higher growth rate. Structural incapacity to supply enough capital goods will prevent a rise in the saving ratio from being fully transformed into the desired level of investment. But it has to be taken into account that a one-sided preoccupation with this 'Fel'dman constraint' on the investment capacity side may bring the 'Preobrazhenski constraint' on the consumption side into action. If the initial capacity of the capital goods industry is just sufficient to replace the worn-out machines, growth can only take place as a result of a temporary reduction in the output of consumer goods which may be impossible for subsistence reasons. In this case a circuitus vitiosus will emerge.

The strategic role of the machine tools sector and the compulsion to enlarge first the equipment in capital goods industries were also dealt with by economists discussing the growth and planning problems of underdeveloped countries in the Fifties and Sixties (see, for example, Dobb, 1960 and Mathur, 1965). Countries like India which lack a self-sufficient machine tools sector can speed up their transformation process by foreign trade. The Fel'dman constraint would be binding only if the domestic output of machine tools could not be supplemented with imports.

The perception that there is a group of fixed capital goods which hold the strategic position in any industrial system like seed corn for agricultural production, led Lowe to the conclusion that it is useful to split up the capital goods sector in the Marxian scheme of reproduction into two subsectors. In his 'tripartite' scheme of three vertically integrated sectors, the first produces primary equipment goods or 'machine tools' which are directly used for production in sectors I and II. Sector II produces the secondary equipment goods which are used as inputs only in sector III producing consumer goods, which means that the capital stock in the latter is not transferable. Thus sector I is the only one capable not only of producing machines for other sectors but also for itself; it is therefore a self-reproducible sector. In Sraffa's terminology, sector I represents the 'basic system'.

The sub-division of the capital goods group is relevant for investigating the structural conditions for steady growth and, even more, in addressing questions of 'traverse analysis', when the problem of structural change is moved to the centre of the stage. The decisive problem that the economy faces upon departing from a steady growth path is the inadequacy of the old capital stock. The dynamic traverse from one steady growth path to another necessarily involves a change in the whole quantity structure, especially the rebuilding of the capital stock. The economy cannot change output unless it first changes inputs, i.e. the capital goods group must provide the commodities demanded for changing the inputs to produce the new output pattern. The production of machine tools is the bottle-neck which any process of rapid expansion must overcome. The key to a higher growth rate lies in increasing the shares of sector I. The same logic requiring that the system as a whole first has to change inputs before it can change output makes such an increase dependent on the prior expansion of the capital stock of this sector. Whereas in the two-sectoral Fel'dman model this is only possible by a policy of putting a larger proportion of new machine tools into the production of more machine tools, in the Lowe model an additional ex post transfer of machines from sector II to sector I is possible, thereby shortening the time of adjustment. Both models come to the same result, namely that in order to increase the growth rates of total output and consumption output in the long run, at first a temporary fall in the growth rate of consumption output is necessary.

The neo-Austrian theory developed by Hicks is characterized by a completely different treatment of the durable means of production. In his neo-Austrian model, a stream of labour inputs is converted into a stream of final outputs (consumption goods). 'Capital goods are simply stages in the process of production' (Hicks, 1973, p. 5), i.e. they are regarded as intermediate products which don't appear explicitly but are implied and produced within each process of 'maturing' of original inputs into the final product. Thus the intertemporal aspect of production and consumption is placed into the forefront of the analysis; time is the essence of capital in the Austrian view. By treating fixed capital as if it were working capital, Hicks does not recognize the need for a special machine-tools sector. There is no basic product in this model. Hence, the production process is not 'circular'; the neo-Austrian approach turns out to be a further variant of the production theoretic paradigm of marginalist analysis, which conceives of the production process as a 'one-way avenue that leads from “Factors of production” to “Consumption goods”' (Sraffa, 1960, p. 93).

