CHAPTER 4, “Capital Goods,” FROM THE BOOK:

The Science of Economics

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1. Definition

In Chapter 1, capital goods are defined as real wealth (which has been produced) which is used to produced more wealth instead of for direct consumption. Real wealth consists of physical goods and services rather than financial capital, claims to real wealth such as money and bonds. The word "capital" is confusingly applied to both capital goods and financial capital, the latter being coupons or tickets (such as money) that one can exchange for real wealth. **In this chapter, we will focus only on capital goods and use "capital" to refer only to capital goods.**

Whether an item is a capital good depends on how it is used. A car used for personal use is not a capital good, whereas the same car used to haul goods for income becomes a capital good.

The economist **Nassau Senior** is credited with forming "the abstinence theory of capital accumulation" (McConnel, 1980, p. 67). The theory states that land and labor are the primary factors in production; they are used to produce the third factor, capital goods. In order to provide tools, as illustrated by the model in Chapter 3, it is necessary to abstain from the production of immediate consumer goods in order to make the tools instead. Capital goods are produced to be used at a later stage in the production of more wealth.

Unlike most forms of land, the quantity of capital goods can be increased or decreased in two ways:

1) more can be produced;

2) personal wealth can be converted into capital goods, and vice versa.

An automobile used for personal use, for example, can be converted into a taxi. A third way that capital is diminished is by normal wear and tear; this tendency of most capital goods to wear down unless constantly maintained is called "depreciation." Land as space, in contrast, does not depreciate.

Capital goods are more than inert matter. Embedded in them is the quality of power, the power to multiply the productivity of land and labor, as a lever enables you to lift a much heavier object than you can with your bare arms. There are several ways how capital goods increases the power of labor (and land).

- First it increases the capability of labor, multiplying muscle and mental power.
- Secondly, it increases the powers derived from natural resources, such as using a waterfall to drive a motor or generate electricity.

- Third, it enables us to increase our division of labor, specializing in more fields and increasing the productivity in each field.

2. Returns to capital goods

Just as labor has a return as wages, and land as rent, capital goods have a return, which we can simply call a capital yield, with the understanding that this "capital" is capital goods. Economists once called this yield "interest," but this confusing usage is now obsolete, since interest earned from financial capital is not necessarily a return on capital goods.

We saw in the model presented in Chapter 3 that an investment in capital goods that doubles productivity will result in increased wages as well as a return to the maker of the capital good. At the margin, where some workers may either make tools or consumer goods, the reward for labor of either type becomes equalized (other factors, such as training and skill being equal), so capital goods will be produced up to that level where the returns just equal the returns from producing consumer goods.

The return on a capital good has two components.

- The first is that due to labor, as in our example. This return is equivalent to the depreciation of the capital good. If you buy a tool that gets used up - depreciates - in one day and also takes one day to produce, the seller's return is, to him, a day's wage for his effort, which is also equal to the using up of the tool that day. Each day, he will make another tool that gets used up in one day. Wages will equal depreciation.
- But suppose, on the other extreme, that the tool lasts forever. The maker does not sell it, but loans it out. Since the tool does not depreciate, there is no labor component to the return. The tool never loses its value, so the labor component is retained as perpetual sales value, which the maker can obtain by its sale. The annual return on the tool is then the second component of a capital yield, the interest. The tool would be like money; you can put it in a bank and get perpetual interest without diminishing the amount of money (assuming there is no inflation or that the interest also compensates for inflation), or you can buy the tool and lend it out for perpetual interest.

In practice, most capital goods neither depreciate quickly nor last forever, so they will have a capital yield composed partly from depreciation and partly from interest.

The fact that capital goods depreciate implies that a user of these goods needs to maintain or replace them. This capital maintenance is a cost of production even though it is not explicitly paid during some time interval; an accountant will enter an amount for depreciation as a cost. Hence, to calculate the economic profits or net income from an enterprise, depreciation needs to be subtracted from the gross income.

3. Roundabout production

As we saw in Chapter 3, productivity can be increased if some production is devoted to indirectly producing a product, such as making the tools that a farmer then uses to produce the final product, the crop. This is called "roundaboutness" or "roundabout production." Production becomes even more roundabout if some production is devoted, say, to making the steel and wood that is then used to make the tools for use in farming. As production becomes more roundabout, it takes longer from making the highest level capital good to its final use in the production of consumer goods. This increase in roundaboutness thus lengthens the period of production, the cycle of time needed to make the final good. This concept of greater productivity from greater roundaboutness of capital goods was developed by economists of the Austrian school of thought, especially by **Eugen von Böhm-Bawerk.**

The founder of the Austrian school, **Carl Menger**, originated Austrian capital theory with the concept of "**goods of higher order**." Goods of lowest order are those directly consumed. Tools used in their production have a higher order, and those capital goods that are used to make these tools have an even higher order. Menger (1871, p. 150) stated that "the value of goods of higher order is always and without exception determined by the prospective value of the goods of lower order in whose production they serve."

