and to deficiency of capital. The deficiency of capital, in turn, leads to a low level of productivity and back to low income. Thus the vicious circle is complete from the supply side it is depicted in Fig 2. The low level of real income. Reflecting low investment and capital deficiency. Is a common feature of both the vicious circles, and natural resources.



Development of natural resources is dependent upon the productive capacity of the people in the country if the people are backward and illiterate, lack in technical skill, knowledge and entrepreneurial activity, the natural resources will tend to remain unutilized underutilized or even misutilized. On the other hand people are economically backward in a country to underdeveloped natural resources. Underdeveloped natural resources are, therefore, both a consequence and cause of the backward people. This is explained in Fig. 3.¹⁴ Poverty and underdevelopment of the economy are thus synonymous. A country is poor because it is underdeveloped. A country is underdeveloped because it remains underdeveloped as it has not the necessary resources for promoting development. Poverty is a curse is that it is self – perpetuating.¹⁵

¹⁴ - Meier and Baldwin. Op., cit, p. 320

¹⁵ - K.N Bhattacharya, India plans P4. Professor Bauer in this dissent on development regards the thesis of the vicious circle of poverty as invalid because it is conclusively refuted by empirical evidence. The Model behind it is defective in that the variables specified or implied in it are either relatively unimportant as determinants of development? Or they do not interact in the fashion implied. He points out that if the thesis were valid innumerable individuals, groups and communities could not have risen from poverty to riches as they have done throughout the world. In both rich and poor countries. Further, the thesis is also lauded by the very existence of developed countries, all of which started poor, with low income per head and low levels of accumulated capital. But they have advanced, usually without appreciable outside capital and invariably without external grants, which would have been impossible according to the thesis of the vicious circle of poverty, Moreover, as the world is a closed system, the thesis is inconsistent with the phenomenon of development. Confusion arises from failure to distinguish between levels of saving and rates of saving. Thus "the thesis of the vicious circle of poverty postulates either that low average levels entail zero rates of changes, which is readily refuted by observation, or alternatively that a low level is the same as a zero rate of change which is a simple error in logic.



Low rate capital formation

The most pertinent obstacle to economic development is the shortage of capital. This stems from the vicious circles of poverty analysed above. Poverty is both a cause and a consequence of a country, slow rate of capital formation. In an underdeveloped country, the masses are poverty-ridden. They are mostly illiterate and unskilled. Use outmoded-capital equipment and methods of production. They practice subsistence farming lack mobility and have little connection with the market sector of the economy. Their marginal productivity is extremely low, low productivity leads to low real income, low saving, low investment and to a low rate of capital formation. The consumption level is already so low that it is difficult to restrict it outlier to increase the capital stock. That is why millions of farmers in such countries use outmoded and obsolete capital equipment. Such small sums as they may be able to save are often hoarded in the form of currency or used in purchasing gold and jewellery, ect. The inclination to hoard money is due to the absence of banking facilities in rural areas. No wonder, there is little capital formation in underdeveloped countries.

It is the high income group that does most of the saving in underdeveloped countries. But these savings do not flow into productive channels. On the other hand, they are dissipated " into real estate, gold, jewellery, commodity hoards and hoards of foreign or domestic currency, money lending and speculation.¹⁶ Thus value- retaining objects and durable consumer goods dominate their expenditure pattern. In addition, conspicuous consumption plays an important part in their consumption patterns. Consequently, they prefer an imported article for its prestige value to an equally good domestic article.

But what are the main reasons for the lack of incentives to save and invest in underdeveloped countries? These include imperfect maintenance of law and order, political instability, unsettled monetary conditions, lack of continuity in economic life, the extended family system with its drain on resources, and its stifling of personal initiative and certain systems of land tenure. The other reasons which inhibit investment are, firstly, sheer habit. It is always easier to attempt the familiar than the unfamiliar. By nature man is happy in his old moorings and would not like to take risks in new ventures. The second reason is the small extent of the domestic market. The capacity of the domestic market to absorb new supplies of commodities is limited due to the low purchasing power of the masses. Thirdly, the difficulties of securing funds for investment purposes are also insurmountable. Many manufacturing activities require large capital-outlays which are difficult to

¹⁶ - R. Nurkse. On cit.. P 26.

obtain due to the lack of a well-developed capital and stock markets, and credit and banking systems. Fourthly, the lack of skilled labour and factor mobility enhance the cost of production and thereby hamper potential investors. Fifthly, absence or inadequacy of basic services like transportation, power and water-supply, etc., further reduce the inducement to invest, lastly, the entrepreneurial ability in itself is a scarce factor in most of the underdeveloped countries. Whatever little entrepreneurship is available, that is scared away by high risks involved in investment. The traders and merchants are mostly engaged in the export industry which consists of primary products. Thus, there is no addition to the real stock of capital in these countries.

In between the low income and high income groups, here is a small middle income group it is mostly engaged in well-established and less risky ventures, such as providing marketing and other services. This group, though not lacking in entrepreneurial ability, is reluctant to invest in manufacturing industries for the reasons which are not far to seek. There is the difficulty of obtaining institutional and corporate finance, advanced technology, trained labour and management. Above all, the difficulties enumerated in the preceding para go together to inhibit the growth of capital in such countries.

Socia-cultural constraints

No doubt shortage of capital is a serious obstacle but it is not the only obstacle to economic development. As Nurkse has said: economic development has much to do with human endowments, political conditions and historical accidents. Capital is a necessary but not a sufficient condition of progress.¹⁷ Broadly speaking, underdeveloped countries possess social institutions and display such attitudes as are not conducive to economic development. According to the UN report on processes and problems of industrialization in underdeveloped countries there are elements of social resistance to economic change in underdeveloped countries which include institutional factors characterized by rigid stratification of occupations reinforced by traditional beliefs and values: attitudes involving inferior valuation attached to business roles and their incompatibility with the patterns of living and concepts of social dignity upheld by the high status groups and factionalism which has been defined as the tendency of the society to be divided by caste and class cleavages, ethnic or religious distinctions, differences in cultural tradition and social pattern. Kinship loyalties and regional identification. Such factors tend to inhibit social and geographical mobility and constitute a drag on progress the people of such countries are averse to accept new values created by the impact of innovations.

¹⁷ - OP. cit., p. 1.

The family is the primary economic and social unit. Family attitudes are responsible for population pressures and attachment to land. They also limit the range of individual freedom in making economic decisions/ which in turn influence the motives to save and invest. Money is hoarded or invested in gold, jewellery or in real estate or is spent to meet social obligations on ceremonial occasions to maintain status. Ostentatious expenditure, better known as conspicuous consumption, on the part of the wealthier classes also limits the primary to save, and invest.

In such a society relations are personal or patriarchal rather than universal. People are influenced by Kinship or status as determined by caste, clan or creed." It appears to be difficult to disentangle a person's abilities and capacities as a worker from his caste, religious beliefs, social or geographical origin or other attributes that have little to do with his potential contribution to production. Consequently, efficiency suffers because special abilities go unused.¹⁸ Moreover, administrators, managers, politicians and policy makers belong to the privileged and dominant classes of society. Since such persons do not have the best talents, they stand in the way of good government, clean administration, and in the efficient working of large_ scale enterprises. They lead to nepotism, bribery, favouritism and inefficient administration. Bad administration whether in private or public enterprise makes economic development all the more difficult.

¹⁸ - N. Buchanan and E . Ellis, Approaches to Economic Development, P.86.

Social attitude towards education is further inimical to economic progress. Purely academic education which trains people for government and other clerical jobs is preferred to technical and professional education in such countries. There is prejudice against manual work which is despised and ill-rewarded. Consequently, there develops a natural distaste for practical work and training that leads to technological backwardness.

Oriental religions give less inducement to the virtues of thrift and hard work. People in such societies regard work as a necessary evil—rather than a virtue. They place high values on leisure, contentment and participation in festivals and religious ceremonies. Thus, money that can be usefully invested is dissipated in uneconomic ventures. People do not believe that progress is possible through human efforts and man is not helpless before the blind forces of fate. Religious dogmas inhibit progress, for they prevent social, economic and political institutions to change in a way that is conducive to economic development. As Dr S. Radhakrishnan observed, the qualities associated with the Eastern culture make for life and stability; those characteristics of the West for progress and adventure.¹⁹

Agricultural constraint

Another obstacle relates to the agricultural sector. The majority of LDCs are predominantly agricultural. Agricultural production constitutes a large share of their GDP and agricultural commodities form a

¹⁹ - Eastern Religion and Western Thought Development, p. 258

considerable part of the value of their total exports. Agricultural practices are controlled by custom and tradition. A villager is fearful of science. For many villagers insecticide is taboo.... A new and improved seed is suspect. To try it is a gamble. Fertilisers. For example, is indeed a risk..... To adopt these untried methods might be to risk failure. And failure could mean starvation.²⁰it is. In fact, not the behaviour of farmers that acts as a constraint on agricultural growth. Instead. the constraints are to be found in the environment in which farmers operate the technology available to them. the incentives for production and investment the availability, and price of inputs. The provision of irrigation, and the climate. The LDCs situated in tropical and subtropical zones are at a disadvantage in terms of climate. Due to heat and torrential rains. Their soils are poor as they contain little organic matter. As a result of the environmental factors, agricultural output fails to increase to meet the rising demand of developing economy. Further, when the growth rate of population is also high, per capita agricultural and food output may actually decline instead of increasing as was the case with the low income- countries during 1970-80 when their per capita agricultural output declined by 0.4 per cent and per capita food output by 0.3 per cent per year. that is why the percentage share of food in the merchandise imports of many LDCs has been more than 25 per cent which entails a heavy burden on their foreign exchange resources. Thus the poor performance of the agricultural sector is a major constraint on the sluggish economic growth of LDCs.

²⁰- Alvin Hansen . Economic Issues of the 1960s, pp. 157-58.

Human resources constraint

Undeveloped human resources are an important obstacle to economic development in LDCs. Such countries lack in people possessing critical skills and knowledge required for all round development of the economy. The existence of surplus labour in them is to a considerable extent due to the shortage of critical skills. Undeveloped human resources are manifest in low labour productivity, factor immobility, limited specialisation in occupation, and in customary values and traditional social institutions that minimise the incentives for economic development. Further, the economic quality of the population remain low when there is little knowledge of available natural resources possible alternative production techniques, necessary skills, existing market conditions and opportunities, and institutions that might be created to favour economising effort and economic rationality. Since LDCs have a dearth of critical skills and knowledge, physical capital, whether indigenous or imported, cannot be productively utilised. As a result, machines break down and wear out soon, materials and components are wasted, the quality of production falls, and costs rise.

Foreign Exchange constraint

Economists like Myint, Prebisch, Singer, Lewis and Myrdal maintain that certain disequalising forces have been operating in the world economy as a result of which the gains from trade have gone mainly to the developed countries leading to foreign exchange constraint.

After the opening up of underdeveloped countries to world markets, there has been a phenomenal rise in their exports. But this has not contributed much to development of the rest of the economy of these countries, as the export sector has developed to the utter neglect of the other sectors of the economy. On the other hand, too much dependence on exports has exposed these economies to international fluctuations in the demand for and prices of their products. They have become unstable due to cyclical instability and balance of payments difficulties. During a depression, the terms of trade become adverse and foreign exchange earnings fall steeply. as a result, they suffer from unfavourable balance of payments. But they are unable to take advantage of a fall in the prices of their products by increasing their exports due to the inelastic nature of supply of their export goods which are mainly agricultural and mineral products. Similarly, they are unable to benefit from a boom in world market.an improvement in their terms of trade is not accompanied by an increase in output and employment due to market imperfections, inadequate overhead capital and structural maladjustments. On the contrary, increased export earnings lead to inflationary pressure, malallocation of investment expenditure and to balance of payments difficulties.

As a result, there has been a secular deterioration in the income terms of trade (or the capacity to import) of LDCs so that they are faced with the foreign exchange constraint. This has led to the need for larger inflow of aid and foreign investment. Consequently, debt servicing of amortisation and interest of debt have risen, income payments of

dividends and profits on private direct foreign investment have grown, and the net inflow of foreign capital has declined. All these have led to further shortage of foreign exchange reserves which acts as a severe limitation on the development programmes of LDCs.

Exercises

Question on chapter two

Obstacles to economic development

Part A True – false questions

Circle whether the following statements are true (T) or false (F)

- 1- Vicious circles of poverty tend to perpetuate the low level of development in LDCs.
- 2- Vicious circles operate only on the demand side
- 3- The demand side of the vicious circle is that the low level of rate income leads to a low level of supply
- 4- Development of natural resources is independent upon the productive capacity of the people.
- 5- Underdeveloped natural resources are both a consequence and cause of the backward people.
- 6- Poverty and underdevelopment of the economy are synonymous.
- 7- Poverty is both consequence and cause of a country's low rate of capital formation.
- 8- in LDCs, the marginal productivity of people are extremely high.
- 9- In LDCs, capital is a necessary but not a sufficient condition of progress.

Part B : multiple – choice questions

Circle the appropriate answer:

- 1- A circular constellation of forces tending to keep a poor country in a state of poverty
 - a) Vicious circles of poverty
 - b) absolute poverty
 - c) relative poverty
 - d) non of these

2- The basic vicious circle stems from the fact that in LDCs total productivity is low due to

- a) market imperfection
- b) economic backwardness
- c) deficiency of capital
- d) all of the above

3- The main reasons for the lack of incentives to save and invest in LDCs are:

- a) political instability
- b) unsettled monetary conditions
- c) none of these
- d) a and b

4- In LDCs , the important obstacles to economic development

- a) socio – cultural constraints.
- b) agricultural constraints
- c) human resources
- d) foreign exchange constraints.

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Chapter Three

The Lewis theory of development

Chapter 3

The Lewis theory of development

The main of goal to studying this chapter to understand the following topics

1- The Lewis theory of development

2- Fei-ran is theory

3- The Marxian theory

- **Materialistic interpretation of history**
- **Surplus value**
- **Capital accumulation**

Chapter Three

The Lewis theory of development

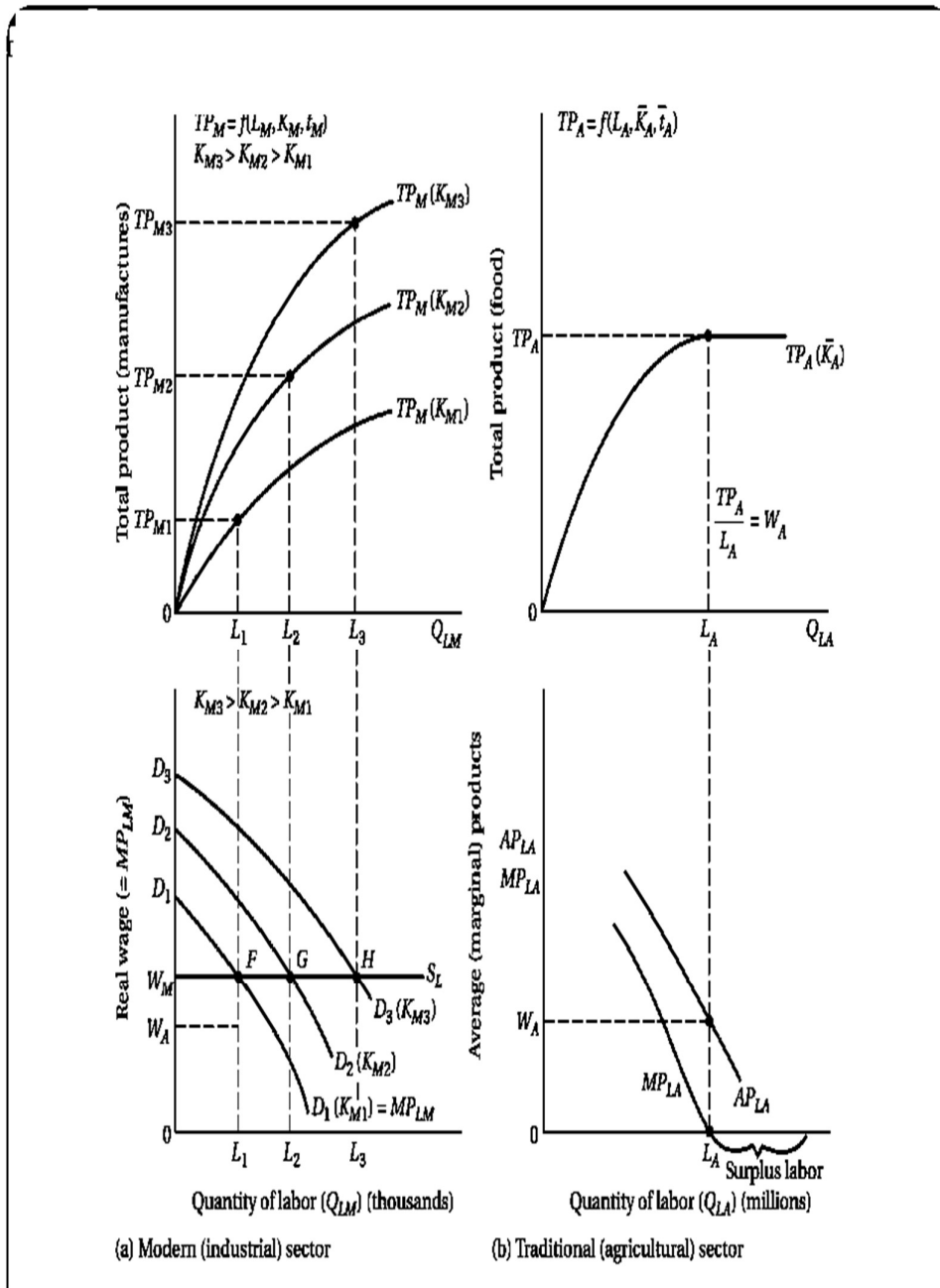
Basic model one of the best-known early theoretical models of development that focused on the structural transformation of a primarily subsistence economy was that formulated by Nobel Laureate W. Arthur Lewis in the mid-1950s and later modified, formalized and extended by John Fei and Gustav RLDCs Rains. The Lewis two sector model became the general theory of the development process in surplus labor third world nations during most of the 1960s and early 1970s. It still has many adherents today.

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 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 out– 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 the level of wages in the urban industrial sector is assumed to be constant and determined as a given premium over a fixed average subsistence level of wages in the traditional agricultural sector. (Lewis assumed that urban wages would have to be at least 30% higher than average rural income to induce workers to migrate from their home areas). At the constant urban wage, the supply curve of rural 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 1, consider first the traditional agricultural sector portrayed in the two right side diagrams of Figure 3.AB. The upper diagram shows how subsistence food production varies with increases in labor inputs. It is typical agricultural production function where the total output or product (TP_A) of food is determined by changes in the amount of the only variable input, labor (L_A), given a fixed quantity of capital, KA , and unchanging traditional technology, ta . In the lower right diagram, we have the average and marginal product of labor curves AP_{L_A} and MP_{L_A} which are derived from the total product curve shown immediately above. The quantity of agricultural labor (Q_{L_A}) available is the same on both horizontal axes and is expressed in millions of workers, as Lewis is describing an underdeveloped economy where 80% to 90% of the population lives and works in rural areas.

Figure.1 The Lewis Model of Modern. Sector Growth in a Two-Sector Surplus Labor Economy



Lewis makes two assumptions about the traditional sector. First there is surplus labor in the sense that MP_{L_A} is zero, and Second, all rural workers share equally in the output so that the rural wage is determined by the average and not the marginal product of labor (as will be the case in the modern sector). Assume that there 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 worker is zero, as shown in the bottom diagram of Figure 3,1b; hence the surplus- labor assumption applied 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 1 a 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 K_M and technology 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_{M2} to K_{M3} as a result of the reinvestment of profits by capitalist industrialists. 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 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. 1a and 1b represents the average level of real subsistence income in the traditional rural sector. W_M in figure. 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 1 b, is expressed in millions whereas in the modern urban sector, figure. 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 bottomed by point OD_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 OW_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

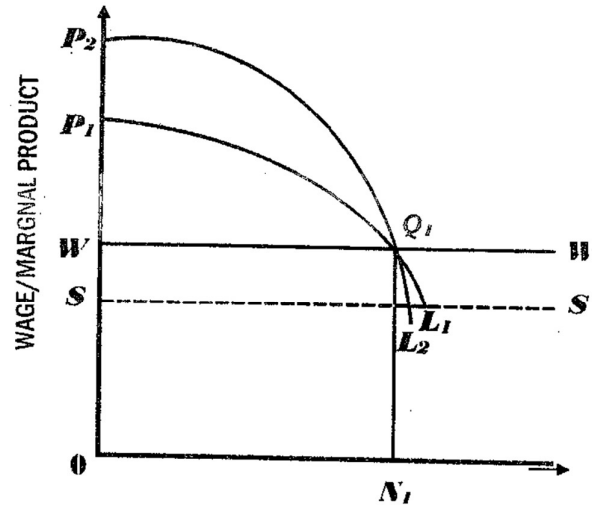
Lewis assumes that all of these profits are reinvested, the total capital stock in the modern sector will rise from K_{M1} to K_{M2} . This larger capital stock causes the total product cut of the modern sector to rise to $TP_M(K_{M2})$, which in turn induces a rise in the marginal product demand curve 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 OD_2GL_2 while total wage and profits increase to OW_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 .

The 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. 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.

A Critical Appraisal

The Lewis theory is applicable to overpopulated underdeveloped countries under certain set conditions. Its applicability is, therefore, circumscribed by its assumptions which are the bases of criticisms discussed below:



QUANTITY OF LABOUR
FIG. 16.2

1- Wage Rate not Constant in the Capitalist Sector.

The theory assumes a constant wage rate in the capitalist sector until the supply of labour is exhausted from the subsistence sector. This is unrealistic because the wage rate continues to rise over time in the industrial sector of an underdeveloped economy even when there is open unemployment in its rural sector.

2- Not Applicable if Capital Accumulation is labour saving. Lewis assumes that the capitalist surplus is reinvested in productive capital. But according to Reynolds,²¹ if the productive capital happens to be labour saving, it would not absorb labour and the theory breaks down. This is shown in Fig.2 where the curve P_2L_2 has a greater negative slope than the curve P_1L_1 , thereby showing labour-saving technique. With the shifting of the marginal productivity curve upwards from P_1L_1 to P_2L_2 , the total output has risen substantially from $OP_1Q_1N_1$ to $OP_2Q_1N_1$. But the total wage bill OWQ_1N_1 and the labour employed ON_1 remain unchanged.

3- Skilled labour not a Temporary Bottleneck. Given an unlimited supply of labour, Lewis assumes the existence of unskilled labour for his theory. Skilled labour is regarded as a temporary bottleneck which can be removed by providing training facilities to unskilled labour. No doubt skilled labour is in short supply in underdeveloped countries but skill-formation poses a serious problem as it takes a very long time to educate and train the multitude in such countries.

4- Lack of enterprise and initiative. The Lewis theory is based on the assumption that a capitalist class exists in underdeveloped countries. In fact, the entire process of growth depends on the existence of such a class which has the necessary skill to accumulate capital. In reality, such countries lack capitalists with necessary enterprise and initiative.

²¹ - Lloyd G Reynolds, wages and Employment in a labour surplus Economy, A. F. R. September 1956.

5- Multiplier process does not operate in LDC. Again, the theory assumes that capital accumulation takes place when the capitalist class continues to reinvest profits. It, therefore, presupposes the operation of the investment multiplier which is not applicable to underdeveloped countries.²² For if profits are reduced somehow or the prices of wage goods rise, the process of capital formation will stop before all the surplus labour is absorbed.

6- One sided theory. This is a one sided theory because Lewis does not consider the possibility of progress in the agricultural sector. As the industrial sector develops with the transfer of surplus labour, the demand for food and raw materials will rise which will, in turn, lead to growth of the agricultural sector.

7- Neglects total demand. Lewis does not study the problem of aggregate demand .he assumes that whatever is produced in the capitalist sector is either consumed by itself or is exported .He does not even analyse the possibility of the capitalist sector selling its products to the subsistence sector. In case , it so happens, the growth process may come to a halt much earlier through unfavourable terms of trade or the subsistence sector adopting new techniques of production to meet the expanding raw material demand of the capitalist sector.

8- Mobility of Labour not so Easy. Higher capitalist wage will not lead to the movement of surplus labour from the subsistence sector to the capitalist sector. People are so intensely attached to their family and

²² - See chapter on Keynesian theory of development.

land that they do not like to leave their kith and kin. Moreover, differences in language and custom, the problems of congestion housing and high cost of living in the capitalist sector stand in the way of mobility of labour to this sector. This is the main weakness of the theory.

9– Marginal productivity of labour not zero. Schultz does not agree that the marginal productivity of labour in overpopulated underdeveloped countries is zero or negligible. If it were so, the subsistence wage would also be zero. the fact is that every worker receives the subsistence wage, may be in kind, if not in cash. It is, therefore, difficult to find out the exact number of surplus labourers who are to move to the capitalist sector, their number hardly exceeding 5 per cent, as is now generally accepted.

10– Productivity falls with Migration of labour from the subsistence sector. Lewis assumes that when the surplus labour is withdrawn from the subsistence sector to the capitalist sector, the agricultural production remains unaffected in the subsistence sector. But the fact is that withdrawal of workers from the farms will reduce output. As pointed out by Schultz. "there is no evidence for any poor country anywhere that would suggest that a transfer of even some fraction, say, 5 per cent: of the existing labour–force out of agriculture, with other things equal, could be made without reducing its production.

11– Low income groups also save. It is not correct to say that only 10 per cent of the people with the largest income save. In fact, people, with low incomes also save due to social reasons and even small farmers save for capital accumulation in underdeveloped countries, whereas high

income groups save less because they spend more under the influence of the demonstration effect.

12- Inflation not self a destructive. Lewis view that inflation for the purpose of capital formation is self a destructive is difficult to believe in the face of acute shortage of consumer goods. Production of consumer goods fails to increase rapidly due to structural rigidities. On the other hand, the marginal propensity to consume of the people is near unity, so that all increases in income lead to inflationary rise in prices.

Inefficient Tax administration, Lewis's contention that taxation will mop up increasing income cannot be accepted because the tax administration in underdeveloped countries is not so efficient and developed as to collect taxes sufficient enough for capital accumulation

Conclusion, despite these limitations, the Lewis theory has the merit of explaining in a very clear cut way the process of development. This two sector theory has great analytical value. It explains how low capital formation takes place in underdeveloped countries which have plethora of labour and scarcity of capital. His study of the problems of credit inflation; population growth technological progress, and international trade gives the theory a touch of realism.

FEI-RANIS THEORY

Introduction

John Fei and Gustav Ranis in an article entitled " A Theory of economic development " analyse " the transition process through which an underdeveloped economy hopes to move from a condition of stagnation to one of self-sustained growth. Their theory is an improvement over Lewis's theory of unlimited supplies of labour because Lewis failed to present a satisfactory analysis of the growth of the agricultural sector.

The analysis that follows is based on the original article and the subsequent modifications²³ made by the authors in their theory of the development of a dual economy.

The theory

The theory relates to an underdeveloped labour-surplus and resource-poor economy in which the vast majority of the population is engaged in agriculture amidst widespread unemployment and high rates of population growth. The agrarian economy is stagnant. People are engaged in traditional agricultural pursuits. Non-agricultural pursuits exist but they are characterised by a modest use of capital. There is also an active and dynamic industrial sector. Development consists of

²³ - John C.H. Fei and Gustav Ranks, A theory of economic development, AER, vol. 51, September 1961; development of labour Surplus Economy, 1964; and Agrarianism, Dualism and Economic development, in the theory and Design of Economic development (eds) I . Adelman and F. Thorbecke, 1966.

the reallocation of surplus agricultural workers, whose contributions to output is zero or negligible, to the industrial sector where they become productive at a wage equal to the institutional wage in agriculture.²⁴

Assumptions

In presenting their theory of economic development Fei and Ranis make the following assumptions:

- 1- There is a dual economy divided into a traditional and stagnant agricultural sector and an active industrial sector.
- 2- The output of the agricultural sector is a function of land and labour alone
- 3- There is no accumulation of capital in agriculture except in the form of land reclamation.
4. Land is fixed in supply.
5. Agricultural activity is characterised by constant returns to scale with labour as a variable factor.
- 6- It is assumed that the marginal productivity of labour becomes zero at some point. If population exceeds the quantity at which the marginal productivity of labour becomes zero, labour can be transferred to the industrial sector without loss in agricultural output.

²⁴ - Before starting this model, students should first read the Lewis Model in the previous chapter.

- 7- The output of the industrial sector is a function of capital and labour alone. Land has no role as a factor of production.
- 8- Population growth is taken as an exogenous phenomenon.
- 9- The real wage in the industrial sector remains fixed and is equal to the initial level of real income in the agricultural sector. they call it the institutional wage.
- 10- Workers in either sector consume only agricultural products.

Given these assumptions, Fei and Ranis analyse the development of a labour-surplus economy into three phases. In the first phase, the disguised unemployed workers, who are not adding to agricultural output, are transferred to the industrial sector at the constant institutional wage. In the second phase, agricultural workers add to agricultural output but produce less than the institutional wage they get. Such workers are also shifted to the industrial sector. If migration of workers to the industrial sector continues, a point is eventually reached when farm workers produce output equal to the institutional wage. This begins the third phase which marks the end of the take-off and the beginning of the self-sustained growth when farm workers produce more than the institutional wage they get. In this phase, the surplus labour is exhausted and the agricultural sector becomes commercialised.

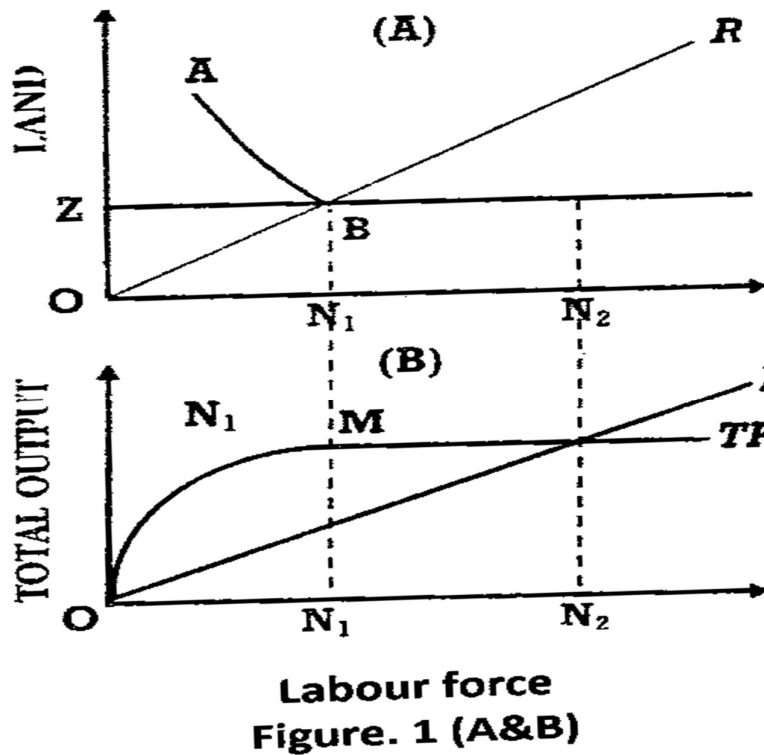


Figure 1, (A) shows the functioning of the agricultural sector where agricultural goods are produced by the application of labour (L) and land (Z) labour is measured on the horizontal axis and land on the vertical axis. The ray OR shows the stage of production. The curve ABC is the production contour of agricultural goods. Assuming land to be fixed at OZ, labour ON_1 produces the maximum output. The total productivity of labour is represented by the TP curve in figure. 1(B). If more labour is employed beyond N_1 with land OZ, productivity of labour becomes constant beyond point M on the TP curve. Assuming that ON_2 is the total Labour force engaged in agriculture, ON_1 is the non – redundant labour and N_1N_2 is the redundant labour force N_1N_2 number of workers do not make any positive contribution to output and their marginal

physical productivity approaches zero beyond point M on the TP curve.
Such workers are disguised unemployed

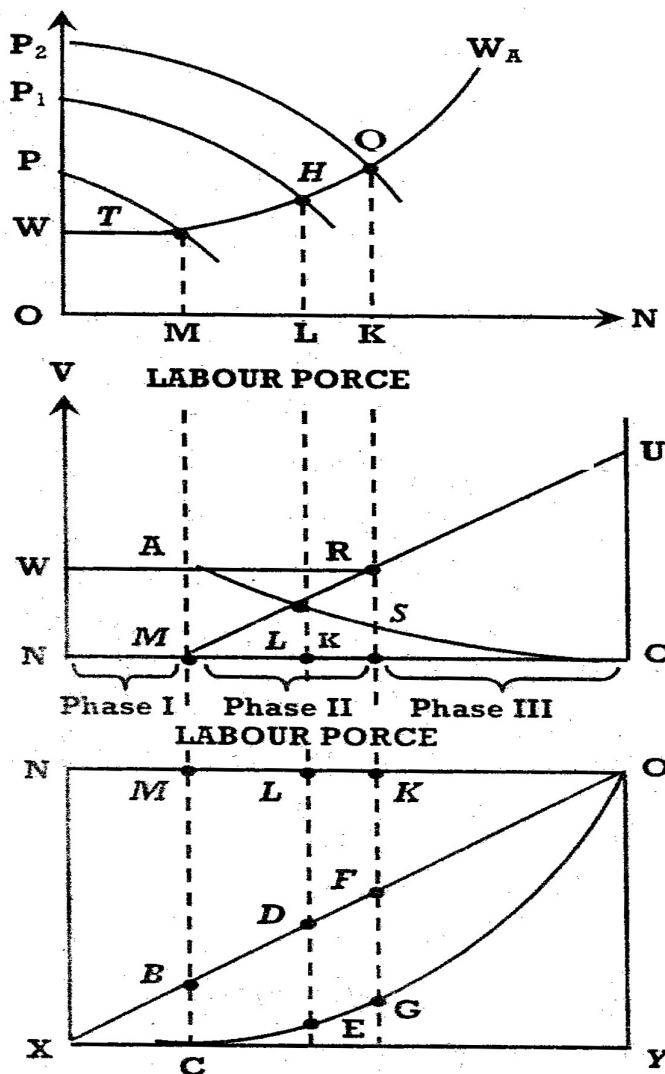


FIG. 2 (A,B&C)

Economic development takes place when these workers are shifted from the agricultural sector to the industrial sector in three phases. This is illustrated in Figure 2. (A), (B) and (C) where panel (A) (C) depicts the industrial sector and panels (B) and (Q,) the agricultural sector. Let

us take panel (Q) where the labour force in the agricultural sector is measured from right to left on the downward output agricultural on and axis horizontal from O on the vertical axis OY. The OCX is the total physical productivity curve (TPP)²⁵ of the agricultural sector. The horizontal portion CX of the curve shows that the total productivity is constant in this region so that the marginal productivity of MN labour is zero. Thus MN labour is surplus and its withdrawal to the industrial sector will not affect agricultural output. If however, it is presumed that the entire labour force ON is engaged in the agricultural sector, it produces NX total agricultural output. Assuming that the entire output NX is consumed by the total labour force ON, the real wage is equal to NX/ON or the slope of the ray OX. This is the institutional wage.