It is precisely the focus on the adjustment problems caused by the impact of technical innovations that has led Hicks to his vertical representation of the productive structure. In contrast to Leontief-Sraffa-Lowe systems, in Hicks neither intersectoral transactions, nor therefore the effects of innovation upon industrial structure, are shown. Hicks sees the decisive advantage of the Austrian method in its ability to cope with the important fact that process innovations nearly always involve the introduction of new capital goods. This would lead to insurmountable difficulties in the traverse analysis if capital goods were physically specified because 'there is no way of establishing a physical relation between the capital goods that are required in the one technique and those that are required in the other' (Hicks, 1977, p. 193). A similar explanation is given by Pasinetti who develops his theory of structural change in terms of vertically integrated sectors. While conceding that the input-output model gives more information on the structure of an economic system at any point in time, he points out that because of the change of input-output coefficients and the 'breaking down' of the inter-industry system over time, the vertically integrated model is superior for dynamic analysis (see Pasinetti, 1981, pp. 109–17). Measuring capital goods in units of vertically integrated productive capacity of the final commodity 'has an unambiguous meaning through time, no matter which type of technical change, and how much of it, may occur' (p. 178).

Whilst it is true that a sectorally disaggregated approach encounters difficulties when the effects of innovations connected with the introduction of new capital goods are studied, the price that Austrian-type models have to pay for their linear 'imperialism' is rather high. Technical change takes place at the industry level, a characteristic which is completely washed out in vertically integrated models. The industriesspecific nature of technical change also implies that, contrary to Pasinetti's assumption, rates of productivity growth in the different vertically integrated sectors cannot be thought of as being independent of each other. How could the new capital goods be produced without the old ones existing at the beginning of the traverse? Thus the existence of a basic system remains relevant, even when the basic product(s) is(are) changing its(their) quality. Innovations introducing new consumption goods cannot be dealt with in a satisfactory way. All this does not imply that the concept of vertically integrated sectors is meaningless, on the contrary, it can be very helpful as a complementary perspective. But it illustrates that input-output models emphasizing intersectoral interdependencies retain conceptual priority.
Capitalism. Capitalism is often called market society by economists, and the free enterprise system by business and government spokesmen. But these terms, which emphasize certain economic or political characteristics, do not suffice to describe either the complexity or the crucial identifier elements of the system. Capitalism is better viewed as a historical 'formation', distinguishable from formations that have preceded it, or that today parallel it, both by a core of central institutions and by the motion these institutions impart to the whole. Although capitalism assumes a wide variety of appearances from period to period and place to place – one need only compare Dickensian England and 20th-century Sweden or Japan – these core institutions and distinctive movements are discoverable in all of them, and allow us to speak of capitalism as a historical entity, comparable to ancient imperial kingdoms or to the feudal system.

The most widely acknowledged achievement of capitalist societies is their capacity to amass wealth on an unprecedented scale, a capacity to which Marx and Engels paid unceasing tribute in The Communist Manifesto. It is important to understand, however, that the wealth amassed by capitalism differs in quality as well as quantity from that accumulated in precapitalist societies. Many ancient kingdoms, such as Egypt, displayed remarkable capacities to gather a surplus of production above that needed for the maintenance of the existing level of material life, applying the surplus to the creation of massive religious or public monuments, military works or luxury consumption. What is characteristic of these forms of wealth is that their desirable attributes lay in the specific use-values – war, worship, adornment – to which their physical embodiments directly gave rise. By way of decisive contrast, the wealth amassed under capitalism is valued not for its specific use-values but for its generalized exchange-value. Wealth under capitalism is therefore typically accumulated as commodities – objects produced for sale rather than for direct use or enjoyment by their owners; and the extraordinary success of capitalism in amassing wealth means that the production of commodities makes possible a far greater expansion of wealth than its accumulation as use-values for the rulers of earlier historical formations.

Both Smith and Marx stressed the importance of the expansion of the commodity form of wealth. For example, Smith considered labour to be 'productive' only if it created goods whose sale could replenish and enlarge the national fund of capital, not when its product was intrinsically useful or meritorious. In the same fashion, Marx described the accumulation of wealth under capitalism as a circuit in which money capital (M) was exchanged for commodities (C), to be sold for a larger money sum (M'), in a never-ending metamorphosis of M-C-M'.