Menger also recognized the role of time in using goods of higher order to make those of lower order. The more distant the goods of higher order, the more time needed between the production of those goods and those of lowest order. Hence, the structure of capital goods, the relative amounts of goods of various orders, is determined by the rate of return on the invested capital goods. If interest rates are lower, then it is more profitable to invest in goods of higher order, and vice versa, when interest rates are relatively high, the rate of return is quicker and the structure of production flattens. Hence, "the productive activity of a people is greatly promoted by credit" (p. 159).

The structure of production and its being affected by interest rates has implications as a partial explanation for business cycles, as worked out by **F. A. Hayek**, another Austrian. If money is injected into an economy by monetary policy, artificially reducing the interest rate, the capital structure will deepen as higher-order investment (which includes the construction of buildings) is stimulated. But since real savings have not changed, consumers have not really reduced their demand for consumer goods, so this extra investment is not economically warranted. When interest rates return to their previous level, the effect of the extra money having been dissipated by rising prices, the structure of capital flattens again, and the extra capital goods become "malinvestments," wasted on capital goods (including real estate such as office buildings and shopping centers) that are excessive for the amount of consumer goods being produced. Hence, the enterprises stop this production, laying off workers that were hired for that purpose, which can trigger a recession or make one that has already started that much worse. (Business cycles will be covered in greater depth in Chapter 12.)

If the use capital goods achieves higher levels of return, we must have a means of measuring the increased yield. This takes the form of a rate of return or yield, also called "net productivity," which can be expressed in the form of a percentage per annum. To

determine the rate of return of a capital project, first we calculate the costs of the factors we employ to undertake our capital project; then we calculate the total returns we stand to gain from the capital project. The excess of returns over costs will be our net productivity, and its ratio to costs the rate of return. Only if the total returns add up to more than the original costs do we have a positive net productivity, and only if the rate of return is greater than the prevailing interest rate (the alternative use of the funds) is it worth undertaking the capital project.

The rate of return on an investment in capital goods depends not only on the technical productivity of the roundabout process but on the market structure. For example, if a new process is protected by a patent, there will be less competition, and so the firm may charge a higher price for the output and get a greater return on the capital good. An entrepreneur creating capital goods needs to determine how much to invest in order to maximize his future return. We have already done some marginal analysis in previous chapters, so we need only apply the same principle regarding costs and benefits. A profit-maximizing firm will increase production up to the point at which marginal revenue equals marginal cost. If the marginal costs are increasing and the marginal revenues are decreasing, any more output and the firm would not be recovering its costs, and any less would result in the firm would not generating possible profits by expanding output.

4. Rental returns to capital goods

Some types of capital goods yield returns which manifest themselves in land values and rents, as we saw in Chapter 3. An example would be the decision to locate a large factory in an area that is economically depressed. Because of the firm, other land owners find their assets rising in value. **Perhaps the most important source of increased land value is a community's investment of capital goods as public works, such as streets, sewers, street lights, parks, and subways. The civic goods provided by private communities, such as residential associations, shopping centers, and large resorts often raise both the land value within the community and that in the neighborhood.**

The provision of water systems - a capital project - benefits not only the irrigator, but also the land-owner. This effect was documented in detail by L. R. East (former Chairman of the State Rivers and Water Supply Commission, Victoria, Australia). He wrote: "the real profits resulting from irrigation development lie not in the sale of water, but in the increases in business activities and in land values resulting from that development." East sites the "spectacular development" of the town of Sheparton, lying within one of the irrigation districts, as evidence that "there are very real benefits received by other sections of the community". Irrigation in Sheparton ultimately increased the value of land to 100 pounds a foot (1940's value) on its main business street (East, 1945, p. 7).

A similar story to that of water supply could be told for the supply of railways, roads and bridges. The process by which land-owners benefit is as follows:

"the carrying out of public works such as roads, railways, and water supply makes possible increased production from the land, or more intensive use of the land, and as practically the whole advantage goes to the owner - as distinct from the worker engaged in production - this advantage is capitalised in increased land values" (p. 27).

Some countries have had the vision to tap this rental capital yield in financing capital investments. Public works are thus funded by the subsequent increase in rent and land values. The huge Aswan Dam, which supplies Egypt's Nile Valley, was financed by an increase of 0.5 pounds an acre in the land tax over a very large area which received summer irrigations from the reservoir (p. 24).

The idea of meeting capital charges from a special tax on land values was also adopted by Canada as far back as 1912. A water corporation was established by legislation to supply water in bulk to the municipalities comprising the greater Winnipeg water district. The public works cost approximately 17,000,000 dollars, and from 1912 to 1927 the whole of the revenue required to pay interest and sinking fund was raised by a special levy on land values - exclusive of improvements - of all the lands within the district (p. 26).

One of the most pressing issues facing the countries of Eastern and Central Europe in their progression towards market-based economies is the redirection of resources and the improvement of infrastructure, including telecommunications. These improvements will increase land rent, and by collecting this rent instead of taxing enterprise and labor, these countries could allow private entrepreneurs to invest in telecommunications and other industries without hurting their productivity with added costs.