The allocation process in three phases during the takeoff is depicted in panel (B) of the Figure.2 where the total labour force is measured from right to left on the horizontal axis ON and the average output on the vertical axis NV. The curve NMRU represents the marginal physical productivity of labour (MPP) in the agricultural sector. NW is the institutional wage at which the workers are employed in this sector.

In phase I, NM workers are disguised unemployed; their marginal physical productivity is zero, as shown by NM portion of the MPP curve in panel (B) or CX portion of the TPP curve of panel (C). This redundant labour force NM transferred to the industrial sector shown as OM in panel (A) at the same institutional wage OW (= NW).

²⁵ - It is the inverted OTP curve of figure 17.1 (B).

In phase II, the MPP of agricultural workers MK is positive in the range MR on the MPP curve NMRU but is less than the institutional portion ($= NW$) they get, as shown in panel (B). So they are also disguised unemployed to some extent and are shifted to the industrial sector. But the nominal wage in the industrial sector will not equal the institutional wage in this phase. This is because agricultural output declines with the transfer of labour to the industrial sector. As a result, there is a shortage of agricultural commodities leading to rise in their prices relative to industrial goods. This leads to the worsening of the terms for the industrial sector, thereby requiring a rise in the nominal wage in the industrial sector. The nominal wage rises above the institutional wage OW to LH and KQ. This is shown by the upward movement of the supply curve of labour from WT to H and Q, as ML and LK labour gradually shifts to the industrial sector in panel (A). The movement on the supply curve of labour WTW_1 from T upward is " the Lewis turning point."

When phase III begins agricultural workers start producing agricultural output equal to the institutional wage and ultimately more than the institutional wage they get. This marks the end of the takeoff and the beginning of the self-sustained growth. This is shown by the rising portion RU of the MPP curve in panel (B) which is higher than the institutional wage KR ($= NW$). Consequently, KO of labour will be shifted from the agricultural sector to the industrial sector at a rising nominal wage above KQ in panel (A) of the figure. This leads to the exhaustion of the surplus labour in the agricultural sector which

becomes fully commercialised. according to Fei and Ranks, the exhaustion of the labour surplus must be interpreted primarily as a market phenomenon rather than as a physical shortage of manpower, it is indicated by an increase in the real wage at the source of supply.

Fei and Ranks point out that as agricultural workers are shifted to the industrial sector, there begins a surplus of agricultural commodities. This leads to the total agricultural surplus (or TAS) in the agricultural sector. The excess portion of total agricultural output over the consumption requirement of the agricultural labour force at the institutional wage is the TAS. The amount of TAS is a function of the number of workers shifted to the industrial sector in each phase of the development process. The TAS is measured in panel (C) of the figure by the vertical distance between the line OX and the TPP curve OCX. In phase I when NM Labour is transferred, the TAS is BC. In phase II as ML and LK workers are shifted to the industrial sector, DE and FG amounts of TAS arise. TAS may be viewed as agricultural resources released to the market through the re allocation of agricultural workers. Such resources can be shiphoned off by means of the investment activities of the landlord class and / or government tax policy and can be utilised in support of the new industrial arrivals."

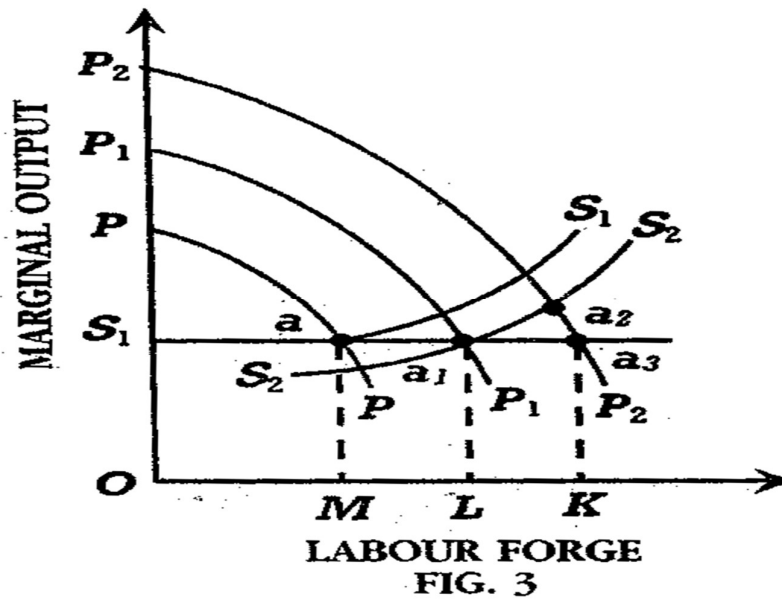
There is also the average agricultural surplus (or AAS).The AAS is the total agricultural surplus available per head to workers allocated to the industrial sector it is as if each allocated workers, carries his own subsistence bundle along with him. The AAS curve is depicted as WASO curve in panel (B) of the figure. In phase I, the AAS curve

coincides with the institutional wage curve WA. In phase II, when MK workers are transferred to the industrial sector, the AAS begins to fall from A to S in panel (B) while TAS is still rising from BC to DE to FG in panel (C).

In phase III, AAS decline more rapidly from S to O in panel (B) and TAS also declines as shown by the narrowing of the area from FG toward O in panel (C) below phase III of panel (B).the decline in both AAS and TAS is due to the rise in the MPP of agricultural workers by more than the institutional wage which ultimately leads to the transfer of the remaining surplus labour to the industrial sector.

Fei and Ranis call the boundary between phases I and II as the "shortage point" when shortages of agricultural goods begin as indicated by the fall of the AAS (the portion AS of WASO curve) below the minimum institutional wage (NW). Anthe boundary between phase II and III as the commercialisation point which signifies the beginning of equality between MPP and the institutional wage in agriculture. Thus the Lewis turning point coincides with the shortage point of Fei and Ranks, and the increase in industrial wage is speeder up at the commercialisation point.

They show that if agricultural productivity is increasing, the shortage point and the commercialisation point coincide. This is because with the increase in agricultural productivity the rise in MPP enables the output to rise to the level of the institutional wage more quickly. It may be viewed as the shifting of MRU curve Upward to the left in Figure. 2 (B). On the other hand, the AAS increases with the increase in total



physical productivity. This means that the ASO curve in Figure. 2 (B) shifts upward to the right. If the rise in productivity is sufficient, the MRU and ASO curve in Figure 2 (B) will so shift upward that the shortage point A and commercialisation point R coincide and phase 11 is eliminated. So far as the industrial sector is concerned, the increase in agricultural productivity has the effect of raising industrial supply curve after the turning point the I point be viewed as the shifting of the WTW1 curve downward to the right below point T in Figure 2 (A). According to Fei and Ranis, significance of the equality between our turning point and the commercialisation point is that, after the turning point, the industrial supply curve of labour finally rises as we enter a world in which the agricultural sector is no longer dominated by non-market institutional force but assumes the characteristics of a commercialised capitalist system. In other words, the economic significance of the elimination of the second phase is that it enables the

economy to move smoothly into self-sustained growth. Balanced Growth Fei and Ranis have further shown that their model satisfies the conditions of balanced growth during the take-off process. Balanced growth requires simultaneous investment in both the agricultural and industrial sector of the economy. This is illustrated in Figure 3. Where PP is the initial demand curve for labour and S_1S_1 the initial supply curve of labour. They intersect at a where OM labour force is employed in the industrial sector. At this level of employment, the industrial sector is getting a profit equal to the area S_1Pa . This profit is the total investment fund available to the economy during the take-off process. A part of this fund is allocated to the agricultural sector thereby raising agricultural productivity and shifting the supply curve of labour in the industrial sector downward to the right from $S_1 S_1$ to $S_2 S_2$. The remaining part of the investment fund is allocated to the industrial sector, thereby shifting the industrial demand curve upward to the right from PP to P_1P_1 . The S_2S_2 and P_1P_1 curves intersect at a_1 on the balanced growth path $S_1 a_3$. At a_1 the industrial sector absorbs ML labour force which has been released by the agricultural sector as a result of rise in agricultural productivity following the allocation of investment fund to it. In Fig.3 ML labour force absorbed in the industrial sector exactly equals the labour force ML released from the agricultural sector in Figure. 2 (B).

Thus as investment funds are continued to be allocated to both sectors through time, the economy will move on the balanced growth path. But there is every likelihood for the actual growth path to deviate

from the balanced growth path from time to time. Such a deviation, however, will call into play countervailing equilibrating forces which tend to bring it back to the balanced growth path. The actual path is, in fact, likely to be oscillating around the balanced growth path " For example, if as a result of over investment in the industrial sector, the demand curve for labour shifts to P_2P_2 and intersects the supply curve of labour S_2S_2 at a_2 the actual growth path will be above the balanced growth path. This will lead to a shortage of agricultural goods, to a deterioration of the terms of trade of the industrial sector and to a rise in the wage rate in this sector. This will discourage investment in the industrial sector and encourage investment in the agricultural sector and thereby bring the actual path to the level of the balanced growth path a_3 .

A Critical Appraisal

The Fei– Ranis model is an improvement over the Lewis model. The Lewis model ignores the development of the agricultural sector and concentrates exclusively on the industrial sector. The Fei–Ranis model shows the interaction between the two sectors in initiating and accelerating development. Moreover, its explanation of the Lewis turning point is more realistic. But the major merit of the theory is that it shows the importance of agricultural products in capital accumulation in underdeveloped countries.

Despite these merits, the model is not free from criticisms which are discussed below.

1- Supply of land not fixed. Fei and Ranis begin with the assumption that the supply of land is fixed during the development process. In the long run, the amount of land is not fixed, as the statistics of crop acreage in many Asian countries reveal. For instance, the index number of area under crops (base 1961-62) in India rose from 82 in 1950-51 to 107.3 in 1970-71.

2- Institutional wage not above the MPP. Institutional based on the assumption of a constant institutional wage which is above the MPP during phases I and II of the development process. There is no empirical evidence to support this assumption. In fact, in labour surplus underdeveloped countries, wages paid to the agricultural workers are much below their MPP.

3. Institutional wage not constant in the Agricultural sector. The theory assumes that the institutional wage remains constant in the first two phases even when agricultural productivity increases. This is highly unrealistic because with a general rise in agricultural productivity farm wages also tend to rise. For instance, the daily real wage rates (at 1966 prices) of agricultural workers for various farm operations in Punjab during the period of the green revolution (1967-72) increased by 41.7 per cent to 55.2 per cent.²⁶

²⁶ - M.L. Jhingan. Surpluses Pertaining since the Green Revolution and contribution to Industrialisation-- A study of Punjab, IJAE. Conference Number, July- September, 1979.

4- Closed model. According Fei and Ranis, the terms of trade move against the industrial sector in the second phase when agricultural output declines and prices of agricultural commodities rise. This analysis is based on the assumption of a closed economy where foreign trade does not exist. But this assumption is unrealistic because underdeveloped countries are not close but open economies which import agricultural commodities when shortages arise.

5. Commercialisation of agriculture Leads to inflation. According to the theory. When the agricultural sector enters the industrial phase, it becomes commercialised. But the economy is not likely to move smoothly into self-sustained growth inflationary pressures will start. When many workers shift to the industrial sector, the agricultural sector will experience shortage of labour. In the meantime, the institutional wage also equals the MPP of workers and the shortages of agricultural products arise. All these factors will tend to create inflationary pressures within the economy.

6. MPP not Zero. Fei and Ranis observe that " with a fixed amount of land, there will be some size of population which is large " enough to render MPP zero." But Schultz does not agree that in labour-surplus economies the MPP is zero. According to him if it were so the institutional Wage would also be zero. The fact is that every worker receives a minimum wage, may be in kind, if not in cash thus it is wrong to say that the MPP is zero in the agricultural sector.

Conclusion, however these limitations do not undermine the importance of the Fei–Ranis model for the economic development of labour surplus countries. It systematically analyses the development process from the takeoff to self–sustained growth, through the interaction of the agricultural and industrial sectors of an underdeveloped economy.

The Marxian theory

Introduction

Karl Marx, the celebrated , author of Das Kapital, is one of the few, celebrities in history who cast a spell on hundreds of millions of people by their doctrines, He has been epitomized as Marx the prophet and is ranked with Christ and Mohammad if we are to judge him by the number of his followers. As Schumpeter wrote, Marxism is a religion. To the orthodox Marxist, as any believer in a Faith, the opponent is not merely in error but in sin²⁷ Marx predicted the inevitable doom of capitalism and it was on this prediction that Communism has built its edifice. The Marxian analysis is the gravest and the most penetrating examination of the process of capitalist development. It had the greatest influence in shaping policies in the Soviet Union, China and other communist countries. Our purpose here is to examine the Marxian process of economic development and not the Marxist system as whole.

The Marxian theory

Marx contributed to the theory of economic development in three respects namely, in broad respect of providing an economic interpretation of history in the narrower, respect of specifying the motivating forces of capitalist development, and in the final respect of suggesting an alternative path of planned economic development

²⁷ - J.A. Schumpeter, Ten Great Economists , p 5 and footnote.

Materialistic interpretation of history. The materialistic interpretation of history attempts to show that all historical events are the result of a continuous economic struggle between different classes and groups in society. The main cause of this struggle is the conflict between the mode of production and the relations of production. The mode of production refers to a particular arrangement of production in a society that determines the entire social political and religious way of living. The relations of production relate to the class structure of a society uniquely characterised by the following components: (i) the organisation of labour in a scheme of division and cooperation. The skills of labour and the status of labour in the social context with respect to degrees of freedom or servitude; (ii) the geographical environment and the knowledge of the use of resources and materials; and (iii) technical means and processes and state of science generally.

According to Marx, every society's class structure consists of the propertied. And the non-propertied classes. Since the mode of production is subject to change, a stage comes in the evolution of a society when the forces of production come, into clash with the society's class structure. The existing property relations "turn into fetters" on the forces of production. Then comes the period of social revolution. This leads to the class struggle– the struggle between the haves and the have nots– which ultimately overthrows the whole social system.

Surplus value, Marx uses his theory of surplus value as the economic basis of the class struggle under capitalism and it is on the basis of his theory of surplus value that he builds the superstructure of

his analysis of economic development. Class struggle is simply the outcome of accumulation of surplus value in the hands of a few capitalists. Capitalism, according to Marx, is divided into two great protagonists: the workers who sell their labour-power and the capitalists who own the means of production. Labour power is like any other commodity. The labourer sells his labour for what it is worth in the labour market, viz, for its value. And its value, like the value of any other commodity, is the amount of labour that it takes to produce labour power. In other words, the value of labour power is the value of the means of subsistence necessary for the maintenance of the labourer. Which is determined by the number of hours necessary for its production. According to Marx, the value of the commodities necessary for the subsistence of the labour is never equal to the value of the produce of that labour. If a labourer works for a ten hour day, but it takes him six hours labour to produce goods to cover his subsistence, he will be paid wages equal to six hours labour. The difference worth 4 hours labour goes into the capitalist's pocket in the form of net profits rent and interest. Marx calls this unpaid work "Surplus value" The extra labour that a labourer puts in and for which he receives nothing, Marx calls "surplus labour. "

Capital accumulation. According to Marx. It is surplus labour that leads to capital accumulation. This supererogatory labour simply Augments the capitalist's profits. The capitalist's main motive is to increase the surplus value which goes to swell his profits. He tries to maximize his profits in there ways (1) by prolonging the working day in

order to increase the working hours of surplus labour. If the working hours are extended from ten to twelve. the surplus will automatically increase from four to six ;(2) by diminishing the number of hours required to produce the labourer's sustenance. If they were reduced, from six to four, the surplus would again rise from four to six. it also tantamounts to a reduction in the subsistence wage; (3) by ' the speeding up of labour', I.e., increasing the productivity of labour. This requires a technological change that helps in raising the total output and lowering the cost of production.

Of the three methods, according to Marx, increase in the productivity of labour is the likely choice of the capitalists, since the other two methods, of extending the working hours and reduction of wages, have limitations of their own.

So in order to make improvements in the productivity of labour, the capitalists save the surplus value, reinvest it in acquiring a large stock of capital and thus accumulate capital. "Accumulate, accumulate. that is Moses and the prophets, " and save, save, I.e reconvert the greatest possible portion of surplus value or surplus product into capital. There are the capitalist's methods.

Profit are determined by the amount of capital. As Marx says, Capital is dead labour that vampire like only lives by sucking living labour and lives the more, the more labour it sucks. To explain the origin of profit and to analyse the relation between wages and profits, Marx separates capital into constant capital and variable capital. Capital invested in stocks or raw materials or equipment which directly assists

the productivity of labour, Marx calls constant capital (C) capital devoted to the purchase of labour power in the form of wages or direct subsistence, he terms variable capital (V). The surplus value is denoted by S. So the total value of product (W) = constant capital (C) + variable capital (V) + surplus value (S) or (C+V) +S.

It is on the basis of this division of the total output that Marx introduces his Department all Schema of Simple and Expanded Reproduction.

Marx divides the total output of the economy (W) into department 1 and department 2. The former is related to the production of capital goods and the latter to the consumer goods. The total output of each department is shown as

$$\begin{array}{r} W_1 = C_1 + V_1 + S_1 \\ + W_2 = C_2 + V_2 + S_2 \\ \hline W = C + V + S \end{array}$$

The Simple reproduction Scheme indicates a situation of stationary state in which all that is produced is consumed. Thus net investment is zero and there is no. Accumulation or surplus. Therefore, equality prevails in both the departments Hence the value of total constant capital in both the departments ($C_1 + C_2$) must equal the output of development 1

($W_1 = C_1 + V_1 + S_1$) that is

$$C_1 + C_2 = C_1 + V_1 + S_1$$

Or

$$C_2 + V_1 + S_1$$

(by eliminating the common factor C_1)

Similarly, the total consumption in both the departments ($V_1 + S_1 + V_2 + S_2$) must equal the total output of department 2 ($C_2 + V_2 + S_2$) that is

$$C_2 + V_2 + S_2 = V_1 + S_1 + V_2 + S_2$$

Or

$$C_2 + V_1 + S_1$$

(by eliminating the common factor $V_2 + S_2$)

This shows that the value of constant capital in department 2 must equal the value of commodities consumed by workers (V_1) and capitalists (S_1) in department 1.

It is in Marx's expanded reproduction scheme that accumulation takes place because the production of department 1 (capitalist sector) is greater than the demand for constant capital in both the departments that is

$$C_1 + V_1 + S_1 > C_1 + C_2$$

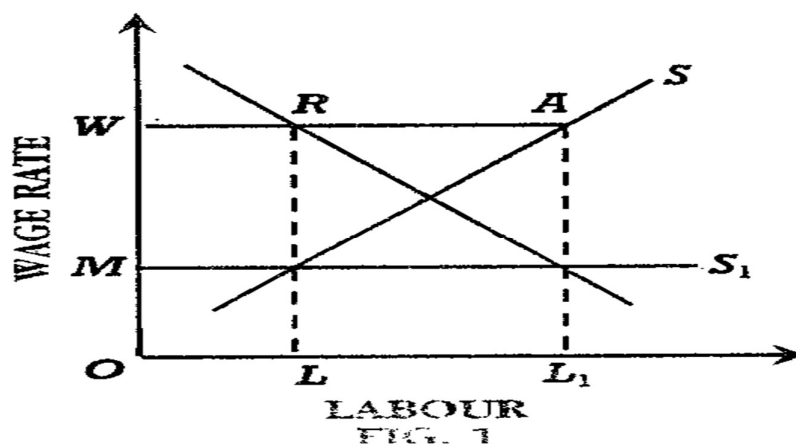
$$V_1 + S_1 > C_2$$

This shows that accumulation is taking place which is being invested in employing more labour (V_1) and the means of production (C_1) in

Department 1 than in Department 2 these, in turn, increase the surplus value (S_1)

In order to analyse the nature of capitalist accumulation, Marx establishes certain relationships between C, V, and S. The ratio of constant to variable capital (C/V) is termed as the organic composition of capital. The rate of surplus value is defined as S/V , the ratio of surplus value to variable capital or of exploitation. This leads Marx to point out that the rate of profit is not dependent solely on the rate of surplus value. The rate of profit (r) can change even though the rate of surplus value (S/V) remains constant, if a change occurs in the organic composition of capital (C/V). The influence of technical progress is to alter the organic composition of capital, generally in the direction of raising the ratio of constant to variable capital. Hence the tendency of industrial progress is to lower the rate of profit r ---even though there is no decrease in the rate of surplus value.

One of the consequences of capital accumulation is the concentration of capital in gigantic enterprises. Competition among capitalists forces them to cheapen their products. This can be done by introducing labour-saving machines which increase labour productivity. Those capitalists who are unable to replace labour by machines are squeezed out and their enterprises are taken over by big capitalists.



Capital accumulation and concentration involve increase in constant capital and decline in variable capital. The rapid growth of constant capital as compared with variable capital leads to a relative decrease in the demand for labour. This process of supplanting labour by machines creates an industrial reserve army which increases as capitalism develops. The larger the industrial reserve army, the worse are the conditions of the employed workers, since the capitalist can dismiss dissatisfied and troublesome workers being able to replace them from the ranks of the reserve army. Capitalists are also able to. It down wages to a semi Starvation level and appropriate more and more surplus value. This is the law of the increasing misery of the masses under capitalism. this is shown in shown in Fig. 1 where the labour force is taken on horizontal axis and the wage rate on the vertical axis. D is the demand curve for labour and S is the supply curve of labour. At the wage rate W, there is an increase in the industrial reserved army equal to RA (=LL₁). As the industrial reserve army expands, capitalists

start adopting labour-saving machines and reduce the wage rate to minimum subsistence level OM in order to have more surplus value.

But when the capitalist is replacing the workers by machines; he is killing the goose the laid the golden eggs. There is a continual reduction of the surplus value. Marx believes that technological progress tends to increase the organic composition of capital (C/V).since the rate of profit is inversely related to the organic composition of capital, the former tends to decline with accumulation. Marx explained this tendency of falling rate of profit in terms of the following equation:

$$R = \frac{S}{V+S} = \frac{S/V}{S/V+1}$$

The rate of profit (r) varies inversely with the organic composition of capital (C/V) and directly with the rate of surplus values (rate of exploitation) (S/V). Therefore, the rate of profit "r" rises with the rate of surplus value S/V and falls with the organic composition of capital C/V.

Capitalist Crisis, in order to counteract this tendency of declining rate of profit, the capitalists increases the degree of exploitation by reducing wages, lengthening the working day, and by "speed ups," etc. But since every capitalist is engaged in introducing new labour-saving and cost-reducing devices, the ratio of labour (and hence surplus value) to total output falls still further. The rate of profit declines all the more. Production is no longer profitable. Consumption dwindles as machines displace men and the industrial reserve army expands, Bankruptcies ensue. Every capitalist tries to dump goods in the market and in the process small firms disappear. A capitalist crisis has begun. The

ultimate cause of economic crisis, Marx point out, is the poverty and limited purchasing power of the masses. Economic crisis appears in the form of an overproduction of commodities, acute difficulties in finding markets, a fall in prices and a sharp curtailment of production. During the crisis, unemployment increases sharply, the wages of workers are further cut, credit facilities break down and small employers are ruined.

This does not continue forever. Revival soon starts. The low level of prices, cut in wages, elimination of speculative ventures and destruction of capital tend to raise the profit rate which eventually leads to new investments. As Marx wrote, " A crisis always forms the starting point of large new investments. Therefore, from the point of view of society as a whole, a crisis is, more or less, a new material basis for the next turnover cycle." But it leads to the same catastrophic conclusion: competition for labour; higher wages; labour – saving machinery; a reduction in surplus value: decline in profit rate; still greater competition and collapse. This succession from crisis to depression, followed by recovery and boom then again crisis is evidence of the cycle character of the development of capitalist production.

In each period of crisis stronger capitalists expropriate the weaker capitalists and along with it grows the indignation of the working class, " a class always increasing in number, and disciplined, united, organized by the very mechanism of the process of capitalist production itself. The monopoly of capital becomes a fetter upon the mode of production.... Centralization of the means of production and socialization of capitalist integument. This integument is burst asunder. The Knell of capitalist's

private property sounds. The expropriators are expropriated. "This is the historical tendency of capitalist accumulation. In elaborating the general law of capitalist accumulation, Marx provides the economic explanation of the necessity and inevitability of the revolutionary transformation from capitalist to socialist society. Capitalism leads to the proletarian revolution whereby the dictatorship of the proletariat is established. Poverty will disappear. The state will wither away and each individual will contribute to national income according to his abilities and receive according to his needs! Socialism replaces capitalism.

A Critical Appraisal

Marx's theory of capitalist development has been accepted by his followers as a gospel truth while it has been severely criticised by his opponents for the following reasons:

1– **Surplus Value Unrealistic.** The whole Marxian analysis is built on the theory of surplus value. However, in the real world, we are concerned not with values but with real tangible prices. Thus Marx has created an abstract and unreal value world which has made it difficult and Cumbersome to understand the working of capitalism.

2– **Marx -- A False Prophet.** Marx has proved to be a false prophet. No doubt socialist societies have come into existence but their evolution has not been on the lines laid down by Marx. The countries which have toed the Marxian line of thinking have been curiously those in which capitalist development lagged behind. All the communist states had been poor and are even now so, as compared to the capitalist countries.

There is no increasing misery of labour in advanced capitalist societies as asserted by Marx. On the contrary, real wages of workers have continued to rise. The workers have tended to become more prosperous with capitalist development, And the middle class instead of disappear g has emerged as a dominant class. There have been also no signs often to withering away of the State in these countries.

3- **Technological progress Helpful in increasing Employment.** Marx led out that with increasing technological progress the industrial reserve army expands, but this is an exaggerated view, for the long run with of technological progress is to create more employment opportunities raising aggregate demand and income.

4- **Decreasing tendency of profits not correct.** According to Joan Muynard Keynes Marx's "explanation of the falling tendency of profits nothing at all." Marx contends that as development proceeds, increase in the organic composition of capital which bring down the in the profit rate. But Marx failed to visualize that technological innovations can be capital saving too, and that with a fall in capital-output ratios and increases in productivity and total output profits can rise along with wages.

5- **Marx could not understand flexibility in capitalism;** Marx also could not foresee the emergence of political democracy as the protector and the preserver of capitalism. Democracy as a political system has proved its resilience and adaptability to the changing times. the introduction of social security measures, anti-trust laws and the mixed

economics have given a lie to the Marxian prediction that capitalism contains within itself the seeds of its own destruction.

6– **Cyclical theory wrong.** Marx emphasized that capital accumulation led to a reduction in the demand for consumption goods and fall in profits .but he failed to realise that with economic development the share of wages in aggregate income need not fall, nor the demand for consumer goods.

7– **Statue analysis. Marx's theory,** though it sought to explain a dynamic process, was, in the words of Schumpeter, " unsuited for it, its two main props being (a) labour theory of value, and (b) a modified version of subsistence theory of wages. Marx was analysing the problem of growth with the help of tools which were essentially suited to static economic analysis. "

Conclusion, despite these weaknesses, some of the Marxian tools pertaining to his theory of economic development have ever since become part and parcel of the theory of economic growth. Technological progress and innovations are the main stay of any theory of economic development. Similarly, capital accumulation is the fundamental idea behind economic growth. Profits are still regarded as both the hallmark of capitalist development and its Achilles heel. Marx showed that economic development does not follow a smooth course but comes about in " fits and starts." Business cycles are inevitable. He pointed out that a state of under –consumption was the main cause of depression and that for stable growth a proper balance between investment and consumption was essential. He also indicated " that too low or too high

wages in relation to total output can adversely affect investment and thus stifle economic growth. Industrial unemployment is also one of the major variables in his system. Thus, Marx was in a way Keynes' precursor.

The Marxian theory and underdeveloped countries

The Marxian theory is not applicable directly to underdeveloped countries. Marx did not think of the problems of such countries. A part from a few illusions remarkable for their determinant note with regard Western Asia or India no special attention is given to the problems of change in underdeveloped countries ".²⁸ Marx was mainly concerned with problems connected with the development of capitalism in the Western World. Colonies were regarded as one of the highest stages " in capitalist development. Foreign domination was regarded as the principal cause of economic backwardness of the colonies .the only obvious remedy was their political freedom.

Marx's failure to recognize the existence of population pressures makes his theory inapplicable to overpopulated underdeveloped countries. But some of the variables of his analysis do exist in such economics. In underdeveloped countries till recently under the colonial rule, labour was being exploited for the benefit of the home country. There was the concentration of capital in the hands of a few capitalists; even now in almost all the underdeveloped countries that are also politically free, wages are near subsistence levels; the increasing misery of the masses is visible; a reserve army of the chronic and disguised

²⁸ - A.Bonne op, cit, P. 243

unemployed exist; the problem of under consumption is universal and the society is sharply divided between the two classes, the middle class being virtually non-existent.²⁹ The existence of such conditions can lead to class struggle and the establishment of the dictatorship of the proletariat. The recent political turmoil in some of the Latin American, African, the Middle and the Far Eastern countries have shown that the existence of Marxian conditions in backward countries act like nurseries where the communist seed grows soon. Ironically, however, it is Marx's perception of planned development expressed in his minor writings which presumably has had a greater impact on the actual economic development of countries such as Soviet Russia and mainland China. Marx's notion of planned development also seems to appeal to those backward countries which are in a great hurry to industrialize at the risk of excessive national belt-tightening.

As a matter of fact, it is Marx's Departmental Schema that is applicable to underdeveloped countries. Such a country is primarily a dualistic economy consisting of capitalist sector and a subsistence agriculture and small scale sector which may be said to represent Marx's two Departments. It is the capitalist sector which yields large economic surplus, while the subsistence sector yields a small surplus. Rapid economic development is possible by reorganising and expanding the capitalist sector (Department 1) and transforming the subsistence

²⁹- Only the Marxian terminology is applicable. For under-consumption implies an abundance of unmarketable goods due to over-production in the Marxian analysis while in the case of underdeveloped countries it refers to low level of consumption due to low level of production . Similarly the existence of a surplus reserve army of workers in the Marxian theory is the result of the introduction of- labour saving devices , whereas in underdeveloped countries unemployment is disguised and rural , not industrial, the result of the growth in number rather, than the use-of industrial technology.

sector (Department 2) into the former so as to increase the economic surplus. This necessitates planning for industrialisation and increase in the supply of agricultural commodities to meet the expanding demand of the capitalist sector. As pointed out by Oscar Lange, it is the commodity character of agricultural production which determines the course and rate of industrialisation, along with the increased production of capital goods.

A number of underdeveloped countries like India, the Egypt, Burma and Ghana have followed the Marxian Departmental Schema in their development plans, these plans have emphasised the growth of Department 1 in relation to Department 2 . the basic strategy has been to increase investments in capital goods industries and services, and to increase the supply of consumer goods by increasing investment and production in agriculture and small scale sector. The primary aim has been to create larger employment opportunities, to increase purchasing power and fresh demand, to build a strong capital base and increase productive and technical capacities within the economy.