Although the dynamics of the M-C-M' process vary greatly depending on whether the commodities are trading goods or labour power and fixed capital equipment, the presence of this impenetrable internal circuit of capital constitutes a prime identifier element for capitalism as a historical genus. As such, it focuses attention on two important aspects of capitalism. One of these concerns the motives that impel capitalists on their insatiable pursuit. For modern economists the answer to this question lies in ‘utility maximisation’, an answer that generally refers to the same presumed attribute of human nature as that which Smith called the ‘desire of bettering our condition’. The unappealing character of the expansive drive for capital suggests, however, that its roots lie not so much in these conscious motivations as in the gratification of unconscious drives, specifically the universal infantile need for affect and experience of frustrated
capital goods. Capital goods are a series of heterogeneous commodities, each having specific technical characteristics. Outside the hypothetical case where real capital consists of a single commodity, it is impossible to express the stock of capital goods as a homogeneous physical entity. As a consequence of capital's heterogeneous nature its measurement has become the source of many controversies in the history of economic thought.

The function of capital goods is production. Unlike labour ('in the raw') and (non-cultivated) land, capital goods are not given, they are themselves produced. Being an output as well as an input, the size and variation of the capital stock are intra-economic phenomena. Because real capital is not an 'original' factor of production but is the result of economic processes in which it participates as one of the determinants, the formation of real capital or investment is the central channel through which all other determinants, be they technical progress, changes in labour supply or the exploitation of natural resources, influence the long-run development of an industrial system.

A distinction is normally made between durable or fixed capital, including not only plant and machinery but also buildings and other essential parts of the industrial infrastructure which are used up only partially during the year, and circulating capital, consisting of stocks of raw materials, semi-finished goods, etc., capital which is fully used up during the production period and must therefore be replaced in full.

Capital has at least two different aspects: capital as goods and capital as value. From a technological point of view, produced means of production are a condition for the operation of any social and economic system, once Smith's early and rude state of society is overcome. It was Marx who emphasized that these necessary physical instruments of production become 'capital' only under the capitalistic rules of the game when the means of production are separated from the labourers and owned by the capitalists. Thus the means of production possess a double aspect in capitalistic societies: on the one hand 'capital' is understood to mean the total of heterogeneous goods and equipment designed for specific uses (productive concept), on the other hand it is regarded as a homogeneous fund of value and source of 'unearned' income in the form of profits (portfolio concept).

The value of the capital goods corresponding to each system of production, even with a constant technique, will change with income distribution whichever the unit in which they are measured. Current relative prices change when the rate of profits or the real wage rate changes, so that the same physical capital represents a different value whereas different stocks of capital goods can have the same value. Furthermore, only in long-run equilibrium will a given stock of capital goods have the same value whether it be determined as the accumulated sum of past investment expenditures or as the expected future net returns discounted back to the present at the ruling rate of profits.

Another way of measuring capital goods is in terms of labour time directly and indirectly required to produce them, the appropriately dated quantities of labour compounded at the various given rates of profits. As the analyses of Joan Robinson (1956), who called it 'real capital', and Sraffa (1960) show, it is impossible to get any notion of capital as a measurable quantity independent of distribution and prices. Whereas the individual is concerned with the extent to which he owns capital goods as a store of wealth and a source of income, society as a whole is never faced with problems of buying or selling capital goods against money or credit. Greater output unambiguously requires a greater amount of capital goods, given the degree of capacity utilization and technology. These additional capital goods can be provided only by a process of accumulation or net investment.

Emphasis on the strategic role of the capacity to produce capital goods in the domestic economy plays a decisive role in the analyses of Fel'd'man (1928) and Lowe (1955, 1976). Both authors take as their starting point Marx's famous two-departmental scheme of expanded reproduction, modifying it in an adequate way to include all activities that increase the capacity of an economy to produce output in one sector. During the Soviet industrialization debate in the late twenties, Fel'd'man formalized the notion that investment-priority for the capital-goods sector was a precondition for attaining a