Exercises

Question on chapter three

Part A True – false questions

Circle whether the following statements are true (T) or false (F)

- 1- In the Lewis model, the capital stock is allowed to increase from the reinvestment of profits by capitalist industrialists
- 2- The economic basic of Marx' theory is surplus value
- 3- Marx believes that technological progress tends to decrease the organic composition of capital.
- 4- In Lewis model the level of wages in urban industrial is assumed to be constant
- 5- The Keynesian approach rejects the idea that saving determines investment and argues instead that the encouragement of investment will generate its own saving
- 6- The materialistic interpretation of history attempts to show that all historical events are the result of a continuous economic struggle between different classes and groups in society
- 7- In Marx theory the surplus value equal what is goes into the capitalist's pocket in the form of net profit.
- 8- The Marxian theory be became the general theory of the development process in surplus –labor third world nation.
- 9- Surplus labor, it can be withdrawn labor from agricultural sector without any loss of output.
- 10- Lewis assumed that urban wages would have to be at least one – third higher than average rural income.
- 11- The supply curve of rural labor to the modern sector is considered to be perfectly inelastic
- 12- According to Lewis, the rural real wage is determined by the marginal product of labor

- 13- Acc. To Lewis, it is more realistic that wage rate is constant in the capitalist sector.
- 14- Lewis assumes that the capitalist surplus is reinvested in productive capital.
- 15- Lewis assumes the existence the investment multiplier in LDCs,
- 16- Lewis theory is considered one sided theory
- 17- Criticism of Lewis theory weakened its power
- 18- The mode of production relate to the class structure of a society.
- 19- Acc. To Marx, every society's class structure consists of the propertied and the non-propertied classes
- 20- Mode of production is subject to change
- 21- Class struggle- the struggle between the haves and have nots.
- 22- Marx uses his theory of surplus value as the economic basis of the class struggle under capitalism
- 23- Acc. To Lewis, the surplus value is the extra labour that a labourer puts in and for which he receives nothing
- 24- Acc to Marx. It is surplus labour that leads to capital accumulation
- 25- Marx separates capital into constant capital and variable capital.
- 26- Acc to Marx, the rate of profit can change even though the rate of surplus value remains constant.
- 27- Acc. To Marx. Capital accumulation and concentration involve increase in constant and variable capital.
- 28- Marx believes that technological progress tends to increase the organic composition of capital.

Part B : multiple – choice questions

Circle the appropriate answer:

1- According to Lewis's model , the dual economy grows only when

- a) the modern sector increases its output share relative to the traditional sector
- b) agricultural sector uses modern equipment.
- c) agricultural sector hires labor economically
- d) modern manufacturing sector is labor – intensive.

2- Marx refers to the concept of organic composition of capital. Which of the following ratios stands for this capital? Constant capital = C; variable capital = V; Surplus value = S

- a) $C/(V+S)$
- b) C/V
- c) $C/ (C+V)$
- d) $(C+V)/V$

3) In the Lewis model, what does the term surplus labor refer to?

- a) an amount of labor that is so high that it deflates wages throughout the economy
- b) labor that does not have at least a primary level education
- c) labor that can be withdrawn from the low productivity agricultural sector without a decrease in the total production
- d) labor that is exploited by the capitalist class

4- In the Lewis model, what will cause an expansion in modern sector employment?

- a) Are investment of profits by capitalists that allows production to expand
- b) interventions by the State to expand employment
- c) An increase in technology
- d) An increase in the surplus labor

5- Which one of the following is not correct about Lewis theory

- a) supply of labour is perfectly elastic
- b) marginal productivity of labour is zero
- c) surplus labour in industrial
- d) surplus labour in rural sector

6- Acc to Lewis, there is surplus labor in the sense that MPLA is.....

- a) larger than zero
- b) less than zero
- c) zero
- d) less than one

7- The organic composition of capital is

- a) the ratio of surplus value to variable capital
- b) the ratio of constant value to variable capital
- c) all of the above
- d) non of the above

8) Acc. To Marx, the relative decrease in the demand for labour due to:

- a) the rapid growth of constant capital as compared with variable capital.
- b) the rapid growth of constant variable capital as compared with constant capital.
- c) the rapid growth in the wage rate
- d) non of the above

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Chapter Four

The Choice of techniques

Chapter 4

The Choice of techniques

The main of goal to studying this chapter to understand the following topics

1- The capital intensity of techniques in developing countries

2- The conflict between employment and output and employment and saving is the choice of techniques.

- **Aggregative implications of factor substitution**
- **Employment versus saving**

Chapter 4

The capital intensity of techniques in developing countries

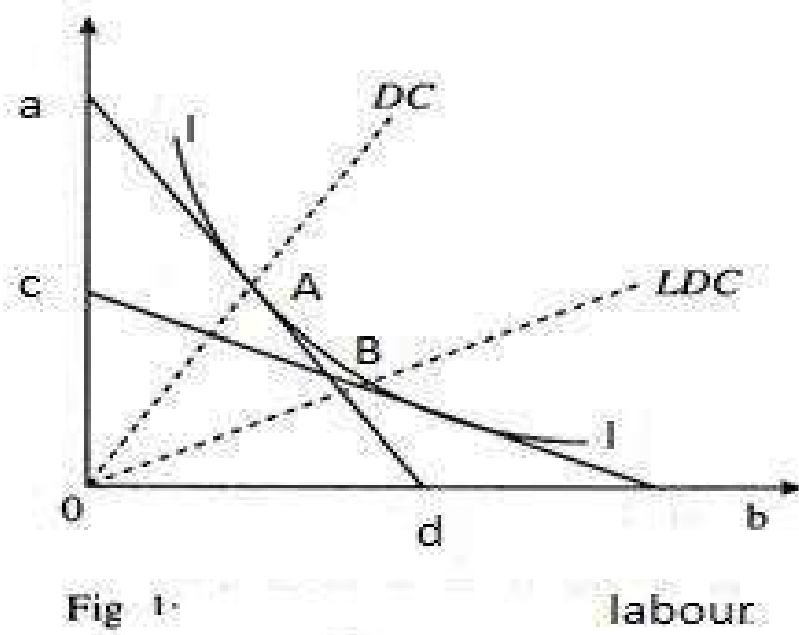
If labour is more abundant and capital is scarcer in developing countries than in developed countries, we might expect to observe the use of more labour-intensive techniques of production in the industrial sector of developing countries, reflecting a lower price of labour relative to capital. Figure 1 shows this assuming the same production function in the two sets of countries, labelled 1, and holding everything else constant, the lower relative price of labour in the developing countries, given by the price line (or isocost curve), cb , gives a more labour-intensive choice of technique than in developed country, where the relative price of labour is given by the steeper line ad .

In the developed country, the capital-labour ratio is given by the ray from the origin, DC , while in the less-developed country the capital - labour ratio is given by the ray LDC : both rays pass through the point of tangency between the price line and production function - A and B respectively.

In practice, however, it is often the case that for the same outputs produced, the capital intensity of techniques is not very different between the two sets of countries and that the capital-labour ratio differs between developed and less-developed countries in the aggregate only to the extent that the composition of output differs; that is, because there are large sectors in developing countries' economies where very little capital is employed at all as in subsistence farming and

petty service activities, in , the modern sectors of developing countries, however, techniques are much more capital- intensive than would be predicted on the basis of knowledge of factor endowments Given the supply of labour available, and given the rate of investment, the more capital- intensive the techniques, the less employment and the more unemployment there will be.

Unemployment is one of the major preoccupations in developing countries, and one of the senses in which the prevailing techniques of production might be regarded inappropriate.



But what accounts for this relative capital intensity of modern sector techniques, and would the developing countries be better off using more labour-intensive techniques? There are a number of reasons why technological choice sometimes appears to be little different in developing countries than in technologically advanced societies.

First for a large number of commodities there may not be a spectrum of techniques to choose from: that is, in practice the production function in Figure 1 may not be smooth and a country cannot move from A to B in accordance with differences in relative factor endowments and relative factor prices. We are talking here, of course, about techniques that are profitable; there may always be more labour-intensive techniques using both more labour and capital, but then the output would not be competitively saleable! If there is not a spectrum of profitable techniques of production, and the coefficients of production are fixed. The production function is L-shaped (sometimes) called a Leontief production function after Sasily Leontief, the father of input-output analysis, which assumes no substitutability between capital and labour, Whether world technology is such that there is only one profitable technique or whether there are many but developing countries are denied access to them, is an empirical question that we shall consider later.

A second reason for the relative capital intensity of production in developing countries is that the market prices of factors of production frequently do not reflect relative abundance or scarce capital and encourage high wages in the modern manufacturing sector by the

government paying high wages to its own employees. The old justification for using capital-intensive techniques, which governments used to believe in and still do to a great extent, was that they were necessary to maximise output and saving, and that more labour-intensive techniques would reduce the level of output and saving because of their, relative inefficiency and high wage bills. Later in the chapter we shall examine these contentions thoroughly but clearly the cheaper that capital is made by subsidies and the higher wages are above their shadow price, the more capital-intensive the techniques will tend to be

A third factor to bear in mind is that although labour may be abundant and its money price may be lower than in developed countries, it is not necessarily cheaper or less costly to employ, because its productivity may be lower. In other words, the so-called efficiency wage (that is, the wage rate divided by the productivity of labour), or wage costs per unit of output, may differ very little between the developing and developed countries. This means that the production function for the developing country in Figure 1 will lie outside the production function for the developed country in such a way that even if the relative money price of labour is lower in the developing country, it is profitable to choose a relatively capital-intensive technique. Figure 2 shows this. The production function for the developing country is labelled 2. Even though labour is cheaper relative to capital in the developing country (slope of $cb <$ slope of ad), none the less the most profitable capital-labour ratio will be the same in both countries (given by the ray from the origin. DC

= LDC). It is probably because abundant labour is not necessarily cheap. In a cost per unit of output sense. That accounts for the observation that in trade developing countries exports are sometimes as capital intensive as in developed countries, contrary to the prediction of certain trade theories. This apparent paradox (sometimes called the Leontief paradox) could be explained by the fact that it is the "efficiency" wage that matters, not the money wage, and while the money wage may be low in developing countries, the efficiency wage is relatively high.

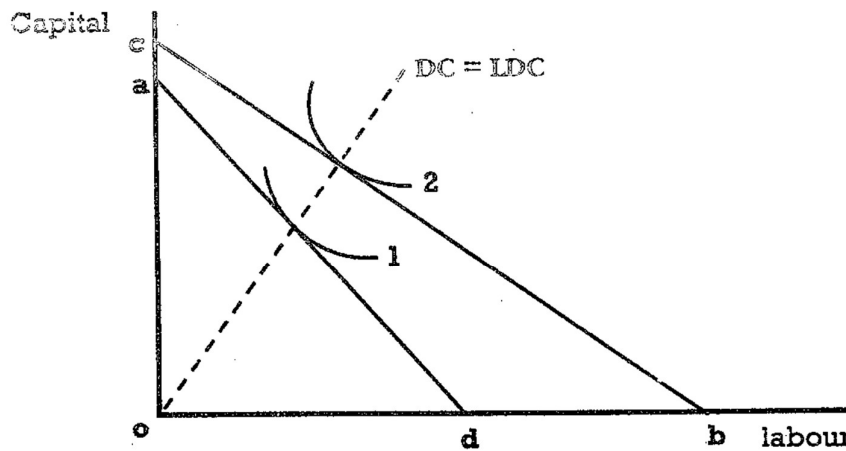


Figure 2

Fourthly, we may mention the fact that in certain instances capital intensity may be explained by a skill constraint. Typically, labour-intensive techniques require a great deal of skilled labour, compared with capital intensive techniques, which require a preponderance of semi-skilled labour to undertake routine tasks. In developing countries

that are short of skilled manpower, capital may substitute for skills and constitute a rational response on the part of decision makers, whoever they may be.

But perhaps the overriding factor that accounts for the relative capital intensity of the modern sector of developing countries is the fact that many, if not most, of the techniques of production are imported from abroad with a heavy bias in the labour-saving direction. The techniques may either be employed by indigenous firms or as increasingly seems to be the case, by large foreign owned multinational corporations, which invest in the country and bring their technology with them. In this case the technology may be inappropriate not because there is not a spectrum of techniques or an inappropriate selection is made, but because the technology available is circumscribed by the global profit maximising motives of the companies investing in the less developed country concerned. The labour-saving bias of the technology is tone explained by the labour-saving bias of technical progress in advanced countries where labour is relatively scarce and expensive. As we know labour saving bias on a production-function diagram is represented by a non-uniform inward shift in the production function, causing capital to be substituted for labour at the same ratio of relative factor prices.

If developed countries have designed labour saving technologies that, through the process of international investment, are now being widely used in developing countries, it might well be asked: why have developing countries not invented capital-saving technologies to economies on scarce capital? The answer is that if a country is to

develop technology to save capital, it must have a capital goods industry, but typically the capital goods sector of developing countries is rudimentary or non-existent, With a large fraction of investment goods coming from abroad, and the relative unprofitable ability of production coupled with lack of know-how, there has been very little incentive for developing countries to establish their own capital goods industries.

Capital goods production is characterised by the ability to specialise, but to do this economically requires a large market a much larger market than for homogeneous consumer products that can reap economies of scale. Capital saving also comes from improvement in the efficiency of capital goods production itself, but without a capital goods sector there cannot be innovations and an important source of capital saving and technical progress in the economy as a whole is lost, it is widely recognised that a capital goods sector is essential for innovatory activity in the economy as a whole, and if developing countries are to reduce their dependence on imported technology from abroad, priority must be given to the establishment and nurture of an indigenous goods sector capital

The empirical evidence on multinational corporations and the choice of techniques is mixed Mall (1978) distinguishes three separate issues,

- * Whether the technologies used by multinationals are adaptable to abundant labour and low wage conditions in developing countries
- * Whether multinationals do adapt the technologies they transfer
- * Whether multinationals adapt better or worse than local firms

Regarding the first question, the technologies used by multinationals are unlikely to be very flexible because the companies tend to predominate in modern industries where processes are complex, continuous and, by their very nature, capital intensive. Outside processing, however ancillary activities, such as the handling of materials and packaging, may be amenable to substitution. On the second issue, it is unlikely that multinationals will undertake major, expensive alterations to technology simply to suit local conditions, and there is not much evidence that they do so.

With regard to third matter, however, in comparison with local firms the experience of the multinationals seems to be very mixed. The problem here is that when making comparisons, like must be compared with like: that is, local and foreign firms must be compared in the same market, producing similar products with equal access to technology. Studies must therefore be treated with caution. It is easy to reach the conclusion that multinationals are more capital intensive than local firms if they operate in different industries producing different products. This in fact is often the case; being concentrated in activities that are intrinsically more capital intensive such as heavy industries and extractive industries.

We turn now, however, to the potential conflict between moving towards the use of more labour-intensive techniques of production and output on the one hand, and saving on the other.

The conflict between employment and output and employment and saving in the choice of techniques

Developing countries have three broad objectives: to raise the level of present consumption, to raise the level of future consumption (by saving now), and to raise the level of employment. In the choice of new techniques, a conflict between objectives may arise first, a technique that maximises employment may involve a sacrifice of output. Second, a technique that maximise employment may involve a sacrifice of saving. As we have mentioned already, certainly one of the justifications for the use of modern capital–intensive technology used to be that labour–intensive –techniques would reduce output and the investible surplus, we need to look at this matter theoretically and empirically. We shall argue that while in theory there may be a conflict, the assumptions upon which a potential conflict is based are either invalid or too extreme and that in practice developing countries could move towards the use of more labour–intensive techniques without sacrificing the level of present or future consumption. Some of the empirical evidence would seem to bear this out.

Employment versus output

A potential conflict between employment and output exists in the choice of new techniques because methods that employ high labour–capital ratios may involve high capital–output ratios because labour

productivity is lower.³⁰ Assume that a fixed amount of capital £1000, is to be invested. Technique 1 employs 100 persons with an incremental capital–output ratio of 5, giving an annual flow of output of £200. Technique 11 employs 50 persons with an incremental capital output ratio of 4 giving an annual flow of output of £250. Therefore the technique that maximises employment has a lower flow of current output.

It should be said straight away that there is very little evidence, if any, to support the view that labour–intensive techniques have higher capital– output ratios than capital intensive techniques. On the contrary, there is growing evidence that labour can be substituted for capital provided cooperating factors are available, without the level of output being impaired. One interesting pioneer study is that by Pack (1974), using UN data on capital per unit of output (k/O) and labour per unit of output (L/O) for six commodities in sixteen firms across ten countries. Pack plots the observations of (K/O) and (L/O) (as in Figure 3) for each commodity from the cross–section data, and then defines the efficiency frontier to estimate the elasticity of substitution along it.

Each scatter point in Figure 3 represents country observation for one industry, say cotton textiles, of the relative amount of capital and labour employed per unit of output. The efficiency frontier (or unit is quant) is drawn through the points closest to the origin and the elasticity of substitution is calculated as

³⁰ - The capital output ratio (K/O) may be expressed as the product of the capital labour ratio and labour requirements per unit of output, that is, $K/O = K/L, L/O$ techniques with a low KL may nonetheless have a high K/O because L/O is high, that is the productivity of labour is low.

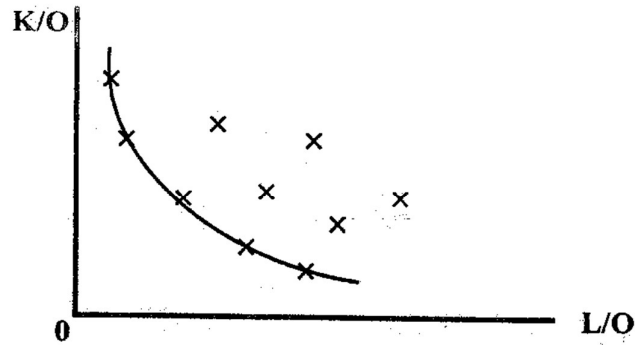


Figure 3

$$\frac{(K/L)_i}{(K/L)_j} = \left[\frac{(W/L)_i}{(W/r)_j} \right]^d$$

Where W/r is the rental ratio, i and j are the two observations closest to the origin, and d is the elasticity of substitution. For five of the six commodities there is a large difference in the amount of capital per worker year used by countries on the efficiency frontier and a fairly high elasticity of substitution. The results are shown in Table 1. The results suggest that for countries using large amounts of capital per unit of labour there are more labour-intensive techniques available (as used by other countries that could be adopted without sacrificing output unless the cooperating factors associated with the increased labour intensity are not available. One interesting observation from pack's work is that India is invariably either on or close to the efficiency frontier, and hence is using labour-intensive techniques effectively.

Pack's study (1976) of 42 plants in Kenyan manufacturing also suggests that there appears to be considerable ex ante choice of capital intensity in most industries, particularly outside the processing sector in the auxiliary activities of material receiving, material handling among processes packaging and storage of the finished products. In fact many auxiliary activities are already very labour-intensive, and contrary to the conventional wisdom it was found that foreign-owned firm generally used more labour-intensive techniques than indigenous firms. Pack ascribes this to the better managerial expertise and technical training of personnel in foreign firms. Forsythe and Solomon (1977) in a study of Ghana, also find scope for capital-labour substitution and can find no overwhelming evidence that foreign firms are " more capital intensive than resident expatriate or private indigenous firms. The situation varies from industry to industry. Helleiner (1975) concludes his survey of multinational corporations and technological choice by saying: in particular industrial sector, the multinational firm has often proven more responsive and adaptable in its factor and input use, especially in the ancillary activities associated with the basic production processes, than local firms, and so it perhaps should be with its wide range of experience on which to draw.

Table 1 Capital –Labour substitution possibilities

industry	Countries on the efficiency frontier	Capital per worker year (\$)	Elasticity of substitution (δ)
Grain Milling	} <i>japan</i> <i>Israel</i>	280 6410	3.70
paints	} India Middle Europe	214 2790	1.60
Tyres	} Iran Mexico	6240 10600	1.50
Cotton textiles	} India Mexico	1100 8240	2.00
Woolen textiles	} India japan	260 4600	1.20

Aggregative implications of factor substitution

Pack (1982) has taken nine industrial sectors from studies that have examined choice of techniques and have worked out the aggregative effects on employment, wage income, non – wage income and value-added of \$100 million investment in each sector, using the most capital- intensive technique and the most appropriate technology, defined as that which yields the highest present discounted value per unit of capital. The results are very revealing, although Pack pinpoints many obstacles to the adoption of more labour-intensive technology. The industrial sectors concerned are shown Table 2. Which gives data on investment and employment in relation to output for the two

technologies compared. For most sectors there are wide differences in the capital–output ratio and the capital– labour ratio.

To derive the aggregative implications of factor substitution, each sector is assumed to have invested \$100 million, either on the most capital –intensive process or on the most appropriate technology, from which employment, wage income (assuming an annual average wage of \$500 per worker), non –labour income and value–added can be calculated for two technologies/ the results are shown in table 3.

Focusing on the aggregate totals, it can be seen that value–added on the appropriate technology is nearly twice as high as on the most capital–intensive technology, and that aggregate level of employment is four times higher. Note also that while labour's share of value–added is higher on the more labour–in–tensive technology and the share of profits is lower, the absolute level of non – labour income is higher. There is no clash between employment and output, or employment and the reinvestible surplus. However value–added per worker on the more labour–intensive techniques is less than half that on the most capital intensive techniques. What is also clear from the table is that there are large differences between sectors in the capital–labour ratio using more appropriate technology, so that the actual sectoral composition of investment will affect the aggregate calculations of employment effects. To increase employment, therefore, it is possible to exploit the scope for factor substitution between sectors as well as within sectors. The obstacles identified by Pack to the adoption of more labour–intensive technology include:

Table 2							
Fixed investment and employment associated							
With capital-intensive and appropriate technologies							
Sector	Annual output of plant	Capital intensive technology			Appropriate technology		
		Investment of dollars of dollars	Number of workers	Thousands of dollars per worker	Investment of dollars of dollars	Number of workers	Thousands of dollars per worker
Shoes	300 000 pairs	334	155	2.2	165	218	0.8
Cotton weaving	40 000 000 square yards	9 779	260	37.6	4 715	544	8.7
Cotton spinning	2 000 tons	1 440	98	14.7	480	240	2.0
Brickmaking	16 000 000 bricks	3 437	75	45.8	796	238	3.3
Maize milling	36 000 tons	613	63	9.7	219	96	2.9
Sugar	50 000 tons	6 386	1 030	6.2	3 882	4 986	0.8
Beer brewing	200 000 hectoliters	4 512	246	18.3	2 809	233	12.1
Leather	600 000 hides	6 692	185	36.2	4 832	3H	15.5
fertilizer	528 000 tons of urea	31 132	248	137.6	29 597	242	122.3

Table 3
Annual employment, wage and non-labour income, and value- added under alternative technologies

Sector	Employment 1		Value added 2		Non- labour income2		Value added 2	
	Appropriate	Capital intensive	appropriate	Capital intensive	Appropriate	Capital intensive	Appropriate	Capital intensive
Shoes	31.589	18.158	15.79	9.08	73.19	59.04	88.99	68.12
Cotton weaving	10.488	2.538	5.24	1.27	18.20	3.61	23.44	4.80
Cotton Spinning	10.747	4.525	5.37	2.26	52.61	32.00	57.98	34.26
Brickmaking	29.909	2.182	14.95	1.09	40.72	- 5.50	55,67	- 4.41
Maize milling	19.231	7.574	9,62	3.79	13.48	8.30	23.10	12.09
Sugar processing	123.980	15.925	61.99	7.96	185.68	154.84	247.66	162.89
Beer brewing	7.160	4.316	3.73	2.16	48.66	21.73	52.39	23.89
Leather	4.502	2.108	2.25	1.05	17.49	10.72	19.74	11.77
Fertilizer	772	691	0.39	0.35	54,57	49.76	54.95	50.11
Total	238.678	58.017	119.33	29.01	504.6	334.50	623.92	363.51

Notes

1- all workers in the industry

2- Million of dollars

- * The costs of information.
- * The problems associated with the use of secondhand machinery.
- *The fact that technical change may be slowed down.
- *The shortage of skilled manpower.

Pack shows high benefit–cost ratios to training in skills; and to overcome the problems arising from the adoption of more labour–intensive technologies, he suggests an industrial extension service equivalent to the extensions services commonly available for the agricultural sector in developing countries.

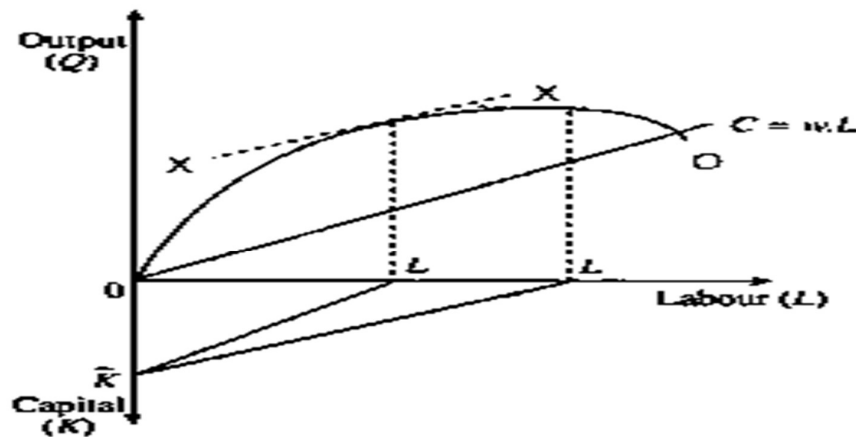
Even if more labour–intensive techniques can be used without a sacrifice of output, there is still the question of whether the investible surplus, and therefore future output will be impaired Pack's work suggests otherwise, but let us now consider in more detail the potential conflict between employment and saving as the traditional argument has it.

Employment versus saving

The potential conflict between employment and saving can be illustrated in its starkest form using a simple production function diagram first used in this context by Cobb (1955) and Sen (1968)

Consider the use of a given amount of investible resources, K , and the possibility of employing those resources with varying amounts of labour to produce output. O is the production function in the consumption sector, exhibiting diminishing returns to labour. Now take

the standard traditional (though not necessarily correct) assumption that in the industrial sector labour is paid a fixed wage that is consumed, so that a ray from the origin (OC) with a constant slope (W) shows the level of the wage bill and consumption at each level of employment. The difference between OO and OC is profit, and if all profits are saved the difference also shown the level of saving at each capital-labour ratio. Saving is maximised where a line drawn parallel to OC is tangential to the production function at employment level L in Figure 4. Beyond this point further employment generation would diminish the level of saving and investible surplus. If the production function in Figure 4 is denoted algebraically as.



$$O = aL - bL^2 \quad (1)$$

And the saving function as

$$S = aL - bL^2 - w \quad (2)$$

The level of employment that maximises saving is obtained by differentiating Equation. 2 with respect to L and setting equal to zero which gives:

$$\frac{\partial S}{\partial L} = a - 2bL - w = 0 \quad (3)$$

Therefore the level of employment that maximises saving is

$$L = (a - w) / 2b \quad (4)$$

And the level of employment that maximises output is

$$L_1 = a/2b$$

Since $L < L_1$, there is a conflict between saving and employment maximisation. The more labour-intensive technique maximises output and consumption in the short run; but the more capital -intensive technique provides a greater surplus for reinvestment for growth and future output and consumption. As Cobb puts it:

The choice between more or less capital -intensive forms of investment has nothing to do with existing factor proportions. It depends, not on the existing ratio of available labour to capital (treated as a stock), but on precisely the same considerations as those which determine the choice between a high and a low rate of investment—namely the importance to be attached to raising consumption in the immediate future compared with the potential increase of consumption in the more distant future which a particular rate of investment or form of investment will make possible. In other words, the same grounds which would justify a high rate of investment would justify also a high degree

of capital intensity in the choice of investment forms, and vice versa (Cobb,1955).

The potential clash between increasing employment and maximising saving represented by the difference between L1 and L in Figure 4 can be seen, however, to be based on several assumptions, the validity of which may be questioned. These assumptions are

- That the wage rate is given and invariant with respect to the technique of production. This assumption would seem to be a hangover from Lewis's influential model of the development process assumes an elastic supply of labour to the industrial sector at constant wage. If this wage is above the minimum necessary, however, several implications ensue.
- That all profits are saved and all wages are consumed.
- That unemployment resulting from the use of capital –intensive techniques does not reduce community saving to the level of saving that would prevail with more employment and a higher wage bill.
- That consumption is not productive (that is, has no investment component), or that present consumption is no more productive than future consumption.
- That governments lack the ability to tax and to subsidies labour to reconcile the potential conflict.

Exercises

Question on Chapter Four

The choice of techniques

Part A True – false questions

Circle whether the following statements are true (T) or false (F)

- 1- In developing countries, labor –intensive reflecting a lower price of labor relative to capital.
- 2- The capital intensity of techniques is different between the two sets of countries.
- 3- The capital – labor ratio is similar between developed and less-developed countries.
- 4- There is a negative relationship between the capital-intensive techniques and the employment.
- 5- There always are more labor-intensive techniques using labor only.
- 6- Wessily Leontief assumes no substitute between capital and labor
- 7- The higher wages are above their shado price, the more capital – intensive techniques will tend to be.
- 8- Wage costs per unit of output is similar between the developing and developed countries.
- 9- The production function for developing country will lie outside the production function for the developed country.
- 10- In developing countries, the money wage may be low; the efficiency wages is relatively high.
- 11- The capital – intensive technique require a great deal of skilled labor
- 12- Techniques that maximize employment have a lower flow of current output.

Part B : multiple – choice questions

Circle the appropriate answer:

1- The capital intensive the techniques , theEmployment and theunemployment there will be

- a) more. Less , more
- b) less, more, more
- c) more, less, less
- d) more, more , more.

2- There may always be more labor- intensive techniques using

- a) both labor and capital
- b) labor only
- c) capital only
- d) skilled labor

3- The wage rate divided by the productivity of labor that is

- a) the wage rate ratio
- b) the efficiency wage
- c) wage costs per unit output
- d) a and b
- e) b and c

4- In a developing country , a relatively capital- intensive technique will choose if the relative money price of labor is

- a) higher
- b) lower
- c) less than 1
- d) zero

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Chapter Five

Financing development from domestic resources

Chapter 5

Financing development from domestic resources

The main of goal to studying this chapter to understand the following topics

1– The prior – saving approach

2– Fiscal policy and taxation

3– The Keynesian approach to the financing of development

Chapter Five

Introduction

The topic of financing development from domestic resources has two major aspects. The first concerns the ways in which saving can be encouraged in developing countries, because only if society is willing to save can resources be devoted to the production of capital goods, saving is necessary to fund investment. In a primitive subsistence economy, without money or monetary assets, saving and investment will tend to be simultaneous acts, in the sense that saving and investment will be done by the same people, and saving will be invested in the sector in which the saving takes place. Those who sacrifice time and resources that would otherwise be used for consumption purposes do so to develop the means of production. They do not hold money or interest-bearing assets. In more sophisticated money exchange economy, however, there is no guarantee that saving will necessarily be converted into investment, with the existence of money and monetary assets; the act of saving becomes divorced from the act of investing.

Those who want to do the investing may be different from those who want to do the saving, and the process of capital accumulation is likely to require financial and credit mechanisms to redistribute resources from savers to investors. Indeed, with a banking system with the power to create credit, investment can take place without prior saving through the process of borrowing. In other words, saving funds investment, but does not necessarily finance it. Investment generates its own saving

through increases in output and profits. In fact, in the early stages of development, savings may not be the major barrier to capital formation but rather an unwillingness or inability to invest.

Unwillingness to invest may stem from cultural attitudes or simply from a realistic assessment of the risks involved.

We analysed in Chapter 1 – 2 why poor people may be risk averse. The inability to invest, on the other hand may result from shortages of cooperating factors of production (including foreign exchange), or lack of access to credit because of the underdeveloped nature of the financial system. The second important aspect of financing development from domestic resources, therefore, has to do with the role of the banking and financial system in promoting and financing investment. The financial system is important for encouraging saving, financing investment and allocating savings in the most productive manner.

In this chapter, we focus primarily on the determinants of saving, the role of the financial system in promoting savings, investment and growth, and also the process of credit-financed growth initiated by the government, which may be inflationary. This leads us to consider the relation between inflation and economic development.

Saving

There are three broad groups in society that save: the household sector, the business sector and the government. The household sector saves out of personal disposable income (personal saving), the business sector saves out of profits, and the government can save out of tax

revenues if it spends less than it receives on current expenditure (that is , runs a budget surplus on current account). Household and business saving is sometimes referred to as private saving, while government saving is public saving. Each the sectors' motive for saving will differ, and we shall consider the determinants of saving later.

As far as the nature of saving is concerned, three broad types may be distinguished: voluntary, involuntary and forced. The origin of these types of saving is fairly self- explanatory:

- Voluntary savings are savings that arise through voluntary reductions in consumption out of disposable income both the household and the business sector may be a source of voluntary savings.
- Involuntary savings are savings brought about through involuntary reductions in consumption. All forms of taxation and schemes for compulsory lending to governments are traditional measures involving involuntary reductions in consumption.
- Consumption may be reduced because of rising prices. This is referred to as forced saving and may happen for a number of reasons. People may spend the same amount in money terms, but because prices have risen this means they spend less in real terms (money illusion). People may want to keep; he real value of their holdings of money constant, so they accumulate more money as prices rise (the real balance effect). Also inflation may redistribute income to those with a higher propensity to save, such as profit earners.

For a variety of reasons, which will be considered later, inflation is likely to be a natural concomitant of development, but it can also be deliberately induced by governments financing budget deficits at full employment by monetary expansion. This is the idea of inflation as a tax on money, it should also be remembered that if an economy is at less than full employment, there can always be more saving by activating unemployed or underemployed resources, provided not all of the increase in output is consumed.

Domestic savings for investment can also be supplemented from abroad. Private foreign investment is a direct source of capital formation and provides a direct addition to domestic investment. It can also be a source of savings by stimulating income and employing previously underutilised resources. Second, Borrowing from abroad provides resources for investment by enabling imports to exceed exports, which in the national accounts shows up as investment in excess of domestic saving. Foreign assistance may be from multilateral or bilateral sources and may take a variety of forms, ranging from loans at commercial rates of interest to outright gifts of goods and services and technical assistance.

Finally, a country's commercial policy can stimulate savings and release resources for investment purposes. Trade itself, improvement in a country's terms of trade, can provide additional resources for investment if the resulting increase in real income is not fully consumed, likewise policies to restrict imports of consumption goods can release additional resources for investment, provided that domestic saving is not

reduced by purchasing power released being switched to home consumption goods. These topics are taken up in subsequent chapters.

The amount that countries save and invest is a proportion of their gross domestic product (GDP) differs enormously, affected by differences in the ability and willingness to save and invest. Some countries dissave. Consuming more than they produce. Some countries save more than they invest, which means they are investing abroad, and other countries invest more " than they save, which means they are net importers of capital. The experience by country and by continent for the years 1980 and 1995 is shown in Table 1. The first thing to note is that the savings ratio much lower in poor countries than in rich ones, but that the savings ratio does not continue to rise for ever as countries grow richer. It tends to level off in the middle- income group of countries and then stabilise. The weighted average savings ratio in the low-income countries (excluding China and India) is only 10 per cent of GDP compared with 25 per cent in the middle-income countries and 21 per cent in high income countries. Some countries in the low income category dissave, for example Tanzania, Burundi, Chad and war-torn Rwanda. Most of the low income countries also have investment ratios that are higher than their domestic savings ratios, indicating that they are net capital importers, the average investment ratio is 20 per cent, compared with a savings ratio of 10 per cent.

The second important observation is the enormous disparity in saving performance between continents, particularly between the high savings ratio of the highly successful East Asian countries and the much

lower savings ratios in the less successful economies of Latin America and Sub-Saharan Africa. The ratio in East Asia (35 per cent) is nearly double that of Latin America (19 per cent), and more than double that of sub-Saharan Africa (16 per cent). The question that naturally arises is: did high savings precede rapid growth in East Asia, or did rapid growth generate its own high savings ratio? Some might argue that it was policies to stimulate saving that were important, including financial liberalisation. Some might say it was policies to stimulate investment, partly through control of the banking system, that generated growth and therefore saving. Others might say it was the deliberate involvement of the government in generating and reallocating new resources.

There is no easy answer to question, but the different replies that might be given highlight the differences in the three broad analytical approaches to the study of financing development from domestic resources, which we will use as the organising framework for the rest of the chapter. The three approaches are as follows:

Table 4									
Saving and investment ratios as a percentage of GDP									
	Cross domestic investment		Cross domestic investment			Cross domestic investment		Cross domestic investment	
Country	1980	1995	1980	1995	Country	1980	1995	1980	1995
Low income economies excluding China	24	32w	22w	30w	Lower-Middle income economies				
And India	..	20w	..	10w	Lesotho	42	87	-62	-9
Mozambique	22	60	1	5	Egypt, Arab Rep.	28	17	15	6
Ethiopia	9	17	3	7	Bolivia	15	15	19	8
Tanzania	29	31	19	-7	Macedonia FYR	..	15	..	4
Burundi	14	11	-1	-7	Moldova	..	23	..	24
					Uzbekistan	..	23	..	24

Malawi	25	15	11	4	Indonesia	24	38	37	36
Chad	4	9	-6	-10	Philippines	29	23	24	15
Rwanda	16	13	5	-7	Morocco	24	21	14	13
Sierra Leone	18	6	2	-9	Syrian Arab Republic	28	..	10	..
Nepal	18	23	11	12	Papua New Guinea	25	24	15	39
Niger	37	6	23	1	Bulgaria	34	21	39	25
Burkina Faso	17	22	-6	6	Kazakhstan	..	22	..	19
Madagascar	15	11	-1	3	Guatemala	16	17	13	8
Bangladesh	15	17	2	8	Ecuador	26	19	26	21
Uganda	6	16	0	7	Dominican Republic	25	20	15	16
Vietnam	..	27	..	16	Romania	40	26	35	21
Guinea Bissau	30	16	-6	-5	Jamaica	16	17	16	10
Haiti	17	2	8	-7	Jordan	..	26	..	3
Mali	17	26	-2	10	Algeria	39	32	43	29
Nigeria	22	18	32	20	El Salvador	13	19	14	6
Yemen Rep.	..	12	..	10	Ukraine	..	..	..	..

Cambodia	..	19	..	6	Paraguay	32	23	18	14
Kenya	29	19	18	13	Tunisia	29	24	24	20
Togo	30	14	25	9	Lithuania	..	19	..	16
Mongolia	46	..	27	..	Colombia	19	20	20	16
Gambia	26	21	1	5	Namibia	29	20	39	17
Central African Republic	7	15	-10	6	Belarus	..	25	..	20
India	21	25	17	22	Russian Federation	22	25	..	26
Lao PDR	..	..	..	..	Latvia	26	21	..	16
Benin	15	20	-5	9	Peru	29	17	32	11
Nicaragua	17	18	-2	-9	Costa Rica	27	25	16	24
Ghana	6	19	5	10	Lebanon	..	29	..	-22
Zambia	23	12	19	3	Thailand	29	43	23	36
Angola	..	27	..	43	Panama	..	24	..	22
Georgia	29	3	..	-9	Turkey	18	25	11	20
					Poland	26	17	23	19

Pakistan	18	19	7	16	Estonia	..	27	..	18
Mauritania	36	15	7	11	Slovak Republic	..	28	..	30
Azerbaijan	..	16	..	17	Botswana	38	25	28	23
Zimbabwe	19	22	16	17	Venezuela	26	16	33	21
Guinea	..	15	..	11	Upper –Middle–				
Honduras	25	23	17	14	income economies				
Senegal	15	16	0	10					
China	35	40	35	42	South Africa	28	18	36	18
Cameron	21	15	20	21	Croatia	..	14	..	1
Cote d' Ivoire	27	13	20	20	Mexico	27	15	25	19
Albania	35	16	..	-8	Mauritius	21	25	10	22
Congo	36	27	36	23	Gabon	28	26	61	48
Kyrgyz Republic	..	16	..	10	Brazil	23	22	21	21
Sri Lanka	34	25	11	14	Trinidad and				
Armenia	29	9	..	-29	Tobago	31	14	42	25
Czech Republic	..	25	..	20	High – income				
Malaysia	30	41	33	37	economies	23	21w	23w	21w

Hungary	31	23	29	21	Korea. Rep.	32	37	25	36
Chile	25	27	20	29	Portugal	34	28	21	18
Oman	22	17	47	27	Spain	23	21	21	22
Uruguay	17	14	12	13	New Zealand	21	24	20	26
Saudi Arabia	22	20	62	30	Ireland	27	13	14	27
Argentina	25	18	30	30	Israel	22	24	11	13
Slovenia	..	22	..	21	Kuwait	14	12	58	18
Greece	29	19	23	7	United Arab	28	27	72	27
					Emirates				
Low- and middle					United Kingdom	17	16	19	15
income economies	26	27w	30w	22w	Australia	25	23	24	22
Sub-Saharan Africa	23	19w	27w	16w	Italy	27	18	24	22
East Asia and	28	39w	28w	38w	Canada	24	19	25	21
Pacific									
South Asia	20	23w	15w	20w	Finland	29	16	28	24
Europe and Central					Hong Kong	25	35	34	33
Asia					Sweden	21	14	19	19

Middle East and N					Netherlands	22	22	22	29
Africa	26	..	45w	..	Belgium	22	18	19	24
Latin America and					France	24	18	23	20
caribbean	25	20w	23w	19w	Singapore	46	33	38	...
					Austria	28	27	26	26
					United States	20	16	19	15
					Germany	....	21	..	23
					Denmark	19	16	17	21
					Norway	25	23	31	29
					Japan	32	29	31	31
					Switzerland	24	23	20	27
					world	24	23w	25w	21w

- The prior saving approach to the financing of development stresses the importance of prior savings for investment and the need for policies to raise the level of savings either voluntarily or involuntarily, or both. The approach is very classical in conception, emphasising saving as a prerequisite of investment. The approach is also characterised by a strong aversion to inflation and a belief that saving will readily find investment outlets.
- The so-called quantity theory approach points to the role of government monetary expansion in appropriating resources for development through forced saving or the inflation tax.³¹ If developing countries are characterised as fully employed in the Keynesian sense (with no spare in the consumption goods industries), both the Keynesian and the quantity theory approach to the financing of development will involve inflation. Plans to invest in excess of plans to save at full employment will drive up the price level, and so will monetary expansion by government. In this sense there is an important practical as well as a theoretical difference between the prior-savings approach and the other two approaches. In the poor-saving approach the resources released for investment come from voluntary and involuntary saving and no inflation is involved. In the Keynesian and quantity theory approaches the resources are released through the process of inflation, by income redistribution from classes with low propensities to those with higher propensities to save, and by inflation as a tax or money.

³¹ - the approach gets its name from the quantity theory of money, which predicts that increases in the quantity of money will always eventually lead to increases in the price level.

The prior savings approach

In classical theory saving and investment are one and the same thing. All saving finds investment outlets through variations in the rate of interest. Investment and the development process are led by savings. It is this classical view of the development process that underlies such phrases. In the development literature as the mobilisation of savings for development and also underlies the policy recommendation of high interest rate to encourage voluntary saving. Lewis's influential model of the development process, which we considered in chapter 5, is a classical model stressing the importance for development of reinvesting the capitalist surplus.

The level of saving and the ratio of saving to national income in developing countries are likely to be a function of many variables affecting the ability and willingness to save. The main determinants of the ability to save are the average level of per capita income, income, the rate of growth of income, the distribution of income between rich and poor and the age composition of the population. In turn, the willingness to save depends on such monetary factors as the existence of acceptable and reliable monetary institutions, the interest rate offered in relation to risk and time preference, and general societal attitudes towards consumption and the accumulation of wealth. Differences in cultural attitudes between countries may distort the estimation of saving functions across countries based on economic variable alone.

Turning to the empirical evidence, the time-series and cross-section evidence suggests that the level of saving per head and the saving ratio are primarily a function of the level of per capita income and growth of income – other factors, including monetary variables, are of lesser importance.

The hypothesis that savings per head and the savings ratio are a function of income per head is part of the Keynesian absolute income hypothesis, that is, saving is a function of income. If we write the Keynesian savings function as $S = a_0 + b_0 (Y)$ and divide by the population level (N) we have

$$S/N = - a_1 + b_1(Y/N)$$

To obtain an expression for the savings ratio we multiply Equation. 1 by N and divide by Y:

$$S/Y = b_1 - a_1 (Y/N)^{-1}$$

The Keynesian absolute income hypothesis therefore predicts that savings per head (S/N) is a linear (but non proportional) function of income per head (Y/N), and that the savings ratio (S/Y) is a hyperbolic function of the level of income per head; that is, that the savings ratio will rise with the level of per capita income but at a decreasing rate. As $Y/N \rightarrow \infty$, $S/Y \rightarrow$ to the asymptote b_1 . This is shown in Figure 1.

The savings data in Table. Figure 1. suggest this

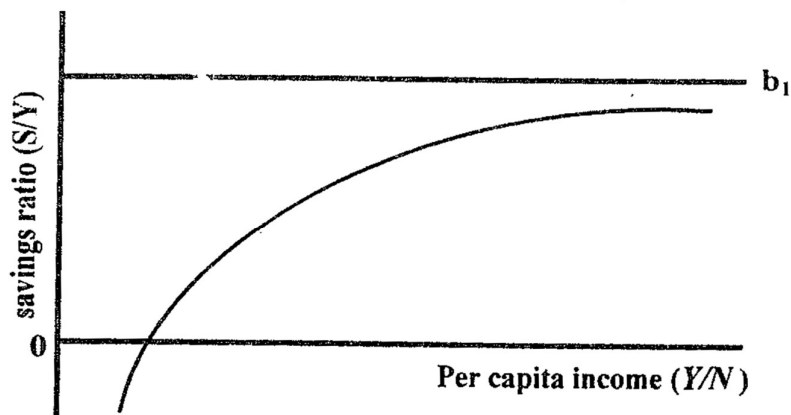


Figure 1

type of relation, as already discussed. Data on the personal savings ratio over the period 1985–93 also suggest this non linear relation, as shown in Table 2. The ratio rises rapidly between the low–income and upper middle income countries and then levels off.

The reason why the savings ratio should rise as per capita income increases and then level off is not clear–cut. It is as if saving is a luxury good in the early stages of development but then loses its appeal. Part of the reason may be purely statistical, arising from the way saving is normally defined in developing countries as the difference between investment and foreign capital inflows.

As investment expenditure becomes more faithfully and accurately recorded as development proceeds (as per capita income rises) the savings ratio is also shown to increase. But there are also a number of economic factors that probably play a contributory role in explaining the

relation. One is the growth of the money economy. As money replaces barter for transactions, the public will wish to , hold a higher proportion of their income in the form of money, which they can only do by giving up command over real resources. This hypothesis is supported by what we know about the income elasticity of demand for money in developing countries, which exceeds unity (For evidence of this, see Thirlwall, 1974, CH.5.)

Table 2 personal savings ratio

Countries	Personal saving as % of GDP (average 1985093
Low income	11.2
Lower middle – income	16.7
Upper middle income	195
High income	20.0

a higher proportion of their income in the form of money which they can only do by giving up command over real resources. This hypothesis is supported by what we know about the income elasticity of demand for money in developing countries, which exceeds unity. (For evidence of this, see Thirlwall. 1974, CH.5)

A second possible explanation is that population growth decreases with increases in the level of per capita income, so that population growth absorbs household saving to a lesser and lesser extent. Another plausible hypothesis is that in the early stages of development the

distribution of income, both personal and functional, grows more unequal but at a decreasing rate. If higher-income groups have higher propensities to save than lower-income groups, and profit earners have a higher propensity to save than wage earners, the savings ratio will be positively related to the degree of inequality in income distribution (personal income distribution) and to the share of profits in total income (functional income distribution). Some evidence of the widening distribution of income in the early stages of development was given in Chapter.

It will be remembered from chapter 5 that in Lewis's model of development with unlimited supplies of labour, it is not the absolute level of per capita income that is the prime determinant of the savings ratio but the size of the capitalist surplus and the distribution of income between entrepreneurial profits and other income according to Lewis (1955), if we ask why the less developed countries save so little the answer is not because they are so poor but because their capitalist sector is so small. Lewis also expressed the view that no nation is so poor that it could not save and invest at least 12 per cent of its national income if it so wished. Investment as a proportion of national income is not small because of an incapacity to save but because the surplus generated in developing countries is used to maintain unproductive hoards of retainers and for conspicuous consumption in general:

Lewis's view is very much in line with our earlier remark that in the early stages of development there may be savings investment gap in the sense of incapacity to save, but an unwillingness to save or to use saving for productive formation.

Other recent studies show that the savings ratio is positively related to the rate of growth of income, which is the prediction of the lifecycle hypothesis of saving (see Modigliani, 1970). The idea is that people wish to smooth out consumption over their lifetime, so that they dissave when their income is low (in youth old age) and save when they are working and their income is high. If income growth then accelerates for some reason, people will save more to give themselves a higher level of consumption in retirement. Thus if income growth is faster in one country than another, this will produce a higher savings ratio. Edwards (1995) has analysed the private savings ratio across 36 industrial and developing countries over the period 1983 to 1992 and finds that one of the most important determinants of high savings is the growth of output. The age distribution of the population also makes a difference, and the degree of urbanisation negatively affects the savings ratio.

The dependence of savings on income suggests that development and rising living standards is a cumulative phenomenon. Growth depends on saving and capital formation, but saving in turn depends on growth and the level of capita income. A virtuous circle can be started once the growth of income rises above the growth of population, allowing per capita income to rise. The virtuous circle of growth must be initiated by directly raising the low levels of per capita income of the vast

majority of people by making their labour more productive. This is the first task of financing capital formation by domestic voluntary means within the prior savings approach. The second task is to encourage and exhort those with the ability to save to curtail extravagant consumption and to invest productively the surplus of income over whatever level of consumption is decided upon. The encouragement to save and invest productively must come from the government and government agencies concerned with promoting economic development. This is where monetary and fiscal policies become important. At the practical level, this is what the prior savings approach to development is concerned with designing monetary and fiscal policies that raise the level of savings directly, and also indirectly by allocating resources in the most productive way possible. While monetary factors may not be so important as income in determining savings behaviour, economic development itself is dependent on the sophistication of the financial system, and there is evidence that saving may be more responsive to interest rates when the level of income rises above subsistence. Research on this topic by Ogaki, Ostry and Reinhard (1996) is reported in Table 3³².

³²- The data refer to the change (in percentage points) in the saving rate owing to a 1 percentage point increase in the real interest rate. For example, in high – income countries with a real interest rate of 3 per cent, a 1 percentage point rise in the real interest rate would raise the saving rate by nearly two thirds of a percentage point (0.584 of a percentage point) at higher baseline levels of the real interest rate, the saving response diminishes slightly.

Table 3 interest sensitivity of savings under alternative we scenarios'

Country groupings	Real interest initial		
	3 per cent	4 per cent	5 per cent
Low-income			
Average for group	0.312	0.306	0.300
Average for 10 poorest	0.177	0.174	0.171
Lower-middle-income	0.532	0.522	0.512
Upper-middle-income	0.560	0.519	0.539
High-income	0.584	0.573	0.562

Source M Orgako. J.D. Ostry and C.M reinhart (1996)

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It appears that saving is very unresponsive to interest rates in low income countries where there is little margin of income over subsistence needs, but its responsiveness rises as consumption rises above subsistence needs and people can exercise choice about increasing their present or future consumption.

This leads us to the extensive topic of financial systems, financial policy and economic development

Fiscal policy and taxation

There is another arm of the prior savings approach to the financing of development from domestic resources that needs to be considered, and that is the use of fiscal policy and taxation. Fiscal policy has two major roles in the financing of development. The first is to maintain the economy at full employment so that the savings capacity of the economy is not impaired. The second is to design a tax policy to raise the marginal propensity to save of the economy as far above the average as possible without discouraging work effort and consistent with an equitable distribution of the burden.

Using fiscal policy to maintain full employment will involve deficit finance if unemployed or underused real resources exist in the Keynesian sense. While deficit finance is likely to be inflationary in the short run until supply has had time to adjust, there is an important analytical distinction between the means by which resources are made available for investment through deficit finance at less than full employment and the means by which savings are generated by inflation. In the former case savings are generated by an increase in real output, in the latter case by a reduction in real consumption through a combination of factors, including a real balance effect on outside money. Income redistribution from low savers to high savers, and money illusion.

Fiscal policy to raise the marginal propensity to save above the average is concerned with the implementation of taxes to reduce consumption in the private sector. Saving brought about by taxation is involuntary saving. How much taxation a country raises as a proportion of national income depends on two major factors: the capacity of the country, and the effort made by the country in relation to its taxable capacity. The taxable capacity of a country depends on such factors as the overall level of per capita income of the country, the distribution of income, the level of literacy and urbanisation. The size of the industrial sector, the importance of trade. Whether the country has mineral resources, and the amount of foreign investment. In turn, the tax effort depends on the extent to which a country exploits these various tax bases and the rates of tax applied to the bases.

The overall buoyancy of a tax system is measured by the proportional change in total tax revenue ($\Delta T/T$) with respect to the proportional change in national income ($\Delta Y/Y$). and is composed of two parts: the elasticity of tax revenue ($\Delta T/T$) with respect to the tax base ($\Delta B/B$) and the elasticity of the base ($\Delta B/B$) with respect to income ($\Delta Y/Y$), that is.

$$(\Delta T/T) / (\Delta Y/Y) = (\Delta T/T) / (\Delta B/B) * (\Delta B/B) / (\Delta Y/Y) \quad (3)$$

If the Tax system is progressive (with higher tax rates applied to higher levels of income or expenditure), then the elasticity of tax revenue with respect to the base will be greater than unity, and buoyancy will be greater than unity provided the elasticity of the base with respect to income is at least unity, if buoyancy is greater than unity, then tax revenue as a proportion of national income will rise as national income rises. The buoyancy of the tax system can be increased by increasing the rates of tax or extending the base.

Any measured change in tax revenue with respect to income is likely to consist both of an automatic increase in tax revenue as income increases if the rate structure is progressive, and the effect of discretionary changes in tax rates and extension of the tax base. The elasticity of a tax system is measured as buoyancy minus the effect of discretionary tax changes. There are techniques for estimating the elasticity of the tax system but we will not describe them here – suffice it to say that the greater the elasticity, the more that tax revenue and saving can increase without the need for discretionary changes. This is

desirable feature of tax systems in circumstances where it may be difficult to implement discretionary changes.

Tax effort depends on the elasticity of the system and overall buoyancy, and needs to be measured in relation to capacity. One way of doing this, pioneered by the IMF (see Tait et al., 1979) is to take a cross-section of countries and relate their ratios of tax to national income to the various measures of tax capacity mentioned earlier, namely per capita income, the importance of trade and industry and so on. Estimating such an international tax function gives an equation of the form:

$$T/GDP = a + b_1(PCY) + b_2(X/GDP) + b_3(I/GDP) \text{ and so on} \quad (4)$$

Where T/GDP is a country's ratio of national income, PCY is per capita income. X/GDP is the ratio of exports to GDP, I/GDP is the ratio of industrial output to GDP, and the coefficients b_1 , b_2 , b_3 and so measure the average effect of each of the variables on the tax ratio across countries. For example, if b_2 was estimated as 0.5, this would mean

Table 4
Composition of tax systems by major type of taxes , tax 1992

	Taxes trade share of GNP	Taxes on international trade	Domestic commodity taxes	Domestic income taxes	Social security taxes	Other taxes
Low income countries	16.0	25.2	32.9	18.8	0	23.0
Lower-middle- income countries	19.0	17.8	28.3	31.5	1.7	20.7
High middle – income countries	21.0	9.3	29.1	25.2	14.8	21.6
Upper – income countries	27.0	1.1	18.2	42.5	27.9	10.3

Source Gillis- Perkins, Kroemer and Snodgrass: 1996

that a country with an export ratio that is 1 per cent above the average for all countries will have a tax ratio that is 0.5 above the average for all countries, other things remaining the same.

By time method, a country's tax effort can be measured by substituting values for PCY , X/GDP , I/GDP and so on in Equation 4 . predicting what the tax ratio should be and then comparing the predicted value with the actual value of the tax ratio. If the actual value is greater than predicted, the country can be said to be making a good effort; if it is less then the tax effort can be regarded as weak.

The facts on tax revenue in developing countries are that tax revenue as a percentage of national income is typically low, averaging less than 20 per cent compared with nearly 30 per cent in high income countries, and taxes on income are a minor source of tax revenue compared with indirect taxes, as can be seen in Table 4. The proportion of the population that pays income tax in developing countries is correspondingly low, averaging about 20 per cent, compared with the vast majority of the working population in developed countries, who constitute over 40 per cent of the total population.

On the surface there would appear to be a great deal of scope for using tax policy to raise the level of community saving relative to income; two important points must be borne in mind, however. The first is that the rudimentary nature of the tax system in developing countries is partly a reflection of the stage of development itself. Thus the scope for increasing tax revenue as a proportion of income may in practice be severely circumscribed. There are the difficulties of defining and

measuring the tax base and of assessing and collecting taxes in circumstances where the population is dispersed and primarily engaged in producing for subsistence, and where illiteracy is also rife. And there is also the fact that, as far as income tax is concerned, the income of the vast majority of the population is so low anyway that it must fall outside the scope of the tax system. Whereas 70 per cent of national income is subject to income tax in developed countries, only about 30 per cent is subject to income tax in developing countries.

Even if there is scope for raising considerably more revenue by means of taxation, whether the total level of saving will rise depends on how tax payments are financed whether out of consumption or saving and how income (output) is affected. It is often the case that taxes that make tax revenue highly elastic with respect to income are taxes that are met mainly out of saving or have the most discouraging effect on incentives. For example, very progressive income tax will discourage work effort if the substitution effect of the tax outweighs the income effect; and to the extent that high marginal rates of tax fall primarily on the upper income groups with a low propensity to consume, saving may fall by nearly as much as tax revenue rises.

To avoid such large reductions in private saving, an expenditure tax on upper income groups, which exempts saving from taxation, is an alternative to a progressive income tax, but the disincentive effect on work effort is not necessarily avoided. This is so because if the expenditure tax encourages saving, the tax rate must be higher to yield the same revenue as the income tax. If people work to consume and

the price of consumption is raised, work– effort will be curtailed if the substitution effect of the change outweighs the income effect. The more successful the expenditure tax is in stimulating saving out of a given income, the higher must be the rate of tax to keep the yields from the two taxes equal, and the greater the disincentive to work effort is likely to be. If the expenditure tax is in addition to the income tax, however, there is no reason to expect any substitution effect in favour of private saving, so that whether aggregate community saving increases depends on how much work effort is discouraged and on the relative propensity to consume and save of those who pay the tax compared with those of the government. In general the most effective tax policy to raise the level of saving relative to income is to impose taxes on those with a high marginal propensity to consume, namely the poor, but there are obvious considerations of equity to bear in mind in pursuing such a policy, as well as the practical consideration of political feasibility

The predominant importance of agriculture in developing countries makes agricultural taxation a potentially significant source of tax revenue and a means of transferring resources into investment. There are a great variety of tax instruments for taxing agriculture, including taxes on land area, on land value, on net income, marketing taxes, export taxes, land transfer taxes and so on. If revenue is the aim, then marketing and export taxes are probably the most efficient and the easiest to collect. As far as exports are concerned, two main systems may be adopted. Either the state– controlled marketing board may pay the producer a price that is lower than the international price received, or the

government may require that all foreign exchange receipts be surrendered, with compensation given in local currency at an exchange rate that overvalues the local currency.

Export taxes may, however, have disincentive effects. The substitution effect of export taxes will be discourage production, or to switch production to the home market the home market is not saturated. Either way, the yield from tax will fall if the tax base (the level of exports) falls more than in proportion to the rise in the export tax. Trades taxes have also been shown to be very unstable because of the volatility of primary product exports (and of imports), which can lead to severe budgetary problem for countries that rely on them (see Bleaney et al., 1993).

In theory, land taxes are probably the most desirable way to transfer resources from agriculture, but in practice land taxes are not important as a source of tax revenue.

It is also worth mentioning that no developing country has yet successfully applied a conventional income tax to agricultural income. The nearest that countries have come to this is to tax the value of land, the imputed income from land or the potential physical yield from land.

The balance between direct taxes on income and indirect taxation on expenditures and trade in the economy at large is heavily weighted in the direction of the latter, particularly in the form of import duties and sales taxes. The emphasis on indirect taxes originates from the difficulties already mentioned of levying direct taxes, and the disincentive

effects that direct taxes can have. this is not to say that indirect taxes are totally devoid of disincentive effects, but they are probably less especially if taxes such as sales taxes and import duties can be levied on necessities without too much social hardship. Indirect taxes on luxuries will raise revenue, the more so the more price inelastic the demand, but the taxes may largely be paid out of saving to the extent that luxuries are consumed by upper income groups with a low propensity to consume. The equity grounds for such taxation, however, are still strong.

Taxes on business are easy to collect and administer, but again business taxation may merely replace one form of saving with another. The marginal propensity to save out of profits is typically high. The main justification for company taxation must be to retain control of resources that might otherwise leave the country if the business is foreign owned, or to substitute public for private investment on the ground that public investment is more socially productive than its private counterpart.

The Keynesian approach to the financing of development

The Keynesian approach to the financing of development by inflationary means stresses, first, that investment can generate its own saving by raising the level of income when the economy is operating below capacity, and by redistributing income from wage earners with a low propensity to save to profit earners with a high propensity to save when the economy is working at full capacity. Second inflation itself can encourage investment by raising the nominal rate of return on

investment and reducing the real rate of interest. Only the first of these two aspects of the Keynesian approach will be considered here.

Unemployed resources provide the classic argument for Keynesian policies of inflationary finance. If resources are unemployed or underused, real output and real savings can be increased by governments running budget deficits financed either by printing money or by issuing government bonds to the banking system and the public.

In a situation of genuine Keynesian unemployment, any tendency towards inflation. Whatever method of deficit finance is used. Should burn itself out as the supply of goods rises to meet the additional purchasing power created. Some economists have questioned, however, whether the observed unemployment of labour in developing countries is strictly of the Keynesian variety, and whether the supply of output would respond very much to increased demand. It is probably true that most unemployment in developing countries results not from a shortage of demand, but from a lack of cooperating factors of production to work with (mainly capital), and the direct multiplier effects of government expenditure may be low, but some deficit-financed projects may have considerable secondary repercussions on output if they eliminate production bottlenecks at the same time.

In the agricultural sector of developing countries, and in the production of consumer goods in the industrial sector, there are many opportunities for investment that can yield outputs several times the money value of capital invested in a very short space of time. In agriculture, the use of fertiliser and the provision of transport facilities

are good examples. Credit expansion for these activities can soon generate sufficient output to absorb the demand creating effects of the new money in circulation.

Thus while it may be conceded that much of the unemployment in developing countries is not of the Keynesian variety, it does not follow that monetary expansion in conditions of unemployment cannot generate secondary employment and output effects. The capacity generating effects need to be considered in conjunction with the emphasis on demand in Keynesian static multiplier theory.

Let us turn now to the Keynesian full employment case. At full employment, inflation is the inevitable result of the Keynesian approach to development. In contrast to classical and neoclassical theory, Keynesian theory specifies independent saving and investment functions and allows price changes in response to excess demand in the goods market to raise saving by redistributing income. Inflation is the means by which resources are redistributed between consumption and investment. In Keynesian models, investment is not constrained by saving, but by the inflation rate willing to be tolerated by wage earners who have had their real wages cut.

If plans to invest exceed plans to save it is reasonable to suppose that both investors and consumers will have their plans thwarted. Investment is less than firms desire, but greater than consumers plan to save. Let us assume, therefore, that the actual growth of capital is a linear combination of planned saving and planned investment.

$$\frac{dK}{K} = a \frac{I}{K} + (1 - a) \frac{S}{K} a < 1 \quad (5)$$

Where k is the quantity of capital, I is planned investment and S is planned saving. Now assume that the rate of inflation is proportional to the degree of excess demand as measured by the difference between plans to invest and save:

$$\frac{dP}{P} = \lambda \left(\frac{I}{K} - \frac{S}{K} \right) \lambda > 0 \quad (6)$$

Where P is the price level. Substitution the expression for I/K into (5) gives

$$\frac{dK}{K} = \frac{a(dP/P)}{\lambda} + \frac{S}{K} \quad (7)$$

S/K is planned saving and $a (dP/P)/\lambda$ is forced saving per unit of capital. Forced saving results from the inability of consumers to fulfil their planned consumption in conditions of excess demand. The underlying mechanism that thwarts the plans of consumers is inflation, which redistributes income from wage earners to profits. Other things remaining the same, if prices rise faster than wages, real consumption will fall and real saving increase as long as the propensity to save out of profits is higher than the propensity to save out of wages.

In Keynesian models, therefore the effect of inflation on saving depends on two factors: the extent to which income is redistributed between wages and profit; and the extent of the difference in the propensity to save out of wages and profits.

The relation between wages, prices and profits, and the consequent effect of income redistribution on saving, is best illustrated using simple algebra. Let Z labour's share of national income so that

$$Z = \frac{W}{PY} - \frac{wL}{PY} - \frac{W}{Pr}$$

Where W is the wage bill, w is the wage rate, P is price per unit of output, Y is income and $r = Y/L$ is the productivity of labour. Hence the rate of change of labour's share may be written as from this equation a number of interesting propositions can be established. First, given a positive rate of growth of productivity, a sufficient condition for a redistribution of income from wages to profits is that prices rise faster than wages. Note, however, that in a growing economy (with positive productivity growth) it is not a necessary condition. Labour's share will fall and the share of profits rise as long as $(dw/w - dP/P) < dr/r$; that is, as long as the real wage rises less than the growth of labour productivity. In a growing economy, therefore, there is no necessary clash between the real wage and profits/ The real wage can rise and the share of profits in income can also rise as long as some of the gains in labour productivity are appropriated by the capitalists.

$$\frac{dZ}{Z} - \left(\frac{d}{w} - \frac{dP}{P} \right) - \frac{dr}{r} \quad (9)$$

Second, it can be shown that, on the classical savings assumption that the propensity to save out of profits is unity and the propensity to save out of wages is zero, the rise in the aggregate savings ratio will be equal to the fall in labour's share of income. If all wages are consumed and all profits are saved Equation 9 may be written as

$$\frac{dZ}{Z} = \frac{dc}{c} - \frac{dr}{r} \quad (10)$$

Where C is real consumption per worker. Hence

$$\frac{dZ}{Z} = \frac{dc}{c} + \frac{dY}{Y} = \frac{d(C/Y)}{C/Y}$$

Where C is aggregate consumption, Y is income and C/Y is the consumption-income ratio. Since $d(C/Y)/(C/Y) = -d(S/Y)/(C/Y)$ and $dz = d(C/Y)$, we have the result that $-d(S/Y) = dz$, that is, labour's share and the aggregate savings ratio change by exactly the same amount (in opposite directions).

The basic Keynesian notion that investment determines saving forms the backbone of neo-Keynesian growth theory, as expounded by Robinson (1962) and Kaldor (1955-6). Variations in the savings ratio resulting from inflation and income redistribution is one of the many possible adjustment mechanisms for raising the warranted growth rate towards the natural rate (see chapter 4). As Robinson used to argue, in response to the neoclassical adjustment mechanisms of variations in

interest rates and the capital–output ratio, there is nothing in the laws of nature to guarantee growth at the natural rate, but if entrepreneurs wish to invest sufficient to grow at the natural rate then saving will adapt, subject to inflation barrier.³³

When a steady rate of growth is going on, the share of savings adapts to it. In effect, the actual growth rate pulls up the warranted growth rate by forcing saving

Saving adapts to investment through the dependence of saving on the share of profits in income, which rises with the level of investment relative to income in the way that has already been described. Profits in turn depend on what happens to real wages when the system is out of equilibrium. The basic equation of Robinson's model is the distribution equation:

$$PY = wL + \pi PK \quad (11)$$

Where π is the gross profit rate R/K . and P , Y , W , L and K are as before. Dividing by P and rearranging to obtain an expression for the profit rate, gives Given the capital labour ratio, the rate of profit depends on the relationship between output per head and the real wage. If all wages are consumed and all profits are saved, the rate of profit gives the rate of capital accumulation and the rate of growth. This follows

³³ -in a static economy the inflation barrier means where a real wage so low that wage earners react to price increases to prevent the real wage from falling further. In a growing labour economy. It is the point at which labour resists any further reduction in its share of national income, is that where labour appropriates all increases in labour productivity itself in the form of increased real wages.

since $S = I = \pi K$, and $\Delta K = \pi K$ there for $\Delta K/K = \pi$. And if the capital output ratio is fixed, $\Delta K/K = \Delta Y/Y$:hence $\pi = \Delta K/K - \Delta Y/Y$

$$\pi = \frac{(Y/L)-(w/P)}{(K/L)} = \frac{R/L}{K/L} = \frac{R}{K} \quad (12)$$

Ratio the rate of profit depends on the relationship between output per head and the real wage. if all wages are consumed and all profits are saved, the rate of profit gives the rate of capital accumulation and the rate of growth. This follows since $S = I = \pi K$ and $\Delta K = \pi K$ therefor $\Delta K/K = \pi$. And if the capital output ratio is fixed, $\Delta K/K = \Delta Y/Y$:hence $\pi = \Delta K/K - \Delta Y/Y$

Variations in the rate of profit and corresponding variations in the real wage provide the mechanism that equilibrates plans to save and invest and the actual and warranted growth rate s.

If the actual growth rate equals the natural rate, the warranted and natural growth rates will also be equalised. If the real wage remains unchanged as investment takes place, however, saving cannot adapt and a greater volume of real investment cannot be financed. This is the inflation barrier in a static model. It appears, in fact, that in a static context the growth rate can only be raised at the expense of the real wage, which comes close to the pessimistic development theories of Ricardo and Marx. In a growing economy such pessimism would be unfounded because it can be seen from Equation 12 that the rate of profit and capital accumulation can rise even if the real wage is rising, as long as the growth in labour productivity exceeds the increase in the real wage.

Kaldor's model also makes saving adjust to the desired level of investment through a rise in the share of profits in national income. The model consists of three basic equations

$$Y = W + R \quad (13)$$

$$I = S \quad (14)$$

$$S = s_w W + s_y R \quad (15)$$

Where R is profits. W is wages, s_w is the propensity to save out of wages and s_y is the propensity to save out of profits. Using the three equations we can write

$$\begin{aligned} I &= s_w (Y + R) + s_y R \\ &= (s_y - s_w) R + s_w Y \end{aligned} \quad (16)$$

Making investment the independent variable in the system and dividing by Y gives

$$\frac{R}{Y} = \left(\frac{1}{s_y - s_w} \right) \frac{I}{Y} - \frac{s_w}{s_y - s_w} \quad (17)$$

The ratio of profits to income and the investment ratio are positively related as long as the propensity to save out of profits exceeds the propensity to save out of wages. The investment ratio must clearly be

the independent variable in the system. Capitalists can decide how much they are going to consume and invest but they cannot decide how much profit they are going to make. If $S_Y = I$ and $S_w = 0$, then $I/Y = R/Y$, and, multiplying both sides of Equation 17 by Y/K we have Robinson's result that the rate of profit, the rate of capital accumulation and the rate of growth are all equal. A higher level of investment can raise the rate of capital accumulation by raising the profits rate and the share of saving in total income subject, of course, to the inflation barrier. The mechanism that gives this result is rising prices—relative to wages.

It is interesting to consider, using a model like Kaldor's how much inflation is necessary to raise the savings ratio by a given amount, there are two ways of approaching this, and both can be considered using the same model. One is to consider the redistributive effects of inflation through time and ask how much inflation there would have to be within a certain time period for the savings target to be achieved, holding the parameters of the model constant. The second approach is to consider what increase in the rate of inflation is required for a once and for all increase in the savings ratio of a given amount. Both methods of approach can be considered if Kaldor's model is formulated in continuous time. Taking a savings function of the Kaldor's type, $S = s_w W + s_y R$ left

Exercises

Question on Chapter Five

The choice of techniques Part A True – false questions

Circle whether the following statements are true (T) or false (F):-

- 1- It is certainly that saving will necessarily be converted into investment.
- 2- Those who want to do the investing may be different from those who want to do the saving.
- 3- In the early stages of development, savings may not be the major barrier to capital formation but rather an unwillingness or inability to invest.
- 4- Unwillingness to invest may stem from cultural attitudes or from a realistic assessment of the risks involved.
- 5- The financial system is important for encouraging saving , financing investment and allocating savings in the most productive manner.
- 6- Household and business saving is referred to as public saving.
- 7- Both the household and the business sector may be a source of voluntary saving
- 8- All forms of taxation involving involuntary reductions in consumption.
- 9- Money illusion 'people spend less in real terms because of rising in prices.
- 10- Inflation can be deliberately induced by governments financing budget deficits at full employment by monetary expansion.
- 11- Plans to invest in excess of plans to save at full employment will drive up the price level.
- 12- Low interest rate encourage voluntary saving.

13- Acc to Keynesian , the saving ratio will rise with the level of per capita income at an increasing rate

14- LDCs save so little because they are so poor.

15- If income growth is faster in one country than another, this will produce a higher saving ratio.

16- Saving is very responsive to interest rates in low income countries.

Part B : multiple – choice questions

Circle the appropriate answer:

1- Unwillingness to invest may stem from:

- a) cultural attitudes. b) a realistic assessment of the risks involved.
- c) a and b d) nor a either b

2- If government spends less than it receives on current expenditure: it runs

- a) a budget deficit. b) a budget surplus.
- c) dissaving d) saving

3- Are saving that arise through voluntary reductions in consumption out of disposable income this means

- a) involuntary saving b) voluntary saving
- c) forced saving d) none of the above

4- The main determinants of the ability to save are

- a) Average level of per-capita income.
- b) the rate of growth of income.
- c) Age composition of the population
- d) All of the above
- e) a and b only

5- The main determinants of the willingness to save are:

a) reliable monetary institutions

b) interest rate offered in relation to risk and time preference

c) societal attitudes towards consumption.

d) All of the above

e) a and only.

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Chapter Six

The Economic Growth Models

Chapter (6)

The Economic Growth Models

We need studying the following topics

- 1- Harrod - Domar model**
- 2- Kaldor's model of growth**
- 3- Joan Robinson's model of capital accumulation**

Chapter Six

Harrod Domar Model Kaldor Model

Fixed coefficients production function suppose we have only production factors capital (K) , labour (L)

K = capital stock

L = Labour

Y = real national product

A = Technological level, notice, the technological progress is neutral we can write the fixed coefficients production function as a following

$$Y = A \min (K / v , K/u)$$

Where

V = Ratio the capital stock to production, it's constant $K/Y = V$

U = Ratio the labour to production its constant $u = L/ Y$

Y = production level determinant by minimize the ratios
(L/u , K/v)

// Suppose dominant constant return to scale this means the double inputs result double output as follows.

If the all input increase by quantity C where (C > 0) then the output increase by the same quantity

$$\begin{aligned} Y &= A, \min (K/v, L/ u) \\ &= (CK/v, CL/u) = CY \end{aligned}$$

// The lost assumption for this production function with factor substitute where we assume no substitute between production factors. Because

the form of this kind of production function do not allow to substitution between capital and labor for example

$$Y = A (K/V)^X (L/U)^B$$

Where $X + B = 1$

The equation of model

Harrod-Domar Model

The hypothesis

- | | |
|---------------------------------|-----------------------------|
| H1 (1) $K = vY$ | full capacity |
| H2 (2) $L = uY$ | full employment |
| H3 (3) $S = I$ | equal $I = S$ |
| H4 (4) $S = sY$ | saving function $0 < S <$ |
| H5 (5) $\Delta \frac{L}{L} = n$ | natural labour force growth |

We can use the fixed coefficient

$$Y = A \cdot \min (K/v, L/u)$$

Suppose $A = 1$ to simple

From the first \bar{H}_1 , we can result

$$\text{If } K = vY$$

$$\text{Then } \Delta K = V \Delta Y$$

From the second \bar{H}_2 , we can result

$$\text{If } L = uY$$

$$\text{The } \Delta L = u \Delta y$$

$$\frac{\Delta K}{K} = \frac{V\Delta y}{vy} = \frac{\Delta y}{y},$$

$$\frac{\Delta L}{L} = \frac{u\Delta y}{uy} = \frac{\Delta y}{y}$$

Model construction

When (H) $K = vy$, (H2) $L = uy$

From H1, H2

This $Y_0 = (K_0/v, L_0/u)$

Stationary state

For any change from K (ΔK) or L (ΔL)

Then we have

$$(H)1 \quad \Delta K = V\Delta y$$

$$(H)2 \quad \Delta L = U\Delta y$$

By divide (H1) , (H2) on (H1) , (H2) we can get the rate of growth as following

$$\frac{\Delta K}{K} = \frac{V\Delta y}{vy} = \frac{\Delta y}{y}$$

$$\frac{\Delta L}{L} = \frac{u\Delta y}{uy} = \frac{\Delta y}{y}$$

$$\frac{\Delta K}{K} = \frac{\Delta L}{L} = \frac{\Delta y}{y}$$

We know $\Delta K = I$

From H3 $I = S$

From H4 $S = sy$

Then $\Delta K = V\Delta Y = I = S = sy$

$$V\Delta Y = sy$$

Marginal $S/v = = \frac{\Delta y}{y}$

Propensity to save

Because $HS \frac{\Delta L}{L} = N$

Then $\frac{\Delta L}{L} = \frac{\Delta y}{y} = N$

This is the $S/v = N$

Equilibrium condition

Staple condition

Suppose you have the following values for Harrod– Domar Model

$$V = 5 \quad U = 10 \quad S = 0.10 \quad n = 0.02$$

$$L_0 = 40 \quad K_0 = 20$$

Calculate the real values for (L) , (K) , (Y) and equilibrium state for both (0) , (1) period

From

$$H1 \quad K = v y \quad = 5y$$

$$H2 \quad L = u y \quad = 10y$$

$$H3 \quad S = 0.10 y$$

$$H5 \quad \Delta L/L = n = 0.02$$

Then

$$\begin{aligned} Y_o &= \min (K/5, L/10) \\ &= \min (20/5, 40/10) = \min (4,4) = 4 \end{aligned}$$

$$K_o = v y_o = 5(4) = 20$$

$$L_o = u y_o = 10(4) = 40$$

The values in period 1

From the H3 $S = I$

$$\text{Where } S_o = 0.10 (y_o) = 0.4$$

But $S = I$

$$\text{When } \Delta K = I_o = S_o = 0.4$$

Then the capital stock in next period (K_1)

$$\begin{aligned} K_1 &= K_o + \Delta K \\ &= 20 + 0.4 = 20.4 \end{aligned}$$

And $n = 0.02$

Where $\Delta L / L = 0.02$

this mean $\Delta L = 0.021$

$$L_1 = L_0 + \Delta L = 40 + 0.2 (40) = 40.8$$

The new equilibrium level of Y_1

$$Y_1 = \text{then } \frac{20.4}{5}, \frac{40.8}{10} = (4.08, 4.08) = (4.08)$$

The model is stable

In the other hand

The demand on labour force in period is

$$Ld_1 = 10y_1 = 10 (4.08) = 40.8$$

Then $LS_1 = Ld_1$

Because $LS_1 = L_0 + \Delta L = 40 + 0.02 (40) = 40.8$

$$Kd_1 = 5 (y_1) = 5 (4.08) = 20.4$$

$$KS_1 = K_0 + \Delta K = 20 + 0.4 = 20.4$$

Then the planned rate of growth equal with actual rate of growth

Where $S/V = n \frac{0.10}{5} = 0.02 = n$

period	Y	L	K	case
0	4	40	20	stable
1	40.8	40.8	20.4	stable

Suppose the n ratio change from 0.02 to 0.03 or L3 then the labour supply increase than labour demand the result its unemployment

We know from period (o) data

$$\frac{\Delta L}{L} = n = 0,03 \quad \Delta L = L (n)$$

Then $\Delta L = (0.03)(40) = 1.2$

Then $L_1 = L_0 + \Delta L = 40 + 1.2 = 41.2$

also $K_1 = K_0 + \Delta K = 20 + 0.4 = 20.4$

$$Y_1 = \min \frac{20.4}{5}, \frac{41.2}{10} = 4.08, 4.12 = 4.08$$

period	Y	L	K	The Model Care
0	4	40	20	Stabile
1	40.8	41.8	20.4	Labor surplus

We note the

$$Kd_1 = 5(4.04) = 20.2$$

While $Ks_1 = K_0 + \Delta K = 20.4$

Then the model instable because it in the capital surplus case

Kaldor Model

$$Y = w + p \quad (1)$$

Where $w =$ wages

$P =$ profit

$$S = S_w W + s_p P \quad (2)$$

Divided By y

$$\frac{S}{Y} = S_w \left(\frac{w}{y}\right) + s_p \left(\frac{p}{y}\right)$$

The Ratio of Saving to Income = S_w the share of the wage from the income + s_p the share of the profit from the income

$$S = S_w \left(\frac{w}{y}\right) + s_p \left(\frac{p}{y}\right) \quad (3)$$

But

$$y = w + P$$

then
$$\frac{y}{Y} = \frac{w}{Y} + \frac{w}{Y}$$

$$1 = \frac{w}{y} + \frac{p}{y}$$

$$\left(\frac{w}{y}\right) = 1 - \left(\frac{p}{y}\right) \quad (4)$$

From (3) and (4)

Then
$$S = s_w - \left(1 - \left(\frac{p}{y}\right)\right) + s_p \left(\frac{p}{y}\right)$$

$$S = s_w - \left(\frac{p}{y}\right) + s_p \left(\frac{p}{y}\right)$$

$$S = s_w + [s_p - s_w] \left(\frac{p}{y}\right) \quad (5)$$

Now we can use the Kaldor's saving function to treatment the instable in harried dormer model

Suppose we have Kaldor's saving function as follows

$$sw = 0.02 \quad sp = 0.42$$

$$p/y = 0.20 \quad w/y = 0.80$$

By using the Kaldor model we can transform the isstable harried dormer model to stable or equilibrium by using Kaldor's saving function. We can do it by redistribute the income between wages and profit to increase the saving ratio from 0.10 to 0.15 where this value allow to real equilibrium dynamically as follows

$$S/V = n$$

$$S = n.v = 0.03 \times 5 = 0.15$$

$$S = sw + [sp - sw] (p/y)$$

$$0.15 = 0.02 + [0.42 - 0.02] (p/y)$$

$$0.13 = 0.4 (p/y)$$

$$(p/y) = \frac{0.15}{0.4} = 0.326 \quad \text{or } \%32.6$$

Then $w/y = \%67.5$

Now we can write the results as follows

$$\Delta K = I = S = 0.15y = 0.15 \times 4 = 0.6$$

$$K_1 = 20 + 0.6 = 20.6$$

$$Y_1 = \min \left(\frac{20.6}{5}, \frac{41.2}{10} \right) = \min [41.2, 41.2] = 4.12$$

We note the surplus labour is delete where the demand for labour become

$$\begin{aligned} Ld_1 &= uy \\ &= 10 \times 4.12 = 41.2 \end{aligned}$$

$$\begin{aligned} \text{Also } Ls_1 &= L_0 + \Delta L \\ &= 40 + 0.03 (40) = 41.2 \end{aligned}$$

Then we can result the Model stable and $S/V = n$ or $\frac{0.15}{0.4} = 0.03$

The new result table

period	Y	L	K	case
(0)	4	40	20	stabile
(1)	40.2	41.2	20.6	Labour surplus

Kaldor's Model of growth

The neo classical models treat the causation of technical progress as completely exogenous. But Kaldor attempts to provide a framework for relating the genesis of technical progress to capital accumulation.

Assumptions

The assumption of Kaldor's model are follows:

- (1) It is based on the Keynesian full employment assumption in which the short – period supply of aggregate goods and services is inelastic and irresponsive to any increase in money demand

At point P the percentage rate of growth of capital and the percentage rate of output (income) are equal.

- (2) Income consists of wages and profits where wages comprise salaries and earning of manual labour and profits comprise incomes of entrepreneurs as well as property owners.
- (3) Total saving consists of savings out of wages and savings out of profits.
- (4) It is assumed that the share of profits in total income is a function of investment, given the propensity to save out of profits.
- (5) All macro–economic concepts of income, wages profits capital saving and investment used in the model are expressed at constant prices

(6) Kaldor assumes as investment function which makes investment of any period partly a function of the change in output and partly of the change in the rate of profit on capital in the previous period

For the operation of the model Kaldor postulates three functions:

The savings function

$$S_t = \alpha P_{t-1} + \beta (Y_{t-1} - P_{t-1}) \quad (1)$$

Where savings S_t consist of savings (α) out of profits (P_{t-1}) and savings (β) out of wages $Y_{t-1} - P_{t-1}$ in period t . The inequalities $1 > \alpha > \beta \geq 0$ show that α and β lie between 0 and 1 and that α (savings out of profits) is greater than β (savings out of wages).

Investment function

$$K_t = \bar{\alpha} P_{t-1} + \bar{\beta} \left(\frac{P_{t-1}}{K_{t-1}} \right) Y_{t-1} \quad (2)$$

$$I_t = K_t - K_{t-1} \quad (2.1)$$

Where

$$\bar{\alpha} > 0 \text{ and } \bar{\beta} > 0$$

Equation (2) shows that the stock of capital (K_t) at time t is a coefficient $\bar{\alpha}$ of the output of the previous period (Y_{t-1}) and a coefficient β of the rate of profit on capital of the period $\frac{P_{t-1}}{K_{t-1}}$ multiplied by the output of the previous Y_{t-1} .

In equation 2.1 shows the investment function where invest in period t equals the stock of capital in the previous period (K_{t-1}) minus the stock of capital in the current period (K_t)

The inequalities $\bar{\alpha} > 0$ and $\bar{\beta} > 0$ reveal that the value of the coefficient $\bar{\alpha}$ and $\bar{\beta}$ are greater than zero.

Technical progress function

$$\frac{Y_t - P_{t-1}}{Y_{t-1}} = \bar{\alpha} + \bar{\beta} \frac{I_t}{K_t} \quad (3)$$

Where

$$\bar{\alpha} > 0, 1 > \bar{\beta} > 0$$

Equation (3) shows that the rate of growth of income (and labour productivity) is an increasing function of the rate of net investment expressed as the proportion of the stock of capital (I_t/K_t) in period t multiplied by the capital per head β plus the coefficient of technical progress α . Here the value of the coefficient of technical progress is greater than zero but of capital per head lies between 0 and 1.

The technical progress function as given by equation (3) shows the growth of income and capital from period t_1 onwards whereby the economy gradually moves from a short period equilibrium to a long period equilibrium of steady growth taking the identity $S_t \equiv I_t$ it is the level of profits which brings about the equality of saving and investment for a stable equilibrium path, the following condition should be fulfilled.

Question

Prove that the rate of growth is the optimal rate of growth which the economy reaches the stability situation

$$S_t = 40 \quad Y_{t-1} = 385 \quad P_t = 20 \quad K_{t-1} = 760 \quad \alpha = 0.4 \quad \beta = 0.08 \quad \bar{\alpha} = 0.02 \quad \bar{\beta} = 1.4$$

The answer

$$S_t = \alpha P_t + \beta (Y_t - P_t)$$

$$40 = 0.4(20) + 0.08 (Y_t - 20)$$

$$40 = 8 + 0.08 Y_t - 1.6$$

$$40 - 8 + 1.6 = 0.08 Y_t$$

$$Y_t \frac{33.6}{0.08} = 420$$

$$S_t = I_t$$

$$I_t = 40$$

$$I_t = K_t - K_{t-1}$$

$$K_t = K_{t-1} + I_t$$

$$K_t = 760 + 40 = 800$$

$$\frac{I_t}{K_t} = \frac{40}{800} = 0.05$$

$$\text{But } \frac{\Delta Y}{Y} = \frac{Y_t - Y_{t-1}}{800} = \frac{800 - 800}{385} = \frac{35}{385} = 0.08$$

We know from the technical progress function

$$\frac{Y_t - Y_{t-1}}{Y_{t-1}} = \bar{\alpha} + \bar{\beta} \frac{I_t}{K_t}$$

By substitute the above result

$$0.09 = 0.02 + 1.4 (0.05)$$

$$0.09 = 0.02 + 0.07 I_t = 40$$

By $I_t = 40$ $K_t = 800$ can reach the stable equilibrium growth

Joan Robinson 's model of |Capital accumulation

Assumption: Mrs. Robinson's model is based upon the following assumptions:

- (a) There is a laissez faire closed economy
- (b) In such as economy capital and labour are the only productive factors
- (c) Total savings consist of savings out of wages and savings out profits
- (d) There is neutral technical progress

- (e) There are only two classes – the workers and the entrepreneurs between whom the national income is distributed
- (f) Workers save nothing and spend their wage income on consumption.
- (g) Entrepreneurs consume nothing but save and invest their entire income (from profits) from capital formation if they have no profits the entrepreneurs cannot accumulate and if they do not accumulate they have no profits.
- (h) There are no changes in the price level

Net national income in the Robinson model is the sum of the total wage bill plus total profits which shown $y = w N + pK$

Where Y is the net national income, w the real wage rate, N the number of workers employed P the profit rate and K the amount of capital

Here Y is a function of N and K . since the profit rate is crucial in the theory of accumulation. it can be shown as

$$P = \frac{Y - w N}{K}$$

Divided by N $P = \frac{\frac{Y}{N} - wN}{\frac{K}{N}}$

By putting $Y/ N = L$ and $K/ N = \theta$ (theta) We have

$$P = \frac{L - w}{\theta}$$

Thus the profits rate in the ratio of labour productivity minus the total real wage rate to the amount of capital utilized per unit of labour, in other words, the profit rate (P) depends on the income, labour productivity (L), the real wage rate (w) and the capital-labour ratio (θ)

On the expenditure side, net national income (Y) equals consumption expenditure (C) plus investment expenditure (I)

$$Y = C + I$$

Since Joan Robinson assumes zero saving out of wages but attributes saving to entrepreneurs profits are meant for investment only we have

$$S = I$$

The saving investment relation may be shown as

$$S = PK$$

And $I = \Delta K$ [ΔK is increase in real capital]

$$[S = I]$$

$$PK = \Delta K$$

Or
$$P = \frac{\Delta K}{K} = \frac{L-w}{\theta}$$

The growth rate of capital ($\Delta K/K$) being equal to P) the profit rate), it depends on the ratio of the return on capital relative to the given stock of capital

The Golden Age

Besides the growth rate of capital ($\Delta K/K$), another factor which determines the growth rate of an economy is the growth rate of population ($\Delta N/N$). when the growth rate of population equals the growth rate of capital i.e., $\Delta N/N = \Delta K/K$ the economy is in full employment equilibrium.

The golden age is explained diagram matically in figure No.1, capital – labour ratio K/N or θ Along the horizontal axis and per capital output on the vertical axis.

The growth rate of labour force is taken to the left of along the horizontal axis , the curve of shown the production function, every point on this curve shows the ratio of capital to labour in order to find out the capital – labour ratio and the wage – profit relation , we draw a tangent NT which touches the production function OP. At point G and cuts vertical axis at w. point G shows the capital –labour ratio for the golden age which is measured by ok, per capita output is OA , out of this OW is paid as wages and WA or EG is the surplus which is the rate of profit on capital.

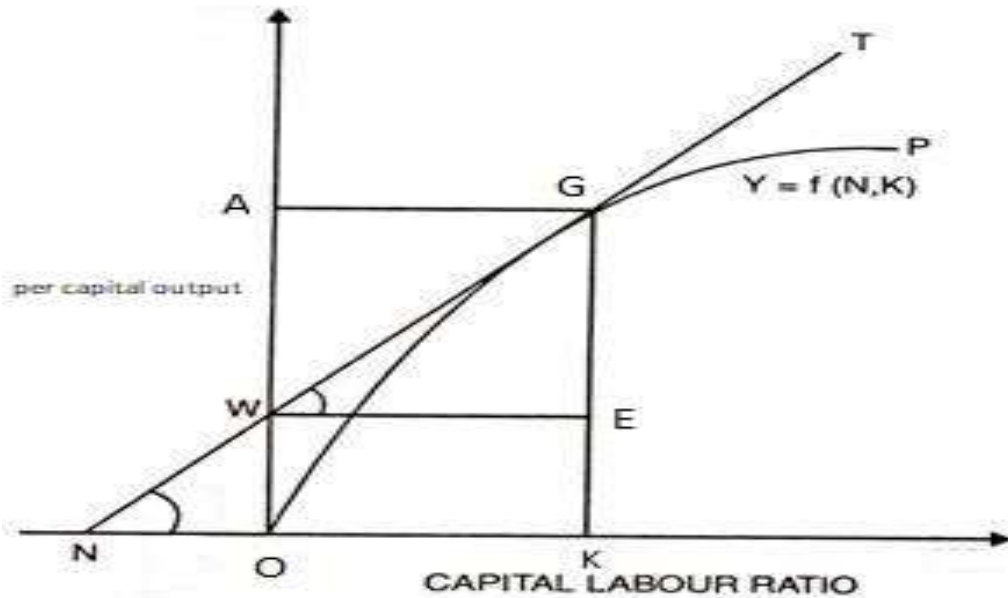


Fig. 1

This figure also proves that the growth rate of capital ($\Delta K/K$) equals the growth rate of labour ($\Delta N/N$), where EG/EW reflects $\Delta K/K$, and OW/ON reflects $\Delta N/N$

Thus

$$\frac{EG}{EW} = \frac{OW}{ON} \text{ where } [\tan \alpha = \tan \beta]$$

According to Mrs Robinson a economy is in a golden age when the potential growth ratio is being realized. The potential growth ratio represents the highest rate of capital accumulation that can be

permanently maintained at a constant rate of profit. This potential growth ratio is approximately equal to the proportionate rate of labour force plus the proportionate rate of growth of output per head

A critical appraisal

- (1) Mrs Robinson assumes that capital and labour are employed in fixed proportions to produce a given output. This is an unrealistic assumption because in a dynamic economy there are no fixed coefficients of production rather substitutability between capital and labour takes place through time. The degree of substitutability being dependent upon the nature of technological changes
- (2) This model is based on the unrealistic assumption of constant price level , when an economy moves on the path to progress, investment has to be increased continuously which tends to raise the demand , this leads to rise I prices, thus price rise is inevitable with growth.
- (3) Joan Robinson's Model is based on the assumption of a closed economy. But this is an unrealistic assumption because capitalist countries are open rather than closed economies in which foreign trade plays a crucial role in accelerating the growth rate

Question

Suppose you have the following gives

$$\frac{\Delta K}{K} = 0.02 \quad Y = 120 \quad N = 20 \quad w = 2$$

Calculate the capital stock (K) which economy reach the golden age or stable equilibrium

Answer

In the golden age situation

$$\frac{\Delta L}{L} = \frac{\Delta K}{K}$$

$$0.02 = \frac{\Delta K}{K}$$

$$\Delta K = 0.02K$$

We know $S = PK$

And $S = I$ in golden age situation

And $I = \Delta K$

$$\Delta K = PK$$

$$P = \frac{\Delta K}{K}$$

If $P = \frac{L-w}{\theta}$

Where $L = \frac{Y}{N} = \frac{120}{20} = 6$

$$P = \frac{\frac{Y}{N} - w}{\frac{K}{N}}$$

$$0.02 = \frac{6-2}{\frac{K}{20}}$$

$$= 2 \times \frac{20}{K}$$

$$0.02 K = 80$$

$$K = \frac{80}{0.02} = 4000$$

Exercises

Questions on Chapter Six

The economic growth models

The choice of techniques Part A True – false questions

Circle whether the following statements are true (T) or false (F):-

- 1- According to the Harrod-Domar model a higher savings rate increases the rate of growth of per capita income.
- 2- The Harrod-Domar predicts the neutrality of growth rates with respect to per capita income
- 3- We can use the Kaldor's saving function to treatment the instable in harried dormer model.
- 4- The one of assumptions of Kaldor's model is that the short-period supply of aggregate goods and services is elastic and irresponsive to any increase in monetary demand
- 5- The one of assumptions of Kaldor's model is that the percentage rate of growth of capital and the percentage rate of output (income) are equal.

Part B: multiple – choice questions

Circle the appropriate answer:

- 1- Harrod-Domar growth model suggests that growth is
 - a) directly related to savings and inversely related to the capital/ output ratio
 - b) directly related to the capital/ output ratio and inversely related to savings
 - c) indirectly related to savings and the capital/ output ratio
 - d) directly related to savings and the capital/ output ratio

2- Which one of the followings is Not an assumption of the Harrod – Domar model?

- a) fixed capital –output ratio
- b) variable marginal and average propensity to save
- c) closed economy
- d) capital is the only factor of production

3- Which among the following statements is not true for the golden Age equilibrium in the growth model of MRs. Joan Robinson?

- a) rate of profit tends to be ruing
- b) level of real wages rise without per worker
- c) technical progress is natural
- d) population in growing at a steady rate.

4- Joan Robinson's growth model deals with

- a) desired growth rate
- b) possible growth rate
- c) natural growth rate
- d) warranted growth rate (June)

5) A technical change is neutral if remains unchanged at constant ratio:
(June)

- a) Kaldor
- b) Harrod
- c) Hicks
- d) Solow

6- The classical model of economic development emphasizes

- a) capital accumulation
- b) laissez faire policy
- c) both a and b are correct
- d) Question does not provide sufficient data or is vague

Pat C : Problems

1- Suppose you have the following value for Harrod- Domar model

$$V = 12 \quad U = 24 \quad K_0 = 36$$

$$L_0 = 72 \quad S = 0.36 \quad n = 0.03$$

Required

- a) The real value of Y_0 is
- b) The real value of Y_1 is
- c) The real value of supplied K_1 is
- d) The real value of supplied L_1 is
- e) The real value of demand K_1 is
- f) The real value of demand L_1 is

2- Suppose the n value increase to $n = 0.05$

- a) Then the real value of supplied L_1 is
- b) And new real value of supplied K_1 is
- c) The real value of Y_1 is
- d) The new real value of demanded K_1 is
- e) The new real value of demanded L_1 is
- f) The calculation of unemployment is L factor is

3- Suppose the n value decrease to $n = 0.01$ then

- a) The new value of supplied L_1 is
- b) The new value of supplied K_1 is
- c) The new value of Y_1 is
- d) The new value of demanded K_1 is
- e) The value of capital surplus is

4- We can use Kaldor saving function to treatment the instability in Harrod- Domar where $SP = 0.90$ $sw = 0.10$

a) Then when $n = 0.05$ the saving percent must be

b) The new value of Y_1 is

c) The ratio of total profit to output is

d) And ratio of total wages to output is

e) When $n = 0.01$ the saving percent must be

f) And new value of Y_1 is

g) The ratio of profit to output is

h) The ratio of wages to output is

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Chapter

The "Magnificent Dynamics" of Smith and Malthus

In *The Wealth of Nations* (1776), Adam Smith wrote a handbook of economic development. Achievement-oriented, Smith preached the great efficiency that comes from specialization, division of labor, and exchange. He stressed the need to remove the blundering hand of mercantilistic governments; to cultivate attitudes of honesty, zeal, and thriftiness; to unleash the competitive profit motive, which would—as if led by an Invisible Hand—achieve the maximum well-being of all.

Labor Theory of Value in a Golden Age Smith had also a theory of dynamic development. He and Malthus began with a hypothetical golden age— "that original state of things, which precedes both the appropriation of land and the accumulation of stock—when labor alone counted, when land was freely available to all, and before the use of capital had begun. What determined pricing and distribution in this simple and timeless dawn?

Answer: The undiluted labor theory of value.

To see this, consider once again Smith's famous case of deer and beaver. Suppose 2 hours of hunting yields 1 deer; or 4 hours yields 1 beaver. Then the competitive price ratio of exchange between deer and beaver will be set by comparative labor time alone: the price of 1 beaver will equal 2 deer. Why 2 deer per beaver? Because the price ratio can be computed in necessary labor time as 4 hours (of sweaty work)/2 hours (of sweaty work).

The determination of price by labor cost alone would apply no matter how many goods there were. It is still true that supply and demand are operating in this golden age; but the situation is so simple that we do not need elaborate dd and ss curves. The long-run ss curves for the different goods are simple horizontal lines at the stated labor costs; so long as there is enough demand to have the goods produced at all, labor costs will be determining of prices.³⁴

Population Growth Now consider Smith–Malthus dynamics. Life is pleasant in the golden age. Babies are born, and the population doubles every 25 years. Since land is plentiful, people move west and spill over onto more acres. National output exactly doubles as population doubles. Price ratios of deer and beaver remain exactly as before.

What about real wages? Real wages still get all the national income, there being as yet no subtractions for land rent or interest on capital.

What is the real wage per hour? So long as land can expand proportionally to the expansion of labor, the law of diminishing returns

³⁴ Note: demand is still there in the background, thus, if it would cost 10 hours to hunt a skunk, and yet nobody received any utility from skunks, skunks would not be hunted and not be bought and sold at a price of 10 hours, or of 5 deer.

cannot come into operation. The wage rate per hour remains at one-half deer or at one-fourth beaver, as determined by labor productivity.

That would be the end of the story until, say, some clever inventor found a new way of doing in 1 hour what used to take 2 hours. This would raise the national product per capita. Such a balanced improvement would leave the price ratio of beaver to deer unchanged; but it would double the real wage rate. In the rude dawn of the undiluted labor theory of value, inventions can only raise wages and speed the pace of balanced expansion

Scarce Land and Diminishing Returns Even had golden ages ever existed; they could not have lasted once all land became fully populated. Malthus pointed to a fatal flaw in the happily expanding economy, Once the frontier of virgin land disappears, new laborers begin to crowd onto existing cultivated soils. For the first time, private property in land springs up. Now land is scarce, and a rent is charged to ration it.

Growth does take place in this new classical world of Smith–Malthus following on the golden age. Population still grows, and so does national product. But product can no longer grow proportionally to labor. Why? Because, with new laborers added to fixed land, each worker now has less land to work with. Naturally, therefore, the law of diminishing comes into operation. The increasing labor–land and decreasing output–land

ratios mean a declining contribution to product of each last (or marginal) worker, and hence declining real wage rates. As David Ricardo essentially pointed out:

A conflict of interests arises between classes. More babies mean lower per capita incomes and wage rates; lower wage rates mean higher rent rates per acre of land. Landlords gain as labor loses. This is why Carlyle criticized economics as the "dismal science."

"To understand the brute fact of economic inequality, we have to jettison the simple labor theory of value and study the effects of scarcity in the productive factors that labor needs access to.

Paradise Lost and Regained How bad can things get? Gloomy Malthus thought, at least in his first edition of 1798, that the end of economic development could be an equilibrium only down at the minimum level of subsistence.

Above this subsistence wage, population would continue to grow. Below it, population would die off. Only at this level could there be lasting equilibrium.

Biological fecundity was a fact of nature. And diminishing returns was a fact of nature. Only sentimentalists could refuse to face the sad facts of life prevailing once Adam and Eve left Eden.

It is for precisely these reasons that Adam Smith had earlier said: Lucky is a nation that is growing rapidly, for it has not yet made its sad rendezvous with its destined equilibrium at the minimum of subsistence. Sad is that nation which has reached the stationary equilibrium of the subsistence level, where deaths just cancel out births.

What did Malthus (and Smith) forget, or at least underestimate? Malthus failed to realize how technical innovation could intervene—not to repeal the law of diminishing returns, but to more than offset it. He stood at the brink of a new century and failed to anticipate that the succeeding two centuries would show the greatest scientific gains in history—a chastening fact, well to keep in mind as one listens to the Club of Rome computer as it sings out its Malthusian dirge.

Detailed Economic Analysis of Smith–Malthus

To understand the world's population problem for the next centuries—and the problems of India, Indonesia, and China in the next two decades—we must master the above classical model, which may have more future relevance for the world than it has had for the West since Malthus time.

As a bonus, the same graphical tools will apply when we investigate the role of capital formation as a factor of growth for Germany, Japan, the United States, and the less developed countries.

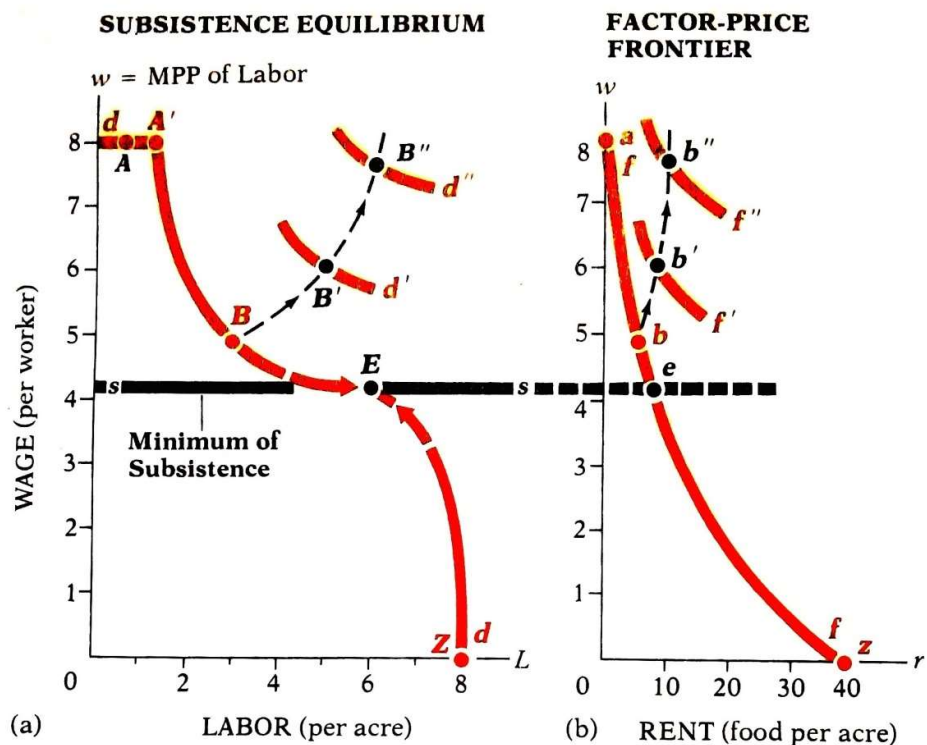
Figure 1 depicts all this. In Fig. 1(a), all the land is settled once A' is reached. Beyond that, We see the wage rate declining as the law of diminishing returns pushes labor's marginal productivity downward along orange dd (which goes through d, A', B, E, and Z).

What keeps the wage from falling down to zero on this dd demand curve for labor? Actually, the wage stops falling where dd intersects the black ss horizontal supply curve set by the minimum wage at which people can subsist and just barely reproduce their numbers. The Malthusian final equilibrium at E is a gloomy one, anything but golden.

Gloomy or not, it does represent a stable equilibrium. Test it.

Let a plague temporarily reduce numbers, moving us to the left of E. Real wages then become high (as they actually did after the Great Plague of 1665), standing at a point on the dd curve above E, But the system cannot stay there, With wages high enough to cause population to grow, we again move gradually back toward the equilibrium at E, as shown by the converging orange arrows. (Note that a temporary growth

of population beyond E, as from a temporary run of good harvests, soon induces a wage rate so much below subsistence as to kill people off until the arrow moves us up dd back to E.)



FIG, 1

Numbers grow until Malthusian state of minimum subsistence is reached

Population growth moves us from the golden age of A, A', and a—down the diminishing—returns marginal—product curve dd to the Malthusian equilibrium at intersection with black ss supply curve of subsistence wage. The fall in real wage rate from a to b to e implies rising rent rates along the orange "factor—price frontier" ff. Because inventions shift dd and ff upward and rightward, historically the real wage rose from B to B' to B'' levels, with rent also rising from b to b' to b''.

Figure 1(b) shows that the rent rate per acre rises as the wage rate per hour falls." On what may be called "the factor–price frontier" (shown as orange ff), landlords are seen to be better off at the high–rent Malthusian subsistence equilibrium e than they were in the earlier golden age at a .

No wonder some landlords greeted with joy the introduction of the white potato, which enabled people to live on cheaper calories, and hence in effect lowered the old ss subsistence curve and raised equilibrium rents. And no wonder some self–centered landlords regarded the spreading of birth–control information as a threat to their own standards of living. One person's slavery is another person's comfort.

Land Rent Ends the Labor Theory of Value

The simple labor theory of value, which said that the price ratios of goods can be predicted from labor costs alone independently of the marginal utilities that bring out a demand for the goods, thus must be dropped to account for the facts of land scarcity. Costs of production now include rent as well as wage payments. Two goods, like food and clothing, may now have equal labor costs per unit; but if food requires more land cost per unit than clothing does, they will no longer sell on a one–to–one basis.

Worse than that from the standpoint of an advocate of a labor theory of value, suppose that people in a socialistic or capitalistic state shift their demand toward producing more food and less clothing. This makes the price of food rise relative to that of clothing. Why? Because food requires more land per worker than clothing does. Hence, the fixed land becomes more scarce when people want more of the product that is "land-intensive," thereby bidding up rent at expense of the wage.

Under neither planned socialism nor market capitalism can we succeed in predicting actual (or needed) commodity prices from labor requirements alone, taking no account of the pattern of tastes and demand and its effects on scarcity of nonlabor factors.

What about labor's right to all the product? Labor is the only input that is human and can sweat, laugh, cry, and pray. True, yet, even though dirt cannot sweat or cry, it does contribute toward the going of potatoes and, when scarce, does need to be economized in the good society.

If you want to make a logical case for labor's being "exploited" you need not handicap yourself by a simple labor theory of value, you may challenge the title to land of those who call themselves landlords and their right to rents. You may claim that only the peasants have a valid title to the land and to rent, or that only the state has valid title.

Who receives rents is an ethical or legal problem. But whatever its solution, rational use of land does require that a rent cost be charged the consumers who buy its products and the factors that are best fitted to work with it.

Technical Advance and Classical Growth Theory

As mentioned, real wages have risen historically, not fallen. Population has not stabilized at subsistence levels. Land rents per acre have risen surprisingly little and, relative to other factor-prices, have actually declined. It is evident that life has not consisted of a movement down an unchanged factor-price frontier or a marginal-product curve.

Inventions of science, of engineering, and of managerial practice have shifted the curves of Fig 1 rightward and upward. The black lines of progress— $BB'B''$ and $bb'b''$ —show the actual course of history. The reader is invited to draw the shifted dd and factor-price frontiers that run through B' or B'' and through b' or b'' . Such shifts have more than won

the race with diminishing returns, making the Malthusian equilibrium point of subsistence unrealistic in Western economies so far. (so far!)

Not all inventions are even-handedly favorable to labor and to land. Thus, inventions which help to drain swamps or to grow more food on poor acres of land might help wages more than they help rents. Some economists would call these "land-saving inventions." In contrast, any inventions that tended to raise rents more than wages, thereby tending to increase landlords share of GNP, might be called "labor-saving inventions." In between would be the case of inventions that raised both factor returns by the same percentage, leaving relative shares of GNP unchanged: these might be called "neutral inventions." In the history of the West, inventions have appeared to be land-saving on balance.

The ghost of Thomas Carlyle should be relieved to know that economics, after all, has not been a dismal science—in the advanced and advancing world.

Ricardo–Marx–Solow^o Models of Capital Accumulation

So far we have stressed the classical preoccupation with scarce land. In the remainder of this chapter, we shall survey the more important model of capital and labor, pushing land to the side as being less important for

the developed part of the world. We can now use much the same tools in a simplified two-factor model.

Basic assumption of capital-labor model: One productive factor grows relative to the other. Now population will be regarded primarily as a noneconomic variable, being stationary (or growing slowly for sociological reasons). Successful accumulation will make capital the varying factor. In an oversimplified model where output is produced by a relatively fixed and a relatively varying factor, the law of diminishing returns sets in.

The return of the augmented factor falls; the return of the relatively scarce labor factor rises. In absence of technical change, a stationary state of equilibrium is ultimately approached.

Notions of Capital It is now capital, written as K , that is the factor growing relative to labor, L . Capital goods consist of a great variety of things: machines of various kinds, plants and houses, tools, raw materials and goods in process (seed grain, growing wheat plants, harvested wheat, flour, dough, warm loaves, wrapped and delivered bread), and canned and frozen edibles.

Society can sum the market values of these physical goods to get total wealth or total capital value; but it cannot command a million dollars of electric generators to transmute themselves into a million dollars of oil-refining equipment. It is true, however, that as generators wear out, the resources which could have gone to replacing them can be shifted to turn out extra refining equipment. The financial counterpart of this physical alchemy is to have investors in the generator industry take the money funds accruing on account of depreciation there and transfer them over to finance extra investment in the equipment industry. Result: although the total balance sheet of money capital may show a practically unchanged total and although the national-income statistician shows only a cancellation of one kind of disinvestment against another kind of investment, still society has managed to change the physical composition of its capital stock without undergoing any change in current consumption of goods.

To give the idealized or stylized story of development all the rope it needs, we shall oversimplify as all the statisticians and economic historians do, we shall work with an index number of real capital goods, K , supposing that its return is the rate of interest or profit.

Effects of Capital Deepening What happens to per capita output when capital grows relative to labor—that is, when capital "deepens"? Recall what happened to output per acre when labor grew relative to land.

Output grew less than proportionally to the growth in the varying factor (labor), and its factor–price (the wage) had to fall. A similar law of diminishing returns comes into operation in our oversimplified model whenever one factor (such as capital) grows faster than the other (such as labor) with innovation absent:

1. Output will not grow in proportion to the growth in the capital stock.
2. The return to capital, the interest rate per annum, will fall as capital deepens. (Or, what is the same thing if we rule out risk and technical change, the profit rate will fall.)
3. What happens to the wage rate now that each person works with more capital goods and with the more intricate capital goods that the economy can now afford in the environment of a lower interest and profit rate? Just as the rent earned by relatively scarce land rose in Fig. 1, here the competitive wage return to relatively scarce labor will rise, as workers become worth more to capitalists and meet with spirited bidding up of their market wage rates. (Note: Competition, not altruism, is at work.)
4. Higher wage rates and lower interest rates do not necessarily imply a higher percentage share for labor at the expense of the percentage share of capitalists. Why not? Because the increase in capital relative to labor might offset (or even more than offset) the decline in the interest rate and the rise in the real wage.

5. Finally, since output (per capita or total) grew less than in proportion to the increase in capital (per capita or total), the capital–output ratio would rise in the absence of technical change (e.g., from capital value being 3 times annual GNP up to $3\frac{1}{2}$ times).

Here is a final summary:

Deepening of capital (no technical inventions): Capital/labor up; capital/output up; interest or profit rate down; wage rate up.

Deepening of Capital in Diagram Form

Figure 2(a) and (b) are like Fig. 1(a) and (b). But now capital is the relatively growing factor. Capital's amount per capita is given on the horizontal axis of (a), and its interest or profit return goes on the vertical axes. And now labor is the relatively fixed factor, and its wage goes on the horizontal axis of (b) just the way land rent did in Fig 1(b).

In the absence of technical change, capital accumulation takes us down the orange dd curve from A to B (and perhaps ultimately to the Ricardian equilibrium point E at which people feel it no longer pays them to save any per cent of their incomes for enhanced future consumption). On the factor–price frontier ff in Fig. 2(b), society can successively be at a; or it can be at b with the higher wage rate and lower interest rate that are implied by an augmented capital stock (more machines available of

every kind per man); or it can be at e with a still higher capital–output and capital–labor ratio. The earlier literary summary of the effects of capital deepening is verified by these graphs.

NET PRODUCTIVITY OF CAPITAL

FACTOR-PRICE FRONTIER

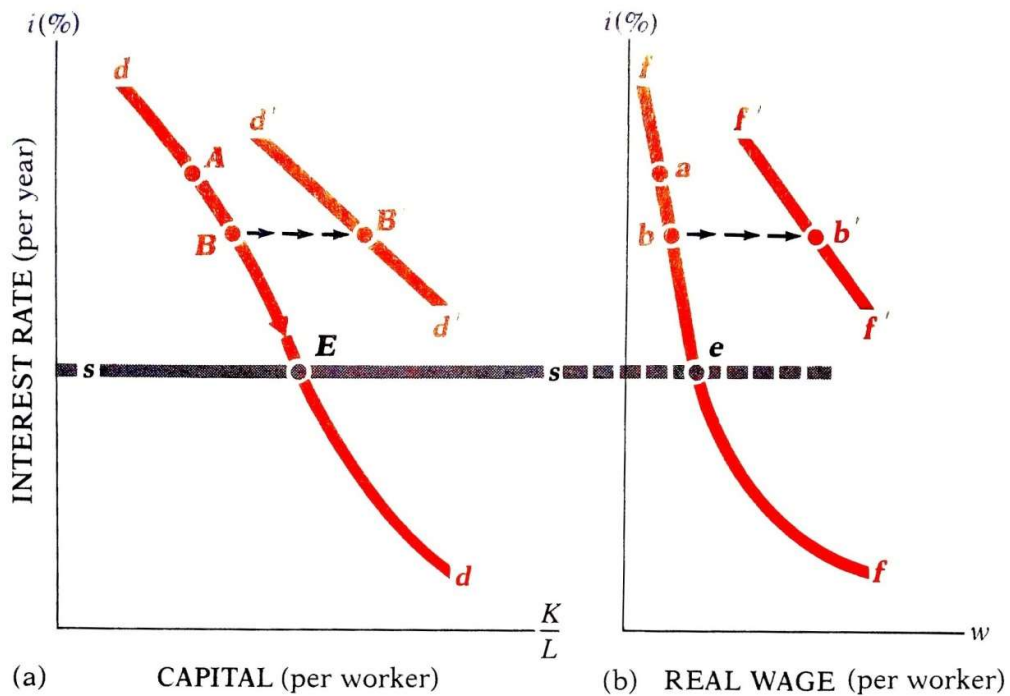


FIG. 2

Accumulation lifts real output and wage, and it depresses interest or profit rate

Adding more and a greater variety of capital goods to fixed labor will, in the absence of technical change, add less and less to total product, causing interest rate earned to fall along dd from B to E , which is the Ricardian equilibrium point at which saving will cease. Along ff , fall in interest rate from b to e must raise the real wage earnable from labor's higher productivity.

Historically, technical innovation has shifted dd and ff rightward just about fast enough to offset diminishing returns and to keep the interest and profit rate almost unchanged. as shown by horizontal arrows from B to B' and b to b' .

Technical Progress and Wages

Now let us reintroduce improving technology. This will shift the dd and ff curves outward, for example, to $d'd'$ and $f'f'$. Instead of moving from B down to E , society may find that diminishing returns is offset. And the economy might in actual historical fact move from B to B' , negating or concealing the Ricardo–Marx law of the declining rate of profit from capital deepening. Note in Fig 2(b) that the real wage rate must definitely rise, with or without technical improvements, so long as the profit rate stays the same or falls.

An alternative theory would ascribe the rise of wages under capitalism to (1) trade–union pressure, (2) government regulation of monopoly, and (3) interventions of a welfare and regulatory kind by democratic governments reacting to militant political pressures from the masses. This alternative hypothesis cannot be rejected as without substance, for we have seen throughout this book that government actions do have consequences for both good and evil.

Still, the magnitude and pattern of the rise in real wages in this last century have been such as to cast doubt on union or political action as an important element in its explanation. Thus, the America of Calvin Coolidge was run on the basis of limited government intervention: trade–unions were weak, monopoly was certainly not shrinking; yet real wages rose strongly. Similarly, Japan and West Germany have shown sharp

growth in real wages linked with sharp growth in labor productivity—and this when governments seemed pro-business rather than pro-labor.

With the advance of technology and the piling up of a larger stock of capital goods, it would take a veritable miracle of the Devil to keep real wages of labor from being bid ever higher with each passing decade. Who fails to see that fact fails to understand economic history as it happened. Economic theories that do not fit these facts have to be sacrificed and replaced by others that do.

The Approximate Facts of Modern Development

Let us summarize our theoretical researches. First we studied the crucial role of limited land and growing labor in economic progress. Then we passed from the labor-land world of Smith- Malthus to one that studied the role in economic growth of capital accumulation relative to labor. Last, but far from least, we stressed the factor of technological change and innovation. A look at the facts will now show that scientific and engineering progress has been vital for growth.

Thanks to Simon Kuznets' Nobel-prize-winning Work at the National Bureau of Economic Research, to the work of others there, and to Robert Solow and Edward Denison, we can formulate certain

uniformities of economic development in the United States and other advanced nations.

The ratio chart of Fig. 3 the great trends of economic development for America in this century. Similar findings apply abroad. Figure 3 is important. Linger over it.

The upper chart shows the growth since 1900 of labor and capital. The resulting growth of real output tops the chart.

Population has more than doubled in 80 years of steady growth. (Taking into account shortening of the working week and changes in age distribution and in labor-force participation, the growth in total number of work-hours has been even more modest.) While labor has about doubled, the stock of physical capital has increased more than eight-fold! Thus the substantial increase in capital per worker, the K/L ratio, does represent a significant amount of "capital deepening.

What about the growth in output? Has output grown less than in proportion to capital, as in a model that ignored technical change? No. The fact that the Q curve is not in between the two factor curves, but actually lies up near the capital curve itself, shows that there must have been technical change in actual history. The close proximity of the

output and capital curves shows that the capital–output ratio has not risen as in the simple deepening model.

Instead, as the lowest curve in the bottom chart shows, the capital–output ratio remains remarkably close to 3 years (i.e., a balance–sheet calculation of current value of all capital goods would show it to equal about 3 years of total product).

Rising Wages and Trendless Profit The real wage has indeed risen steadily. This is in accordance with what one would expect from the growth in the capital tools available to cooperate with labor, and from favorable technological trends. The real interest rate (corrected for price inflation) or, if we could get complete statistics, the rate of profit actually earned on more risky investments–does not show the decline that would be predicted from simple deepening of capital and diminishing returns. Interest rates and profit rates fluctuate much in business cycle and war, but display no strong trend upward or downward for the whole period. Either by coincidence, or as the result of some economic mechanism that needs study, technological change has just about offset diminishing returns.

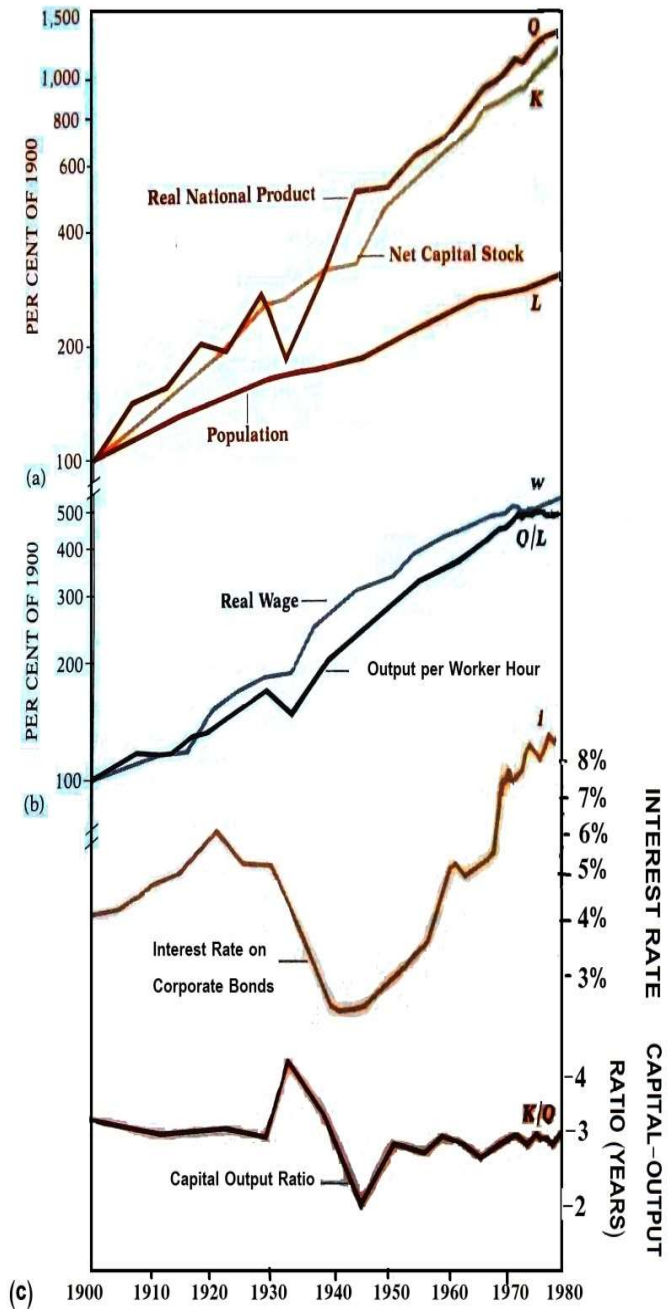
BASIC TRENDS OF U.S. DEVELOPMENT

FIG. 3
Economic growth has displayed striking long-run regularities

(a) Capital stock has grown faster than labor supply. Total output has nonetheless shown rate of growth in full pace with capital.

(b) Real wage rate has grown steadily, if anything overmatching growth in average labor productivity per man-hour. No pauperization or immiserization of the working class shows up in broad wage statistics. (But note the OPEC-induced slowdown in the trend for the 1970s.)

(c) Without technical invention and innovation, deepening of capital relative to labor would depress interest rate and raise capital-output ratio. But, in fact, technical change seems to have just about offset diminishing returns to capital accumulation. (Hence, statical curves of Fig. 2 must have been shifting rightward. REMARK: If higher money interest rates were corrected for price inflation, trendless oscillation of interest and profit rates would be more apparent in defiance of any strong Law of Declining Rate of Profit.)



Output per work-hour is the solid black curve shown in the middle chart of Fig. 3. As could be expected from the deepening of capital and from technological advance, Q/L has risen steadily. Moreover—and this too represents a remarkable coincidence or the result of some economic mechanism needing study—the percentage growth in wage rates per hour has almost exactly matched the percentage growth in product per work-hour.

This does not mean, as some Wall Street arithmetic has implied, that labor has captured all the fruits of productivity advance. It means, rather, that labor has kept about the same share of total product, with property also earning about the same relative share throughout the period. (A closer look at the middle chart suggests there might have been a slow upward creep in the share of labor in GNP, with property's share dropping gently; but part of this might be the return to capital invested in educations—called "human capital.")

Six Basic Trends of Economic Development

These basic facts of economic history in the advanced nations can be summarized approximately by the following trends:

Trend 1. Population has grown, but at a much more modest rate than the capital stock, resulting in a "deepening of capital."

Trend 2. There has been a strong upward trend in real wage rates.

Trend 3. According to what is often called Bowley's Law, the share of wages and salaries relative to the total return to property has shown considerable constancy in the long run (but perhaps with slight signs of an edging upward of labor's share).

Trend 4. Instead of observing a fall in the real rate of interest or profit, we actually observe their oscillation in the business cycle but no strong upward or downward trend in this century.

Trend 5. Instead of observing a steady rise in the capital–output ratio as the deepening of capital invokes the law of diminishing returns, we find the capital–output ratio is approximately constant in this century.

Trend 6. The ratio of saving to output has oscillated in the business cycle—reaching about the same level at various high–employment phases of the cycle. Or, taking into account the approximate constancy of the capital output ratio, we can convert this approximate constancy of the ratio of investment–to–income into the following: National product

has generally had a trend rate of growth at a roughly constant percentage rate per year.

Analyzing the Laws of Motion of the Mixed Economy

While these are only approximate truths and not like the unrepeatable laws of physics, they portray fundamental facts about economic growth. How to explain them?

Trends 2 and 1—higher wage rates when capital deepens—fit nicely together with classical and neoclassical theories of production and distribution. Trend 3—Bowley's Law that the wage share is approximately constant—is an interesting coincidence that could consistently hold under all kinds of conditions only in a static neoclassical model that possessed a special kind of production function relating Q to L and K (for which relative factor shares are constant).

Trends 4 and 5, however, warn us that neoclassical theory cannot hold in static form! A steady profit rate and a steady capita-output ratio are incompatible with the more basic law of diminishing returns under deepening of capital.

We are forced, then, to introduce technical innovations into our static neoclassical analysis to explain these dynamic facts. And a good thing it is we are told to introduce technical change, since we have much independent evidence of the modern importance of science and engineering.

In terms of the analysis back in Fig 1), we are forced to introduce an outward shift in the dd and ff curves there to account for all the trends. Thus, the eastward move in Fig. 2(a) from B on dd to B' on $d'd'$, which corresponds to the eastward move in Fig. 2(b) from b to b' , will be consistent with trends 1 to 6. The tendency toward diminishing returns has just been offset by the technical shift, with interest remaining at the same horizontal level and the wage rate rising just as much as output per head. The capital-output ratio, which cannot easily be read in Fig. 2, must stay constant if the interest return on capital is to constitute the same relative share as before.

Professor Solow, utilizing his own methods of analysis and corroborating the independent findings of numerous scholars at the National Bureau of Economic Research and elsewhere, has come up with the following remarkable conclusion:

Scarcely half the increase in America's productivity per capita and in real wages can be accounted for by the increase in capital itself. At least half

the increase in productivity is a "residual" that seems to be attributable to technical change—to scientific and engineering advance, to industrial improvements, and to "know-how" of management methods and educational training of labor.

This vital finding needs careful interpretation. First, although it is customary to measure and speak of the enhanced productivity of labor, there is no necessary implication that all the higher productivity (or most of it, or little of it) came from greater effort on the part of workers, or from more intensive conditions of sweat and strain; nor that it came from more effort and education, or from more initiative and incentives of the human labor force; nor, for that matter, from more energetic and clever executive management. The facts do not point to any simple interpretation. We must reserve judgment pending further researches.

Second, it is artificial to separate capital formation and technology completely. New techniques do tend to be embodied in new kinds of equipment. It is possible to imagine a stationary state—like the optimistic one of John Stuart Mill in which there is no net saving and investment, but in which there is considerable technical progress as the depreciation charges of worn-out equipment finance their replacement by technically better equipment. Still, no one will deny that innovations can be introduced faster in a society that is performing net investment in addition to the gross investment corresponding to replacement. We all

do learn from actually doing, and the society which gets to try out more new things will run that much ahead of the one doing little or no net saving.

Are Inventions Labor-Saving or Capital-Saving?

Any invention that wins its way under competition must raise the real wage, the interest rate, or both.

However, some inventions will by their nature have a tendency to increase the relative share of labor; others to increase the relative share of capital (of property generally); and others to affect both factors in about the same degree. This suggests the convenience of the following definition:

Definition: An invention is called "labor-saving," "capital-saving," or "neutral," depending upon whether it tends to lower the relative share of labor, to lower the relative share of property, or to leave their relative shares unchanged.

An extreme example of a labor-saving invention would be one that enabled unmanned machines to turn out robots that could do any of the manual and intellectual tasks of human labor. This would no doubt

reduce the competitive wage drastically and could conceivably drop human labor's share of NNP from its present level of between 75–80 per cent to below 50 per cent.

An example of a capital-saving invention would be the case of a cheap computer that enabled firms to get along with much less inventory; or the invention of Kleenex tissue to replace durable handkerchiefs, or the invention of easily launched, wave-reflecting satellites that made ocean cables unnecessary. Try to see if you can specify other examples of capital-saving or labor-saving innovations and of neutral innovations in between.

The steady rise in wage rates is thought by many economists to induce employers to come up with labor-saving inventions. This tendency is often offered to help explain the failure of the profit- and-interest rate to fall as capital is accumulated.

Marx, a century ago, had used such an explanation to account for the success of capitalists in resisting a rise in wages and in creating an industrial reserve army of the unemployed. Sir John Hicks of Oxford has, in our day, advanced similar arguments of an inherent bias toward labor-saving innovation.

We have seen that economic analysis can throw much light on the laws of motion of the mixed economy. And when we look at the 1980–2000 United States projections by the Wharton School or other computer models, we see that these trends are still persistent, but with a slowing down of progress as affluence and the OPEC energy constraints cause a deceleration of productivity.

Admittedly, growth theory is still at the frontier of economics, and the experts are not all agreed on the mechanisms of past and future paths of development. Some alternative theories are presented in the Appendix to this chapter.

However, we are now armed to tackle in coming chapters the problems of growth in less developed economies, advanced economies, and collectivist systems like the Soviet Union.

SUMMARY

1. Many writers have tried to read into economic history a linear progression through inevitable stages, such as primitive economy, feudalism, capitalism, and some form of communism. The actual facts have not agreeably stuck to such timetables. In particular, the mixed economies that dominate the western world came into being without permission of social prophets.

2 The classical models of Smith and Malthus describe economic development in terms of fixed land and growing population. A simple "labor theory of value" prevails so long as land is superabundant; and output develops steadily with population in this golden age where labor gets all the product.

3 In the absence of technical change, increasing population ultimately exhausts the supply of free land. The resulting increase in population density invokes the law of diminishing returns: Fixity of land keeps output from growing proportionally to increased labor. With less and less of land to work with, each new worker adds less and less extra product; the decline in labor's marginal-product means a decline in the competitively earned real wage. As each acre of land gets more and more labor to work with, its marginal-product and competitively earned rent go up.

A fundamental factor-price frontier depicts how the rent rate must rise as the wage rate falls (but no one can predict what will happen to the relative shares of land and labor in national product).

4 The Malthusian equilibrium comes when the wage has fallen to the subsistence level, below which the supply of labor will not reproduce

itself. However, in realistic fact, technical change has kept economic development progressing in the West by continually shifting the productivity curve of labor upward.

5 The Ricardo–Marx–Solow model stresses the deepening of capital, i.e., the process of accumulating capital goods of varied types faster than the growth in population and labor hours. In the absence of technical change, an increase in capital per capita would not be matched by a proportional increase in output per capita—because of diminishing returns. Hence capital deepening would lower the interest rate (which is the same as the "profit–rate" if risk is ignored), raise the real wage along the factor–price frontier, and raise the capital–output ratio.

6 Historically, trends 1 and 2 a rise in K/L and in w —could be consistent with the static model. Trend 3's approximate constancy of relative shares of labor and property—as measured by wL/Q and iK/Q , where $Q = wL + iK$ —is not mandatory in the static model, but is consistent with a special technical case or it (Cobb–Douglas). However, trends 4 and 5—the failure of the interest and profit rate to fall and of the capital–output ratio to rise—show clearly that technical change must be brought into the analysis. Trend 6—approximate constancy of the investment–income or saving ratio—taken with the constancy of the capital–output ratio arithmetically implies a constant percentage growth of output.

7 The facts suggest the hypothesis that capital accumulation is second to technical change in explaining rising productivity. But innovation and investment interact, as new techniques get embodied in new equipment and people learn by trying new investments. Increasing productivity can be expressed conveniently in terms of labor productivity—i.e., Q/L —but this does not necessarily imply anything about the reasons for the rise.

8 Inventions are defined as labor-saving, capital-saving, or neutral, depending upon whether they reduce labor's relative share of national product, reduce property's relative share, or leave shares unchanged. Experience with rising wage rates makes firms seek labor-saving inventions.

Either by coincidence or cancellation of offsetting trends or as the result of economic mechanisms needing study, the pace of invention has turned out to be about enough to offset the effect of diminishing returns to capital on the interest and profit rate; and innovations have not turned out to be so labor-saving or capital-saving as to change much the relative shares of labor and property. Innovation itself explains much of progress.

APPENDIX: Modern Discussions of Development Theory

Economics, not being a settled subject, is itself still undergoing development. While the broad facts of historical development discussed in the chapter are not in dispute, different interpretations of them are given by different authors. Some further ideas associated with the names of Joseph A. Schumpeter, Sir Roy Harrod of Oxford, W. W. Leontief of Harvard, Professors Joan Robinson and Nicholas Kaldor of Cambridge University, and various American economists are sketched briefly in this Appendix.

While an elementary textbook cannot pretend to resolve advanced topics, today one would consider an introduction to physics old-fashioned if it did not somewhere give the reader a glance at fundamental issues on the frontiers of knowledge: atomic theory, elementary particles, generalized relativity, etc.

Similarly, many beginning students of economics will want to have a glimpse of the issues at the frontier of current economic analysis. Without mastering every intricacy of this Appendix, the interested reader can capture the flavor of developing economic thought from it. In particular, many readers who are not concerned with the rest of the theories discussed in this Appendix may still want to turn to its final discussion the fascinating and Useful subject, input-output analysis by Nobel laureate W. W. Leontief.

SCHUMPETERIAN INNOVATION

Joseph Schumpeter (1883–1950) of Vienna and Harvard was author of two economic classics: *The Theory of Economic Development* (English ed. Harvard University Press, Cambridge, Mass., 1934) and the posthumous *History of Economic Analysis* (Oxford University Press, New York, 1954).

Schumpeter emphasized the role of the innovator—i.e., the inventor, the developer, the promoter, the person who initiates and recognizes technical improvements and who succeeds in getting them introduced. Like Carlyle's faith in the role of the great leader in history, Schumpeter's theory regards the innovators as the dynamic actors of capitalism, who rule profitably for a day, only to have their profits nibbled away by imitating competitors.

Figure 2(a), well represents Schumpeter's notion of what would happen if all innovations ceased. Competition and capital accumulation would quite quickly push society down the curve of diminishing returns dd . Indeed, Schumpeter thought that the long-run ss horizontal line at which the supply of new saving will disappear would be at a zero rate of

interest and profit, being properly drawn in Fig. 2(a) down on the horizontal axis itself. (His much-attacked theory of a zero interest rate in the innovationless stationary state can be replaced by a low-positive-interest-rate floor without much altering his theory of cyclical development.)

But now Schumpeter plays his trump card. Innovation is periodically shifting the dd curve upward and outward. The violin string is plucked by innovation; without innovation it dies down to stationaries, but then along comes a new innovation to pluck it back into dynamic motion again. So it is with the profit rate in economic life.

The profits due to innovation, we have seen, will be competed away by imitators, with labor and consumers soon benefiting from price reductions. The innovation-induced rise in interest rates will soon coax out saving and capital formation, until the accumulation of the augmented capital stock leads to diminishing returns, a "profit squeeze," and minimal interest. But then along comes a new burst of innovations—e.g, railroads, electricity, automation, coal liquefaction—to pluck the system back into dynamic motion, and we are off on new repetition of the process.

Ignoring Schumpeter's specific theories of the business cycle, we see that his theory of development is completely consistent with the first two

trends of economic history: rising real wage rates, and capital increase outstripping population increase. His general theory does not specifically call for constant relative shares, a trendless profit rate, a constant capital–output ratio, or a trendless average propensity–to–consume–and–save. Still, all or any of these could be quite consistent with Schumpeter's general schemata.

Unemployment In The Stationary State?

Ricardo, Alfred Marshall, and Schumpeter had one thing in common with Lord Keynes of *The General Theory of Employment, Interest and Money*. They all thought that profit rates would be pushed to minimal levels in the absence of technical change. But Ricardo and company all thought that when this day of Judgment came, the economy would be voluntarily consuming 100 per cent of its full–employment income. Although positive investment would cease, people would then be spending enough on consumption to maintain full employment.

(In terms of Part Two's diagrams, in the Ricardian stationary state the $C + I + G$ curve would be intersecting the 45° line at the full–employment level, with $C + I + G$ actually equal there to $C + \text{replacement} + G$, because net investment ceases in the stationary state. For the remainder of this chapter we shall interpret I as net investment rather than as gross investment; likewise, we deal with net saving rather than gross saving.)

Keynes, on the other hand, feared that such minimal rates of interest and of profit on risky ventures might create a stationary state of stagnation with chronic unemployment:

People might still want to save at full employment, but no matching real investment would be forthcoming when the promised profit rate is too low to coax out risk taking. When the interest to be earned on short-term gilt-edge government bonds has become so low as to make people indifferent between hoarding much or little safe, idle money, central bank policy can't do much to prevent stagnation.

This notion of a troublesome stationary state did not die with the 1930s. Prominent followers of Keynes at Cambridge University, such as Professors Joan Robinson and Lord Kahn, have grave doubts concerning the possibility of a successful deepening of capital accompanied by full employment in a mixed economy. At the least, they would stress that it will never happen by itself in a country that confines itself to orthodox fiscal and monetary policies. At the most, they would harbor severe doubts that "managed capitalism" could—or would!—pursue the unorthodox policies of monetary and fiscal expansion implied by a successful synthesis of neoclassical and post Keynesian analysis.

Readers who go on to advanced economics may be referred to writings of these Cambridge authors. Here, briefly, will be presented some of the points that need to be considered in doing justice to both sides of the argument as it bears on long-term economic development. No attempt will be made to identify ideas and writers meticulously.

Unchangeable capital output ratio

The land-output and labor-Output ratios were not constants in the first Smith-Malthus model of development. And the capital-output ratio in the Ricardo-Marx-Solow model of Fig. 2 was likewise not supposed to be a technical constant. In the absence of technical change, successful capital formation by society would enable output to grow; and the resulting phenomenon of diminishing returns would imply a smoothly growing capital-output ratio as capital deepening took place. On this view, dynamic technical change has seemed historically to provide about the extra productivity needed to offset statical diminishing returns, keeping the measured capital-output ratio constant.

Many modern economists—Robert Eisner of Northwestern, the late Alvin Hansen of Harvard, Luigi Pasinetti of Cambridge, and others—hold that the capital-output ratio is very nearly a technical constant; and that any attempt to accumulate capital beyond the rate required by the annual growth in output will soon be unsuccessful. Profits or rents from

equipment will fall off badly after any surge of capital investment. Excess capacity will follow, and the resulting profit squeeze will kill off private investment, as it did in the sluggish years following 1929 and 1973. Therefore, they argue, any long-term theory must utilize an invariable capital-output ratio like that shown in Fig. 3.

Harrod-Domar Growth Models

These concepts can be illuminated by some interesting models of balanced compound-interest (or "exponential") growth developed by Sir Roy Harrod in England and Professor E. Domar in America. This theory, which can be Skipped by the time-pressed reader, has two aspects: the long-term "natural rate of growth" and the so-called "warranted rate of growth"

THE NATURAL RATE OF GROWTH

The historical data of Fig. 3 can help explain Harrod's arithmetic. And, in turn, a simple Harrod-Domar model can give an oversimplified "explanation" of those historical trends

Suppose hours of labor L grow steadily at about 1 per cent per year. And for extreme simplicity, assume that technical change is in effect

making every person's efficiency as a laborer grow at another 2 per cent per year. Either because of more scientific methods of production or better education, it is as if 100 workers can this year do what it took 102 to do last year; and this is repeated indefinitely. To coin a phrase, while actual L in its human-hour units is growing at but 1 per cent per year, the number of "efficiency units of labor" L^* is growing at 3 per cent per year because of the annual 2 per cent efficiency improvement. This leads to the concept of the natural rate of growth.

Definition: The natural rate of growth of a simplified Harrod system is the percentage growth per year of its labor supply expressed in "efficiency units" (which means natural labor units as augmented by the presumed increase in technical effectiveness of each person-hour); as a condition of balanced growth, output and capital must also be growing at this same natural rate per year.

With GNP (or Q) and with L^* growing steadily at this natural rate of 3 per cent per year, the stock of capital K must also grow at the same natural rate of 3 per cent per year if it is to keep in balanced pace. How much net investment is required each year to keep K growing at this natural rate of 3 per cent? Or, in other words, how much must people be steadily saving and investing out of their annual full-employment product to keep growth nicely balanced?

Evidently the needed saving–income, or saving–GNP, ratio depends on the numerical value of the capital–output ratio K/Q times the natural growth rate."

We are now in a position to write down the arithmetic formula relating three historical things: the Harrod natural rate of growth of .03 per year, or in the general case g per year, the historical capital–output ratio of, say, $3\frac{1}{3}$, or in the general case K/Q ; the required saving/GNP ratio of .10, or in the general case s . We get

$$S = g \times \frac{K}{Q} \quad \text{or} \quad .10 = .03 \times 3\frac{1}{3}$$

This relationship determines the amount of voluntary saving and investment that is needed if the Harrod natural rate of growth is to be an equilibrium state.

Explaining the Trends

Can this simplified Harrod–Domar model or balanced natural rate of growth account for all six of the basic trends listed earlier? Yes, as footnote 20 hinted earlier, Let us check off the trends.

The model certainly gives a deepening of capital relative to hours of actual L, since K grows at 3 per cent and L only at 1 per cent.

[However, in this simplified model, an observer who concentrates only on L^* , labor in efficiency units, will see a constant $(K/L)^*$. With no "deepening" going on but merely an apparent "widening of capital" to keep K and L^* balanced.]

Trend 2 is verified also. The wage rate rises—actually at 2 per cent per year. Why? Because actual persons (L, not L^*) collect the marginal product of the increasing efficiency units in them, and these units work with their full quota of capital goods.

Trend 3 is verified and is no longer a coincidence. Because technical change was so nicely neutral as to make each person take on "the strength of ten," the balanced growth in K and L^* means we are dividing shares between the factors in precisely the same way as before. (Recall that an observer of L^* alone merely sees balanced widening of capital, not deepening: note that no Cobb–Douglas assumption therefore needs to be made.)

Trend 4's constancy of the interest rate is now precisely verified, being neither an approximation nor a coincidence. Each unit of K, being matched exactly by the same amount of L^* as before, experiences no diminishing returns and has imputed to it the same competitive interest

rate. (If degree of risk is the same, constancy of the interest rate means constancy of the somewhat higher profit rate.)

Trend 5 is also verified, since the Harrod natural rate of balanced growth assumes from the beginning an unchanged K/Q ratio. In terms of the Ricardo–Marx–Solow model, even if the capital–output ratio could smoothly change, it will not have to change at all in a situation where widening of K to match L^* means no diminishing returns and entails Q growing in full proportion to K .

Trend 6's constancy of the saving–income ratio is verified from the basic Harrod formula for the natural rate of balanced growth at the same compound interest rate per year: $s = \text{constant } g \times \text{constant } K/Q$.

Interdependence of Trends

The six trends are not all logically independent. We could have saved time by checking any two or the three trends 3, 4, and 5, knowing that their correctness would arithmetically guarantee the correctness of the remaining trend. Here is why. If property always gets the same fraction of output, say, one–fourth, and if the profit rate stays constant, then the process of capitalization of an income stream shows that the value of the capital stock must be a determinate multiple of output. [That is, K 's fractional share of Q divided by the interest rate is equal to the capital–

output ratio: $i(K/Q) \div i = K/Q$. Thus, if capital gets one-fourth of 3,000-billion-dollar Q, and this property return of \$750 billion is capitalized by dividing it through by $i = .07\frac{1}{2} = \frac{3}{40}$, then the value of capital is seen to be determinate at \$10,000 billion, or $3\frac{1}{3}$ times the value of output.]

Harrod's Warranted Rate of Growth

The natural rate of growth is designed to cope with long-term problems of economic development. A few words can be said about a related tool designed more to explain cyclical instability than the long-term trend.

What if society's actual saving fraction differs from that needed to keep the natural growth rate in nice balance? That is, suppose actual desired $S/Q = s_a$ at full employment is greater, or less, than s given by $g(K/Q)$. Too high a schedule of saving, we saw in Part Two, will tend to lead to unemployment. Too low a saving schedule, relative to the investment schedule, was seen to produce an inflationary gap and tendency toward price inflation.

Very well, No longer is the natural growth rate g the one that the system will realize, Growth in balance has now become rather irrelevant. Still Harrod can ask this rather odd question:

Starting from enough unemployed resources so that the natural growth rate of labor and other resources encounters no bottleneck or ceiling—starting from there, what rate of growth of output, W , if it could be achieved and maintained, would lead to a large enough volume of investment to justify (via the multiplier analysis) a continuance of its own growth rate W ? The answering W is defined as the "warranted rate of growth.

In short, to get W , reinterpret the old Harrod relations $s = g(K/Q)$; instead of taking g as given in it, work the relation backward to solve for the unknown growth rate of Q . Follow these steps: (1) Replace s by the actual saving ratio S/Q people insist on having namely, s_a . (2) Replace the g specified by labor force and technological growth by the unknown warranted rate of growth W . (3) Provided that the capital–output ratio K/Q is a hard constant, let it stand. (4) Solve for W by removing K/Q to the denominator under S/Q .

We go from the natural rate to the warranted rate thus: $s_a = W(K/Q)$ replaces $s = g(K/Q)$, and then

$$W = \frac{s_a}{K/Q}$$

An example will help. With $g = .03$ and $K/Q = 3\frac{1}{3}$, Harrod needs $s = .10$ for his natural-growth process. But suppose people want to save $s_a = .13\frac{1}{3} > .10$. This overthrift would lead to unemployment. But suppose somehow Harrod could start a faster expansion, of W per cent per year in Q , which can always get the labor it needs from the ranks of the unemployed. Then how fast must it expand to generate enough I/Q to match $S/Q = s_a = .13\frac{1}{3}$? If every dollar of expanded Q requires K to expand by $3\frac{1}{3}$ dollars, our answer is $W = .13\frac{1}{3} / 3\frac{1}{3} = .04$. Q growth higher than $W = .04$ will generate $I/Q > .13\frac{1}{3}$, Just as Q growth less than $.04$ will generate $I/Q < .13\frac{1}{3}$.

The warranted rate is an odd concept. It does not tell you what will in fact happen, but only what would—if it came to happen by design or by luck—have certain self-warranting properties. Such a growth rate of output, W , if it could somehow be established and maintained, warrants a level of investment just big enough to match the voluntary saving that its own income growth entails.

Cycles and Instabilities

Two observations should be made about cyclical instabilities involved in the warranted rate of growth.

1 Once all the unemployed are back at work, the natural rate of growth g must set a ceiling against which, alas, the faster warranted rate of growth must eventually collide. Thus W of 4 or 5 per cent per year and g of only 3 per cent per year ultimately means the Harrod warranted expansion will very soon hit full employment. On business cycles, some writers have constructed a theory of a collapse into recession based upon a bouncing back of the system from its collision with the natural-rate employment ceiling.

2 The warranted rate of growth, even if originally established, will not persist after being disturbed. In the Harrod model it is definitely unstable. To see this, note that if the actual growth rate temporarily exceeds $W = 4$ per cent, this new income will be generating in desired investment more than the $13\frac{1}{3}$ (= 4% x 3) per cent ratio of desired saving—thereby accelerating its own growth still faster above W . (A less than 4 per cent initial growth rate will similarly create a deficiency of intended investment relative to the $13\frac{1}{3}$ per cent intended saving, thereby decelerating its own growth still further below W .)

Just as an unmanned bicycle, which is unstable if disturbed from the vertical, can be converted into a stable system by a steadying and compensating human hand, so can a Harrod–Domar growth path that would be unstable under *laissez faire* be made stable by compensating monetary and fiscal policies in a mixed economy.

NEOCLASSICAL DYNAMICS

The Ricardo–Marx–Solow model of smooth substitutability of labor for capital (i.e., of labor for a great variety of alternatively producible capital goods) has less need to work with Harrod–Domar concepts than those models which regard the capital–output ratio as a hard constant.

However, it is useful to interpret the Harrod–Domar concepts for a neoclassical model like Fig. 2.

By a simple "neoclassical growth model" is meant one in which the state uses monetary policies to make sure that thriftiness does not lead to unemployment and abortive thrift: By making equity and loan funds available at lower interest and profit rates (and possibly by unorthodox credit policies that provide guarantees against risks and uncertainties), such a managed system can contrive deepening of capital, as described earlier. Alternatively, this neoclassical model can be interpreted as describing the technology of an efficiently run collectivist society that never faces macroeconomic problems of unemployment or of inflation due to lack of proper effective demand.

In such a society, where whatever is withheld from consumption goes into capital formation, any rate of growth is essentially a "warranted rate of growth. This is because there is (1) no dichotomy of saving–investment problem and (2) no hard constant for the capital–output ratio.

Here is an idealized example. Add a new supply of L to a system that has a certain K and has previously been producing a certain Q. This new L can be put to work with the given K as rapidly as we like. There results a growth rate of Q that can be as high as the growth in L can produce. People can consume and invest out of the new output as much or little as they like. Depending on whatever amount of capital formation they decide on, there will result a gradual accumulation of K with the K/L ratio able to move in any way without trouble.

All the above is in sharp contrast to a model with fixed capital–output ratio, which calls for a specific W growth rate of Q. Contrast the Harrod case with the italicized words in the above paragraph!

Three Sources of Growth

Neoclassical output growth can be decomposed into three separate sources: growth in labor or L, growth in capital or K, and technical innovation itself. Momentarily ignoring technical change, note that a 1 per cent per year growth rate in L together with a 1 per cent per year growth rate in K is assumed to cause output to grow also at a 1 per cent per year rate. (Resist the temptation to add 1 per cent to 1 per cent and come out with 2 per cent; L and K cooperate in production, each needing the other.)

Suppose L grows at 1 per cent per year and K at 5 per cent. It is tempting, but wrong, to guess that Q will then grow at 3 per cent, the simple average of 1 and 5. Why wrong? Because the two factors do not contribute equal shares to product: about three-fourths of all product goes to labor as wages and only one-fourth of Q to property as its interest-profit share. This means L's growth rate gets 3 times the weight of K's; so, the correct answer is that Q will grow at 2 per cent per year ($= \frac{3}{4}$ of 1% + $\frac{1}{4}$ of 5%). Hence, output growth per year follows the law

$$\% \text{ Q growth} = \frac{3}{4} (\% \text{ L growth}) + \frac{1}{4} (\% \text{ K growth}) + \text{T.C.}$$

where T.C. means technical changes that raise productivity by shifting the dd curve of Fig. 2; and where $\frac{3}{4}$ and $\frac{1}{4}$ would of course later be replaced by new fractions if the relative shares of the factors later come to change.

If we seek to explain per capita growth, matters are simpler still, since this enables us to get rid of L as a separate growth source. Now, using the fact that capital gets one-fourth share of output, we have

$$\% \frac{Q}{L} \text{ growth} = \frac{1}{4} (\% \frac{K}{L} \text{ growth}) + \text{T.C.}$$

This relation shows clearly how deepening of capital would raise the capital– output ratio if there were no technical improvements being made: output per capita would grow only one–fourth as fast as capital per capita, reflecting one aspect of diminishing returns.

This relation now explains the meaning of Solow's conclusion—that more than half the increased output recorded in historical statistics seems to be a "residual" attributable to scientific advance rather than to thrift and capital formation. This means that the second term in the above relation—T.C. for per cent Q growth due to technical change—appears, on statistical measurement, to have been bigger than the first term representing the investment contribution. When Solow tries to allow for the fact that new techniques get embodied in new capital goods, the relative importance of the first term rises somewhat. (Although the primacy of technical change seems corroborated by German and Japanese statistics, the importance of the capital factor does seem greater in Britain, Canada, and Russia.)

ALTERNATIVE THEORIES

Repudiation of Aggregate Production Functions

Professors Joan Robinson and Nicholas Kaldor of Cambridge University are skeptical that "capital can be usefully measured as an aggregate, which together with labor produces aggregate output. This is certainly a healthy skepticism. They are even more skeptical that the marginal productivities calculated from such an alleged production function can be used to explain wage and profit rates and the relative shares in GNP of labor and property. They go too far, I think, in their doubt that economists can work with a detailed breakdown of numerous heterogeneous capital goods—machines of type A, B,C,... –to get quantitative results at all like the neoclassical case, in an actual realistic mixed economy of uncertain growth.

Dissenting Voices

Robinson and Kaldor by no means agree on what is to replace the aggregative analysis. Both incline, but in different degree, toward a macroeconomic theory of income distribution with the following property:

Here is an economy with high property share and high growth. How wrong to think it is the thrift of the rich (or anybody else) which causes that fast growth. The causation runs the other way: fast growth produces high profits, rather than vice versa.

This presumably wishes to assert something more than the familiar observation that when a country like Japan or West Germany experiences a miracle of productivity growth, people find it easiest to be thrifty out of the increase in income and to be slow in renegotiating real wage rates commensurate with the recent rises in marginal productivities. It is beyond controversy that such induced thrift does further speed up capital formation and tends (in neoclassical fashion) to speed up growth still further, but that is another story.

Exercises

1. In Fig 1, the solid line OP is the ordinary diminishing–returns diagram. (Disregard for the present the two broken lines OQ and OR) OP shows how output of good Q increases as more and more of variable input A is added to a fixed quantity of another input, B. The line is straight from O to H. This means that until the A quantity reaches OD, the marginal–product of A is (increasing / constant / decreasing). Thereafter, it is (increasing / constant / decreasing). This marginal–produce is measured by the slope of the line; so marginal–product reaches zero when the line is (flat / vertical)–i.e., when A's quantity reaches (OD / OE / OF / OG)

2. In very early attempts to construct economic theory (e.g, in Adam Smith), the discussion was often carried on as though production were exclusively a matter of labor cost (thus, the labor cost of hunting animals for food). So long as only one type of input is considered, there cannot be any conflict between two or more input classes over division of the output they cooperatively produce.

Soon, however, it became evident (and this drew major emphasis in the works of Malthus and Ricardo) that land was likewise a productive input and one scarce or limited in supply, whereas there was no comparable limit to the size of population that might ultimately appear. Hence "the law of diminishing returns" evolved—and with it, consideration of the clash between interests of the two input categories.

a. In the Malthus–Ricardo approach to diminishing returns. (land / labor / capital) is the fixed input, and (land / labor / capital) is the variable one. Malthus felt that a final "equilibrium" would be reached when labor had (increased / decreased) sufficiently to make the wage per worker just equal to the minimum–subsistence level.

b. This wage per worker would be labor's (marginal– / total) product. The remainder of total product, after these wages were paid, would go to landowners. In Fig. 1 terms, the Malthusian equilibrium would be

reached with labor at a total (of OG/ necessarily less than OG, say, OE or OF), and with total output (NG / JE or MF)

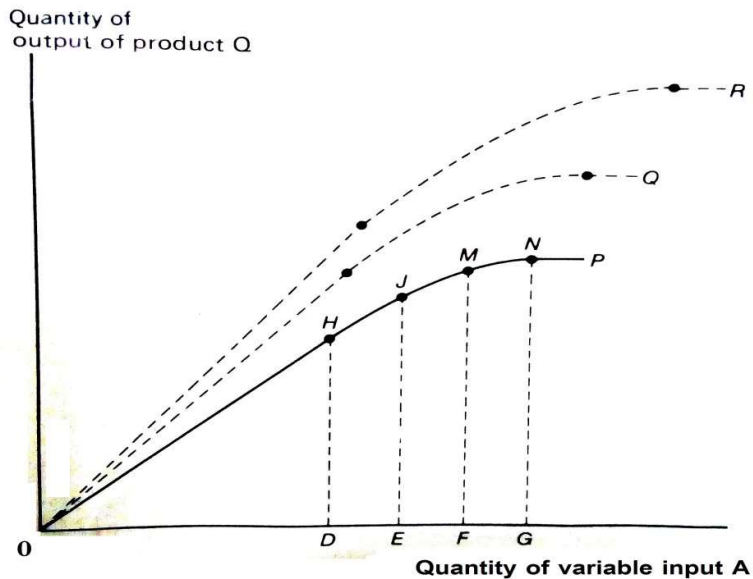


Figure. 1

3. a. As this "Malthusian equilibrium," in which labor earns only a subsistence wage, is approached, land becomes, in relative terms, more scarce. So its price (the rent per acre) must (rise / fall)

b. Offhand, one might think that as this painful situation (for labor) is approached, the relative share of landowners in total income must rise just as the price per unit of land rises. This is not necessarily so. The

absolute amount of income going to land-owners must rise; the relative share of landowners in total income could fall.

The total product and its division between the two input classes is as follows.

$$\begin{array}{lll}
 (1) \text{ Price of labor} \times & (2) \text{ Number of units} & (3) \text{ Labor's total income} \\
 & & \text{of labor} = \\
 \\
 (4) \text{ Price of land} \times & (5) \text{ Number of units} & (6) \text{ Land's total income} \\
 & & \text{of land} = \\
 & & \hline
 & & (3) + (6) = \text{Total product}
 \end{array}$$

As the labor supply increases, moving toward the Malthusian equilibrium, these six magnitudes behave as follows:

Item (1), the price of labor, (rises / falls / remains constant).

Item (2), number of labor units, (rises / falls / remains constant).

Item (3), labor's total earnings, may go either way. It may rise, remain constant, or fall (since its two components move in opposite directions).

Item (4), land's price, (rises / falls / remains constant).

Item (5), quantity of land, (rises / falls / remains constant)

Item (6), land's total earnings, (rises / falls / remains constant).

So item (3) could possibly rise sufficiently to outstrip, in relative terms, the rise in item (6). This is most likely when the "bite" of diminishing returns is not yet acute, so that increases in the labor quantity do not push down labor's marginal-product (the price of labor) by very much. But the more closely the point of zero marginal-product is approached (even though this point is never actually reached), the less likely this outcome becomes.

4. a. The two ingredients in Malthus-Ricardo diminishing-returns analysis were land and labor, with labor the variable and increasing element. In modern development theory, the participants change. The fixed input is considered to be (land / labor / capital). The variable input is (land / labor / capital). When this variable input is increased relative to the fixed input, the condition is described by economists as a (widening / deepening / maintenance) of capital.

b. If the stock of capital (i.e., machinery, tools, and other such equipment) is gradually increased over time, we would expect that increase to be accompanied by at least some technological improvement-i.e., the appearance of different and more efficient capital

goods. But suppose we consider such technological change absent, and apply the analysis of question 3. An increase in capital with labor or population fixed—or more generally, an increase in the ratio of total capital to total labor—would lead to (an increase / a decrease) in the return to each unit of capital (the profit rate or interest rate), and (an increase / a decrease) in the wage paid to labor.

5. Consider the process indicated in question 4 in more detail. Designate the variable input capital as K , the fixed input labor as L , and quantity of total output as Q . Then—with no technological progress—the following results are to be expected as K is increased relative to L :

(1) The capital–labor ratio, K/L , (increases / decreases).

(2) The capital–output ratio K/Q (see text), will (increase / decrease), because when the law of diminishing returns is operating, any increase in the variable input—i.e., (in K / in Q / in L)—yields an increase in output, Q , that is (less than / exactly / more than) proportionate to the K increase.

(3) As the K/L ratio increases, the interest or profit rate (price of K per unit) (increases / decreases), and the wage rate (price of L) (increases / decreases)

(4) The fractional or percentage share of total output going to K owners (must increase / might increase / must decrease), just as in question 3.

6. In Malthus–Ricardo analysis, the diminishing–returns process came to a halt when labor's wage fell to the minimum–subsistence level. In the more recent diminishing–returns reasoning outlined in questions 4 and 5, the process ends when (pick one):

- a. The marginal product of capital reaches zero.
- b. Wages reach the maximum–subsistence level.
- c. The rate of interest falls to a level where people choose to save no part of their income.

This drying up of saving ends the growth in K, since there is no longer any more money to finance further increases in K. This reasoning assumes that the rate of interest (is / is not) the governing factor as to the amount of income that is saved. (There is more on this point in the chapter Appendix.)

7. a. In the United States, over the past century, the stock of capital has grown more or less steadily, and grown more rapidly than population or

the labor force. To this extent, then, it is appropriate to apply the reasoning of questions 4 through 6.

But what about technological progress, which improves the Performance of K (capital), and which was specifically ruled out in those questions? In terms of Study Guide Fig. 1 (where the variable input is now K), technical progress lifts the output curve from OP to OQ, and from OQ to OR. [The black dots on the OQ and OR lines mark the points at which curvature begins (the line begins to "bend over")—i.e., the point at which the influence of diminishing returns first begins to set in.] Thus even though K is increasing, the shift in position of the total product curve means that the marginal-product of K will (increase / decrease). The rate of interest or profit (per unit of capital) will thus (fall / rise) relative to labor's wage rate.

b. Combining the two effects (diminishing returns and technological progress), we see that the increase in the capital stock (raises / lowers) total output. Technical progress (raises / lowers) total output. The increase in the capital stock (disregarding technical progress) (raises/ lowers) the demand for labor. Hence we would expect labor's wage or price to (increase / decrease). The exception to this is the case of technical progress which greatly (increases / decreases) the interest or profit rate and (increases / decreases) the demand for labor.

8. The facts of U.S. growth since 1900, as indicated in the text, are these:

a. The labor force has approximately (remained constant / doubled / increased fourfold / increased sixfold). The stock of capital has approximately (remained constant / doubled / increased fourfold / increased eightfold)

That is, the capital stock, in proportion to the labor force, has (increased / decreased) by a factor of (2 / 4 / 6). There (has / has not) been a deepening of capital.

If both capital and labor had increased eightfold, we would expect output (disregarding technical progress) also to have increased by a factor of 8. But with labor only doubled, we would expect the output increase to be (more / less) than eight times its value in 1900.

b. In fact, output has increased by a factor of about (2 / 4 / 8). This means that the ratio of capital stock to annual output—the capital–output ratio—has (increased / remained about constant / decreased). Things (have / have not) worked out as the simple law of diminishing returns would indicate, the reason evidently being (that the law has been incorrectly set out / technological change / the higher real wage paid to labor).

c. The actual capital–output (K / Q) ratio in the United States is at present about (1 year/ 3 times $K / 3$ years / 5 times L).

d. Real wages (have risen / have fallen / show no clear trend either up or down). The interest or profit rate—the "price of capital" (has risen / has fallen / shows no clear trend either up or down).

e. Output per work hour, or Q/L , has (risen / remained constant fallen). The increase in the wage rate (has exceeded / is approximately equal to / has fallen behind) the (increase / decrease) in output per work hour.

9. The terms "labor–saving" and "capital–saving" innovations lack precise, universally accepted meanings. The text suggests that an "X–saving" innovation is one which has the effect of reducing (X 's price / X 's relative share in total product / amount of X employed per unit of output)

LEARNING OBJECTIVES

After studying text, the preceding review material, you should be able to meet the following objectives:

1. Define or explain briefly (a) the labor theory of value; (b) the law of diminishing returns; (c) the capital–output ratio; (d) the "deepening" of capital.

2. Outline the major problem (or problems) opened up for economic analysis once that analysis moves beyond the simple "labor theory of value" to recognize that there are two (or more) types of inputs involved in production.

3. Describe briefly the sequence of events predicted from application of the Malthus–Ricardo interpretation of the law of diminishing returns.

4. Describe similarly the sequence predicted when capital is considered the variable and increasing factor, and labor the fixed factor—without technological change. Explain how the conclusions so reached are altered (if at all) when allowance is made for technological change.

5. Summarize briefly the results that have occurred in the United States since 1900 with respect to (a) total real output; (b) real wages; (c) the real rate of interest or profit; (d) growth in the capital stock; (e) growth in population or the labor force; (f) the capital–output ratio; (g) the effect (if any) of the diminishing– returns law.

QUIZ: Multiple Choice

1. Suppose agricultural output requires only two inputs, labor and land. The quantity of land available is fixed: the quantity of labor is variable. Then, as labor quantity is increased in order to increase output quantity, the law of diminishing returns will begin to operate, and (1) the ratio of labor to land will increase; the ratio of land to output will fall, (2) both the labor–land ratio and the land–output ratio will fall: (3) both the labor–land ratio and the land–output ratio will increase: (4) the labor–land ratio will fall. and the land–output ratio will increase: (5) the labor–land ratio will increase, but the land–output ratio will not change.

2. In the simple labor theory of value, demand for goods plays the following role: It (1) interacts with supply to determine price, as in any other case: (2) dominates over supply in the determination of price, but does not influence quantities produced and consumed: (3) settles quantities produced and consumed, but has no influence on price; (4) has no influence either on quantities produced and consumed or on price: (5) dominates over supply both as to price and as to quantities produced and consumed.

3. The most important single factor accounting for increased productivity and growth in the American economy thus far appears to have been (1) a deepening of the capital stock: (2) technological change: (3) a

widening of the capital stock; (4) the use of growth–encouraging monetary and fiscal policy; (5) the increase in skills of the labor force

4. Since 1900, the stock of capital in the United States (according to the text) has increased (1) eightfold, and operation of the diminishing–returns law has significantly reduced the capital–output ratio; (2) tenfold, and operation of the diminishing returns law has significantly increased the capital–output ratio (3) only by an amount proportionate to the increase in the labor force, so that the diminishing–returns law has had no application; (4) threefold and operation of the diminishing–returns has significantly reduced the capital–output ratio; 5 eightfold, but the capital–output ratio has not increased significantly, despite the diminishing returns law.

5 In the United States (according to the text) the share of wages and salaries in national product since 1900 (1) has significantly increased, (2) has remained about constant, or shown a very slight upward trend: (3) has significantly fallen, except for a Period during and immediately after World War II. (4) rose fairly steadily until about 1930 and remained constant until 1945 (excluding World War II,) but has fallen perceptibly since then; (5) is not correctly described by any of the above.

6. If the amount of capital employed is increased, if the amount of labor and other inputs stays approximately fixed, and if the capital–output ratio

remains constant, then (1) the capital–labor ratio must have fallen;(2) the price of capital must have fallen. (3) the law of diminishing returns has been in operation; (4) technological improvements would explain this result: (5) total output must have fallen.

7. If the capital–output ratio increases, then it should follow that (1) the real wage of labor must fall if there has been no technological change, but not otherwise; (2) the real wage labor must fall, regardless of the extent of technological change; (3) the total stock of capital must have decreased, or at best remained constant: (4) the real rate of interest or profit must fall if there has been no technological change, but not otherwise; (5) the real rate of interest or profit must fall, regardless of the extent of technological change.

8. A deepening of capital must, in the absence of technological change, (1) increase the capital–output ratio: (2) decrease the capital–output ratio, (3) increase output more than proportionately to the increase in capital; (4) increase output in proportion to the increase in capital: (5) increase the share of capital owners in the total of output

9. According to the law of diminishing returns, if land is the fixed input and labor the variable input, then as the quantity of output is increased, (1) the relative share of labor in total product must fall; (2) the price of land must fall; (3) the share of labor in total product or output must rise;

(4) land's percentage share in total product or output must rise; (5) none of the above is necessarily correct.

10. By "deepening of capital" is meant (1) an increase in the stock of capital relative to the size of the labor force; (2) the introduction of new capital goods which embody technological change; (3) a change either in productivity or amount of capital which increases the share of capital-owners in total product; (4) an increase in the productivity of capital which reduces, or at least does not increase, the total of the capital stock; (5) none of the above.

11. If capital is considered the variable input, then in the operation of the law of diminishing returns (without technological change), as output is increased, (1) the share of capital-owners in total output must increase; (2) the capital-output ratio must decrease; (3) the share of capital-owners in total output must decrease; (4) the capital-output ratio must increase; (5) the capital-output ratio must, by definition remain constant.

12. If a nation's capital-output ratio gradually increases overtime, this indicates that (1) the share of capital-owners in total output is increasing; (2) the diminishing-returns stage has not yet been reached with respect to capital, (3) the marginal-physical-product of capital must have reached zero; (4) technological progress must be improving the

productivity of capital: (5) the law of diminishing returns is operating with respect to capital's productivity.

APPENDIX: Modern Discussions of Development Theory

Because much of the material in this Appendix is at the frontier of economic knowledge, it is by no means as well organized or integrated as the topics outlined (for example) in Parts 2 and 3 of the text. Some of it may seem difficult—as, for example, the "Harrod–Domar growth models. These growth models are really fairly simple—but they do not seem simple at all until you have mastered the elements that go into their construction.

1. Economic growth analysis often begins by drawing on the Ricardo–Mills idea of the stationary state. (It is also mentioned briefly in reference to Mills thought.) Many classical economists thought that nations would grow until they reached a final "stationary state condition. Thereafter, there would be no further growth— not, at any rate, in the capital stock. When this final state is reached, the economy's stock of capital goods may be very large, but there is (positive / zero / negative) net investment—i.e., the capital stock (is / is not) being increased. There is just enough investment each year to balance that year's depreciation of the existing capital stock. The interest rate is (positive / zero / negative). No net investment is being undertaken because (1) all the capital–goods projects carrying a yield higher than the prevailing interest rate have

already been undertaken, and (2) at that prevailing interest rate, the amount of saving out of income is (positive / zero / negative).

The points to note especially are these: (a) capital growth stops because there is no saving to finance investment; (b) saving stops because the interest rate is insufficiently high to persuade people to save any part of income. So the classical belief in a stationary–state tendency relies heavily on the view that the interest rate is important to people in deciding how much (if anything) they will save out of incomes.

2. More recent views have been sceptical of this alleged drift toward a stationary–state equilibrium. Perhaps the strongest counterargument emphasizes the fact of technological change the drive toward which has been powerful in capitalist economies.

The stationary–state economists conceded that increases in per capita output might be possible via better technology. But–for the stationary state–the introduction of these improvements would have to be financed entirely out of depreciation allowances–i.e., net investment would have to be zero, that being one of the conditions of stationary–state equilibrium. In actual fact, new technologies usually find their expression in new and different machines or equipment, the development of which calls for positive net investment.

Joseph Schumpeter was prominent among the critics of the stationary-state idea. He argued that—insofar as any such tendency exists at all—it is repeatedly offset by the work of crazy and not-so-crazy inventors who want to do things differently and—perhaps—better.

There is an important distinction to be made here. The inventor is one who thinks up a new idea. But there is a huge gap between that new idea and the new (or improved) and commercially successful product in which the idea finds its expression. Schumpeter called the individual who bridges (or tries to bridge) that gap (a speculator / an economist / an innovator).

In Schumpeter's view, if you want to understand what "capitalism" has meant, and how it has really behaved over the past 100 or 150 years, you must look at the process of technological change— and in more detail, at the two stages of that change. Inventors invent. Innovators seek to profit from invention. (Inventor and innovator may or may not be the same individual.) Some innovators have succeeded; some very few have succeeded spectacularly. Most of them have (with less publicity) gone broke. But the lure of winning the grand prize in the innovation lottery remains undiminished.

Normally, innovators go to the money capital markets, seeking the finance they need. They have thus bid (up/ down) the interest rate, thus (encouraging / discouraging) saving out of income as financing for the new projects. Repeated innovations thus keep pushing the economy into bursts of capital accumulation and growth.

3. Stationary–state reasoning has also been attacked for its view that the amount people save out of income is governed primarily by the level of interest rates. In the Keynesian view, people save against life's uncertainties, and they go on saving no matter how low the interest rate may be.

The interest rate may instead dictate what people do with income saved. People may save when interest rates are low—but they do not necessarily lend. Instead, they may display "liquidity preference". In periods when profit opportunities look bleak, investment will be (high / low), and the reduced demand for investment money will make the interest rate (high / low). However, this (high / low) interest rate will not of itself reduce saving. So the disparity between saving and investment must be ironed out by a (rise / fall) in incomes and production, and by unemployment.

This is, of course, "short–run analysis" (as Schumpeter pointed out with respect to Keynes). These periods of unemployment may in time be

overcome by further technological change, and consequently a surge of new investment. If we combine Schumpeter's views with those of Keynes, the conclusion is that capitalist economies are more likely to continue to grow rather than to drift toward a stationary-state equilibrium. Technological change will persistently create new investment opportunities, and the public's continued disposition to save will (except, just possibly, in certain low-interest-rate periods) provide financing for investment.

4. Much of this Appendix deals with the concepts of the natural rate of growth and the warranted rate of growth, used in Harrod-Domar growth models.

"Growth" means here year-to-year increases in total output. These models tackle the question: Can a capitalist economy maintain reasonably steady growth without drifting off its growth path into unemployment and depression on the one side, or inflation on the other? The answer: Yes, provided several independent forces mesh together properly; otherwise, no.

The major forces involved are: (1) The rate of increase in the capital stock—ie., rate of net investment. (2) (The rate of saving out of income by the public (saving being the means by which investment is financed)). (3) The rate of increase in population, and consequent increase in the

labor force. (4) The law of diminishing returns. (5) Technological change.

To approach the Harrod–Domar models in detail, begin with the chapter's discussion of diminishing returns. If the capital stock K is increased, then total output will increase also. But if K grows more rapidly than the labor force L , then the percentage output increase will be less than the percentage K increase—i.e., K will feel the impact of diminishing returns. However, K 's "marginal productivity" can be restored or even improved if new and more efficient capital goods are developed—in other words, if there is technological innovation: This would have to be "labor–saving innovation: less L needed in production per unit of K ."

Now let's tackle the "natural rate of growth." We begin by assuming there is no technological change. Thus as K increases, it is under a continuing diminishing–returns threat. However, we here use the diminishing–returns law in simplified form.

The usual diminishing–returns outline (e.g., Study Guide Fig1) says that as the amount of the variable input is increased (relative to the fixed–amount input), its marginal product will gradually fall, ultimately reaching zero. It is often argued that this outline exaggerates the extent to which variability of input proportions is typically possible in actual production.

By and large, in this view, a given capital stock needs a given labor force to operate it. If there are insufficient capital goods, some part of that labor force will be unemployable. If the capital stock is too large, some part of that K will be unusable until and unless L is increased. Note carefully that this is not a denial of the diminishing-returns effect. It says only that this effect, instead of occurring gradually, will occur all at once, at the point where the fixed K/L ratio is reached, suddenly and completely.

In Harrod-Domar models, the relationship in production (dictated by technology) between the total capital stock K and total labor force L is assumed to be sufficiently close to fixed that it is no great distortion to treat this K/L ratio as being exactly fixed. If this fixed-proportions requirement is not satisfied, the factor in excess, whether K or L, will be unemployable.

Now consider the fact that population and the labor force ordinarily grow year by year. Let this growth rate, expressed as a fraction, be designated g . For example, if the growth in L, is 3 per cent annually, then $g = \frac{3}{100}$

We have assumed that technology dictates a fixed K/L ratio. Assume further that the current and actual K/L ratio is "just right" (i.e., there is no excess of either input). But L is increasing. This calls for a matching

increase in K to maintain the proper K/L ratio. Will it occur? That is the question underlying the "natural-rate-of-growth" idea. The forces that govern increases in population and the labor force are markedly different from those that govern increases in K.

Using our example of a 3 per cent annual increase in L, we want K's annual increase to be 3% of K, to maintain the proper K/L ratio. More generally, we want the annual increase in K to be g_K . However, any increase in K (whether the desired g_K or some other figure) is what we more usually call net investment I. There must be just enough of each year's total output Q channeled into investment rather than consumption, to provide the required K increase.

(In growth analysis, the symbol is conventional for "total annual output"—the same thing more commonly called GNP. We shall use Q for the balance of this question. REMEMBER: $Q = GNP$.)

This means that just the right amount of Q must be saved, since net investment spending is financed out of saving S. (In natural-rate-of-growth analysis, it is assumed that there is no "Keynesian problem, whereby saving fails to flow smoothly into investment.)

So the problem is: How much must be saved out of Q (what fraction of Q must be saved) in order to produce the needed I (the K addition desired so as to match the L addition)?

Let s = the fraction of Q saved annually. Thus total annual saving will be sQ .

Now we can fit things together. By the assumption that all saving flows into investment, we have $sQ = I$. And the desired $I = gK$. Hence, if things are to go as desired, we must have $sQ = gk$. Or to put that equation in the text's form:

$$s = g \times \frac{K}{Q}$$

The expression K/Q , on the right-hand side of this equation, is the capital-output ratio, a measure already introduced in the chapter immediately preceding this Appendix, and one which crops up in all these growth models: the ratio between the value of the total capital stock and the value of total annual output. If total K is valued at \$10, and annual Q is \$3, then the capital-output ratio is $10/3$, or $3\frac{1}{3}$ (years). Assuming the same ratio to apply to additional K and additional Q, as is done in these models, this means that if \$10 is spent on net investment in some new capital goods, that investment can yield, for each year of the life of those capital goods, additional output of \$3.

Now consider the commonsense meaning of the equation above. In our example, L grows at 3 per cent per year. So we want both K and Q to grow at 3 per cent also, to stay on the natural-rate-of-growth path. This calls for net investment, hence an equal amount of saving to finance that investment. How much saving and investment? One may be at first tempted to say: 3 per cent of Q . Not so. The capital-output ratio says that that amount of new capital goods would fall short of producing an additional 3 per cent of Q . It tells us that 10 of I is needed for 3 of Q . Putting 10 per cent of Q into investment will yield just a 3 per cent increase in Q annually. (It will also increase K by just 3 per cent. The value of total K is $3\frac{1}{3}$ times Q . So 10 per cent of Q equals 3 per cent of K .)

a. In brief, given any labor-force growth rate g , we must multiply g by the capital-output ratio K/Q in order to determine the required rate of saving s out of income. With a K/Q ratio of $3\frac{1}{3}$ and a labor-force growth rate of 3 per cent annually, 10 per cent of income must be saved and invested to keep this economy on its natural-rate-of-growth path.

If, instead, L 's annual growth rate is 4 per cent (with the same K/Q ratio), the required s -value would be approximately (8.5 / 10.0 / 13.3 / 15.0 / 16.7) per cent. If the L growth rate is 5 per cent, the required s -value becomes (8.5 / 10.0 / 13.3 / 15.0 / 16.7).

b. If saving does take place at the percentage rate required, we have "balanced growth: the saving rate is balanced against the labor-force growth rate. Using the 3 per cent L growth figure, if saving is 10 per cent of Q, then output will grow annually at $(3 / 10)$ per cent. Allowing for population increase, output and income per capita will increase (by 3 per cent / by 10 per cent / not at all). (Hence this is growth only in a qualified sense, we return to this point in question 8.) The capital-labor proportion K/L will (rise / remain constant / fall).

c. If saving falls short of that required by population growth, the ratio K/L will (rise / remain constant / fall), and the result will be (unemployment / inflation) by reason of an (excess/ insufficiency) of capital goods.

5. a. In actual fact, as was pointed out earlier in the chapter, in the United States the ratio K/L has (risen / fallen / remained constant). This suggests that the path followed has not been that of "balanced growth." But in the illustration of question 4, technological change was specifically excluded. When consideration is given this element, U.S. growth may still have been "balanced."

Technological innovation may take many forms. Typically, it appears in the form of new and different capital goods, which human labor is trained to operate. One way of handling technological change analytically is to think of it as a development increasing the productivity of labor.

By this approach, the increase in L (the labor force) does not fully indicate the increase in the "effective" labor supply—if L is increasing not only in numbers but in productive efficiency. The text uses the symbol L^* to measure the effective labor force. That is, if L grows, and this growth is accompanied by greater training and skill, L^* grows (even faster / more slowly).

If the ratio K/L rises, as it has done in the United States, it is (impossible / still possible) for the ratio K/L^* to remain constant.

b. In the United States since 1900, the division of GNP between K owners and L owners has (shifted in favor of K owners / shifted in favor of L owners / remained approximately constant). Further, the capital–output ratio K/Q (i.e., K / GNP) has (increased significantly / decreased significantly / remained approximately constant). These two facts (correspond / do not correspond) to "balanced growth."

c. In the United States, the real wage per unit of L has (risen / fallen / remained constant). In "balanced growth," the wage per unit of L^* (rises / falls / remains constant). The actual rise in United States wage per unit of L (can be / cannot be) consistent with "balanced growth."
(Remember that L is smaller than L^* . So an unchanged per capita income for each L^* unit will mean a higher per capita income for each L unit.)

"Balanced-growth analysis, in summary, notes that we must reckon with two basic and largely independent elements: growth in population (or the labor force), and the propensity of the population to save. These two elements must harmonize in the sense that saving finances investment, and that investment takes the form of the new capital goods with which the increase in population must work. Growth is "balanced," and it occurs at "the natural rate," when these two basic elements are in reasonable harmony.

The elements are not in harmony when saving fails to provide the required amount of new capital goods. But they are not necessarily out of harmony when saving appears "too great," so that its tendency is to increase the K/L ratio. This is an incentive toward "labor-saving innovation"—i.e., technological change designed to change the fixed K/L ratio, to increase it to a higher "workable" level.

The economists who argue that factor proportions are fixed (or nearly so) consequently do not regard the observed rise in K/L as a contradiction of their view. They consider input proportions to be fixed only in a particular state of technology—i.e., with given equipment. A more automated technology defines a new and higher (but again fixed) K/L relationship.

6. If the rate of saving is high in relation to the growth in the labor force, it is far from state to assume that technological change will always save the day. Even if such output-increasing changes are directed toward an increase in the K/L ratio (i.e., toward "automation), their effects typically appear rather slowly in actual production.

If we assume, as natural-growth analysis does, that whatever is saved will be invested, then getting just enough in new capital goods to match the population increase reduces to getting just the right proportion of income saved (not used for consumption). But that reasoning ducks the Keynesian problem. Will the amount of scheduled investment equal the amount saved? the point that investment plans are made dependently of saving plans. If the total of scheduled investment is less than the total amount the public plans to save, GNP will fall. (With incomes lowered, saving will be lowered also.)

There is a further complication, Insofar as net investment creates new plant and equipment, it adds to productive capacity. That capacity is gradually increased; and so is the "full-employment" level of GNP. If the public wants to save some given fraction of its income (a rising income), we need, not steady investment spending, but gradually rising investment spending.

This brings us to warranted-rate-of-growth analysis. It tackles a question different from the natural-growth one: Will enough new capital goods be produced, through investment, to match all the saving the public wants to undertake?

The four beginning ingredients in Harrod's warranted-rate analysis are as follows:

(1) Just as in the natural-rate case, it is assumed that in production, input proportions are fixed-i.e., K/L is fixed. We also have a given capital-output ratio, K/Q , or K/GNP .

(2) We start with more than enough L . for the existing K . Part of the labor force is unemployed for lack of capital goods with which to work. An increase in K is needed if even part of this unemployment is to be

removed. (For this question, it makes no difference whether total L is increasing annually, as in question 4, or is fixed in amount)

(3) Business firms are assured that there will be some extra L available to work with any extra K created. But they still must ask this question: If we build this extra K, will there be sufficient demand for the extra output thereby producible to have made that investment worth undertaking? In sum: Will there be a sufficient rise in GNP to justify building the extra K? so the underlying question is: What will be the rate of rise in GNP?

(4) The public plans to save some fixed fraction of GNP. The public does the saving, but a different group—business firms—does the investment (I) spending. The amount of S imposes an upper limit on the amount of I spending possible. But that is no guarantee that business firms plan to spend on I as much as the public plans to save.

Assuming the existing capital stock K to be fully employed, then the amount of I spending planned by business firms will be governed by their expectations as to the future level of GNP (or). (As in question 4, hereafter we use only the term Q, not GNP.)

Suppose that business firms are pretty confident that Q will rise by 10 per cent—say, from \$100 to \$110 billion. Since their present K is fully occupied, they will want to have built just enough extra K to meet that \$10 billion increase in demand for output.

How do we convert that anticipated \$10 billion Q rise into a dollar total for extra k ? The "rate of exchange" is provided by the capital–output ratio, K/Q . If this ratio is 3, business will want to use saving of \$30 billion (and not more), since that amount of investment (addition to K) is just capable of producing an extra \$10 billion of Q annually. Thus the combination of business expectations and the K/Q ratio will settle the amount of I spending.

a. If business firms instead anticipate a Q rise from \$100 to \$120 billion, with the same K/Q ratio of 3, their desired I spending will be \$(zero/ 20 / 40 / 60 / 80 / 100) billion. If they expect no rise in Q , then their planned I spending will be \$(zero/ 20/ 40 / 60 / 80/ 100) billion. The planned I spending total equals the expected Q rise multiplied by the capital–output ratio.

Let W stand for the expected Q rise, stated as a fraction. (If a rise from \$100 to \$110 billion is anticipated, $W = 1/10$; if from \$100 to \$120 billion, $W = 1/5$.) What is the general expression for I , stated in terms of W , Q , and K/Q ?

b. At long last, we reach the "warranted rate of growth." It is that rate of annual growth in Q , expressed by the symbol W (a fraction of Q) that, once started, would just keep the economy progressing in a smooth, continuing rate of growth. Remember, the fraction of Q that people want to save is assumed to be fixed. That fixed fraction of Q saved would be just enough to equal the amount that business firms would want to invest, given their expectations as to future Q .

The essential requirement, then, is just $S = I$. And finding W , the warranted rate of growth, is just a matter of (1) putting S in place of I in the equation worked out in part a above, and then (2) rearranging that equation so that W sits alone on the left-hand side thereof. Use a separate scrape of paper for the detail, then show the resulting equation below.

c. In the equation above, S stands for total saving. The text equation uses the symbol s_a to indicate that fixed fraction of Q which the public insists on saving. Thus, $S = s_a Q$. Make this substitution in the equation above, and you get the text's equation, namely:

$$W = \frac{s_a}{K/Q}$$

If the fraction of Q that people wish to save is always 12 per cent, and the capital-output ratio is 4, the warranted rate of growth would be (zero / 1 / 2 / 3 / 4 / 5) per cent per annum. If K/Q is 5, and saving is always 10 per cent of income, the warranted rate would be (zero/ 1/2/3/4/5) per cent growth per annum.

7. The "warranted-rate-of-growth" idea is pretty clearly related to the "acceleration-principle," investment spending is largely governed by the rate of growth in GNP (or Q). But in the warranted-rate outline, such spending is much more dependent upon business firm's expectations as to the likely rate of GNP increase than it is in the acceleration-principle argument.

Notice that the "warranted rate of growth" is not envisaged as a growth rate that will necessarily remove all unemployment of L —even though creation of new plant and equipment will of course add to employment. (Unlike the "balanced-growth" model of question 4, warranted-rate analysis pays relatively little attention to L 's size—i.e., is it fixed, or growing? There must be enough L on hand to operate the additional K created—that's about the extent to which warranted-rate analysis considers the L matter.)

The essential point to grasp about the warranted-rate argument is this: If the economy manages to get started along its warranted-rate growth

track, it will (so the argument goes, any-how) continue on that steady growth track (assuming the fixed capital-output and saving percentage figures persist) until and unless some disturbance bumps it off.

One possible source of disturbance is the limit on the labor force L . If K grows so rapidly as to overtake L (even though L may be rising), then, with unemployed L removed, K runs into the fixed K/L ratio, and investment meets a bottleneck. The amount of I spending will (increase/decline), saving will (exceed / fall short of) investment, and GNP will be thrown off its warranted rate path. While in due course technology may change things by increasing the K/L ratio, the shorter-run adjustment may be the Keynesian one: a fall in incomes and in saving.

8. If an economy gets aboard its (positive) warranted-rate growth track, and manages to stay aboard, presumably one result to be expected is something we normally associate with growth, namely, an increase in per capita incomes. But now turn back to the natural-rate-of-growth model examined in question 4. This is growth only in a limited sense. The capital stock K will be increasing—but only in proportion to Q and to L . Everything continues just as it was before, except that it is being done on a somewhat larger Scale. Output Q grows, to be sure. But L grows at the same rate. There is no increase in per capita income.

Such a growth in K --just enough to maintain the existing K/L ratio--is sometimes called a widening of capital--in contrast to a deepening of capital, which means an increase in the K/L ratio. The results of capital deepening (without technological change) are those described in diminishing--returns analysis. To review part of question 4, and some of the questions used in the chapter preceding this Appendix, when capital is so deepened, Q will grow (more than / exactly / less than) in proportion to the K increase. The capital Output ratio K/Q must (increase / remain constant / decrease), since K is increasing (faster than / at the same rate as / less than) Q the rate of return to K (the interest rate, or rate of profit) will gradually (increase / decrease). The wage rate, or rate of return to L , will (rise / remain constant / fall).

These results rely crucially upon the assumption of no technological change. In the actual history of recent times, there most certainly has been such change. Hence the results discussed in the text, and in question 5 above.

9. The Leontief input--output system (see text) is not at all concerned, as Harrod--Domar models are, with aggregate growth." Although it involves some interest in the matter of growth, the Leontief construction is microeconomic in the particular sense that it deals with the individual products which collectively make up GNP, and with the individual inputs required for manufacture of these finished products.

Suppose that GNP is composed of just three types of finished goods: X, Y, and Z. Suppose further that (for whatever reason) this problem is posed: We need a 5 per cent increase in X output, a 15 per cent increase in Y output, and we can afford to reduce Z output by 10 per cent. Overall, what would these output changes call for in the way of extra productive inputs needed?

This is the type of question the Leontief system is constructed to answer. As its base, it uses statistical material covering production in past years.

It is appropriate to illustrate the nature of the Leontief system through the example of a three-good GNP. But in real life, things are rather more complicated. Within any actual GNP, there are thousands upon thousands of different items. Even a computer-aided system cannot take full account of them all. The most appropriate simplification is to lump products together by industry—thus making the industry the microeconomic unit. Even a quite modest plan of division yields several hundred industries for a Leontief system to digest.

Typically, the output of any one industry goes in two directions. Part of that output may be a finished consumer good for households. But part

(or all) may go to other industries as inputs. Fuel oil is an output used by families for home heating. It is also an input used by firms for their manufacturing needs.

A Leontief table is built to record this fact. Each industry gets a line (technically a row), showing where its output went. On the X-industry line, so much of X output went to the Y industry as a raw-material input, so much to the Z industry for similar use and finally, so much of X to households for consumption purposes.

This arrangement of rows, one for each industry, means that each industry also gets a column (a vertical listing), showing the inputs it got from other industries—that is, the raw materials it needed to produce its own finished product. At the bottom of each column is a figure showing that particular industry's total labor input.

This is the information at the surface of a Leontief system. Suppose the table indicates that 6 labor units, L, were used per unit of X produced. This is only the direct requirement. X's total L requirements were greater, for X's production also called on inputs from Y and Z, and they used labor too. (Of necessity, a Leontief system must work in money terms, but these money figures are intended as equivalents of real input-output relationships.)

The Leontief system probes for total input–output needs: the total L per unit of X, total Y per unit of X, total Z/X relation, and so on. Each such input–output figure (e.g., 10 L units per X unit) is assumed to be fixed; this is really the same "fixed–factor– proportions assumption used in Harrod–Domar models.

If the Leontief system has developed these "input–output coefficients" correctly, it can then indicate the requirements for any given increase in output. Suppose (to use a simplified version of the illustrative problem with which this question began) the question is: What would be needed in order to obtain a 10 per cent increase in net final output of X –with no increase in net final outputs of Y and Z?

Insofar as Y and Z are needed as inputs in X production, more of these commodities will have to be turned out even though there is to be no increase in their final output. And the required increase in X output may have to be more than 10 per cent–if X is needed as an input in Y production or in Z production.

The Leontief system will accordingly report that such a 10 per cent increase in net final X output would require so many extra units of X, so many of Y, so many of Z, and so much extra L.. We would expect the L requirement to be (less than / the same as/ greater than) the extra L needed directly in the X industry. The rise in Y production will (increase "final consumption" of Y/be fully absorbed as inputs for other industries).

The same is true of Z production. Of the increase in Y production, (all will go directly to the X industry / some may go, for example, to the Z industry, hence only indirectly to the X industry).

LEARNING OBJECTIVES

After studying the Appendix and the preceding review material, you should be able to meet the following objectives:

1. Explain what is meant by "the stationary state." Outline the views which prompted some classical economists to argue that there was a long-run tendency for any economy to gravitate toward this stationary state, and set out two counterarguments.
2. Describe what is meant by a "balanced rate of growth," indicating the two independent "rates which are in need of balance. Explain the "Keynesian" possibility which is set aside in the development of such balanced-rate analysis.
- 3 Describe what is meant by a "warranted rate of growth." Distinguish it from the balanced-rate analysis mentioned above, and cite the two magnitudes that are needed to establish an economy's warranted-rate growth path.

QUIZ: Multiple Choice

1. A "deepening of capital can be expected to reduce the rate of interest or profit unless (1) the capital–output ratio remains constant; (2) the capital–output ratio increases; (3) the capital–labor ratio increases; (4) the capital–labor ratio decreases;; (5)– output remains constant.

2. If saving and investment take place in the amounts indicated by the natural rate of growth, (1) the ratio of capital to labor in production will rise; (2) the ratio of capital to output will rise; (3) the rate of profit or interest will rise; (4) the share of labor–owners in GNP will rise relative to the share of capital–owners; (5) none of the above is correct.

3. According to the analysis of the "natural rate of growth," if the economy is actually growing at that rate, (1) the capital– output ratio will increase, but at a rate less than the natural rate of growth; (2) technological change will be taking place at a steady rate, and the rate of return on capital will be maintained at a steady level by this technological change; (3) there will be a widening of capital but no

deepening of capital; (4) there will be a deepening of capital but no widening of capital; (5) none of the above is correct.

4. "Balanced growth," as the term is used in Harrod-Domar models, involves essentially a balance between (1) saving and investment; (2) investment and the capital-output ratio; (3) total capital and total labor; (4) investment and the distribution of income between capital and labor; (5) saving and population growth.

5. The principal concern of "warranted-rate-of-growth analysis is with the (1) rate of increase in the labor force needed to just match the scheduled increase in investment spending; (2) rate of saving needed to just balance against the rate of increase in the labor force; (3) rate of interest that will attract a volume of investment just sufficient to maintain full employment; (4) maximum rate of growth in output that is possible without setting off inflationary price increases; (5) rate of investment spending needed to just balance against the fraction of income which the public wishes to save.

6. Which alternative in question 5 would be correct had that question referred, not to the "warranted rate," but to the "natural rate" of growth?
(1). (2). (3). (4). (5).

7. The results attributed to "capital deepening" (without technological change) are those produced by (1) the law of diminishing returns; (2) a fixed capital–output ratio; (3) balanced growth;(4) the warranted rate of growth; (5) a decrease in the K/L ratio.

8. "Warranted and "natural" rates of growth differ in this respect, namely, that (1) warranted–rate analysis assumes that capital can be deepened, natural–rate analysis that it cannot; (2) natural–rate analysis assumes unemployment of labor, and GNP

is thrown off the natural–rate path when full employment is reached: (3) the natural rate indicates the fraction of income the public actually wishes to save; (4) the warranted rate is an unstable one, and any disturbance will throw GNP off the warranted–rate path; (5) not at all, since they are two words used by different economists to mean the same thing.

9. A Leontief input–output system records, with respect to the total output of any one industry. (1) only that part going to households, since to include the part going to other industries would be double counting; (2) only that part going to other industries, since its purpose is to record input–output relationships; (3) that part going to households and the part going to other industries as well, but the latter on a value–added basis to avoid double counting; (4) both the part going to households and the

part going to other industries, in full; (5) none of the above, since for industries it records inputs, not outputs.