

is retained within the department for replacement of used up means of production. The remainder, equal in value to $v_1 + m_1$, is transmitted to Department II and is exchanged for consumers' goods. Department II produces consumers' goods and part of its output, equal in value to c_2 , is transmitted to Department I and exchanged for the means of production needed to replace those used up in Department II. The remainder of the output of Department II, $v_2 + m_2$, remains in the department for consumption. In order for the production process to proceed smoothly, the exchange of output between the two departments must be balanced, that is $c_2 = v_1 + m_1$.

Let us now assume that we have a case of an expanding economy, i.e. a case of expanded reproduction. Then, as it is known, not all of the surplus value is used for consumption, but part of it is accumulated for increasing the means of production and for employing more labour power. We can express this fact by the equation

$$m = \bar{m} + m_c + m_v,$$

where \bar{m} denotes that part of the surplus value consumed, m_c is the part of the surplus value used to increase the quantity of the means of production and m_v —the part of the surplus value used to employ more labour power.

Dividing the whole national economy into two departments, we obtain the following relationships:

$$\begin{aligned} \text{Total output of means of production} &= c_1 + v_1 + \bar{m}_1 + m_{1c} + m_{1v} \\ \text{Total output of consumers' goods} &= c_2 + v_2 + \bar{m}_2 + m_{2c} + m_{2v} \\ \text{Total national product} &= c + v + \bar{m} + m_c + m_v \end{aligned}$$

The total demand for means of production is equal to the sum of the means of production needed for the

replacement of those used up in both departments and for the expansion of production, i.e.:

$$\begin{aligned} \text{total demand for means of production} \\ = c_1 + c_2 + m_{1c} + m_{2c}. \end{aligned}$$

The total demand for consumers' goods is equal to the sum of the wage bill in the two departments plus the joint expansion of the wage bill and the joint surplus value consumed, i.e.:

$$\begin{aligned} \text{total demand for consumers' goods} \\ = v_1 + v_2 + m_{1v} + m_{2v} + \bar{m}_1 + \bar{m}_2. \end{aligned}$$

There must be equality of demand and output of means of production and this leads to the following relationship:

$$c_1 + c_2 + m_{1c} + m_{2c} = c_1 + v_1 + \bar{m}_1 + m_{1c} + m_{1v}.$$

From this we get

$$c_2 + m_{2c} = v_1 + \bar{m}_1 + m_{1v}.$$

We can obtain the same result from the condition of equality between the demand and output of consumers' goods.

The equation $c_2 + m_{2c} = v_1 + \bar{m}_1 + m_{1v}$ expresses the relationship between the components of the output of the two departments in an expanding economy. We can present this relationship in the following table:

$$\begin{array}{c} c_1 + m_{1c} + \boxed{v_1 + \bar{m}_1 + m_{1v}} \\ \swarrow \\ \boxed{c_2 + m_{2c}} + v_2 + \bar{m}_2 + m_{2v}. \end{array}$$

what is added in the given sector to the value of the means of production obtained from other sectors is called *value added*. It may, therefore, be said that for each sector the flow to other sectors plus the final product equals the flows from other sectors plus the value added.

THE MARXIAN SCHEMES

Even a mere superficial acquaintance with the analysis of inter-industry relations induces the supposition that there is a close analogy between the relationships obtained by Leontief and the analysis of reproduction given by Karl Marx in the second volume of *Capital*. Let us recall in brief the assumptions underlying the Marxian schemes.

Marx assumes that the total value of the national product (total output) over a certain period of time, e.g. a year, consists of three parts: the value of the means of production used up during the given period—that is c , the constant capital used up; v , the value of the labour power engaged in the production process (variable capital); and m , the surplus value (profit). The total national product, therefore, is $c+v+m$.

The component c consists of replacement of means of production used up, and the sum $v+m$ constitutes the national income.

Marx divides the entire national economy into two departments: one producing means of production, the other consumers' goods. Therefore:

$$\begin{array}{l} \text{Total value of output of Department I} = c_1 + v_1 + m_1 \\ \text{Total value of output of Department II} = c_2 + v_2 + m_2 \\ \hline \text{Total value of national product} = c + v + m \end{array}$$

where $c = c_1 + c_2$, $v = v_1 + v_2$, $m = m_1 + m_2$.

In the case of simple reproduction, i.e. when the national economy is stationary, the total demand for means of production is equal to $c_1 + c_2$, and the total demand for consumers' goods: $v_1 + v_2 + m_1 + m_2$. In other words, the total demand for means of production is equal to the joint replacement requirement of both departments, and the total demand for consumers' goods is equal to the sum of the joint wage bill and surplus value of both departments.

Assuming that demand for and output of means of production are equal, we have

$$c_1 + c_2 = c_1 + v_1 + m_1$$

which reduces to

$$c_2 = v_1 + m_1.$$

We obtain the same result by assuming equality of total demand and output of consumers' goods, i.e.

$$v_1 + v_2 + m_1 + m_2 = c_2 + v_2 + m_2.$$

That is,

$$v_1 + m_1 = c_2.$$

The relationship $c_2 = v_1 + m_1$ is an equation of equilibrium between the two departments of the national economy in the case of simple reproduction. Indeed, let us construct a table representing the relationship between the production of the two departments and their mutual exchange

$$\begin{array}{r} c_1 + \boxed{v_1 + m_1} \\ \swarrow \\ \boxed{c_2} + v_2 + m_2 \end{array}$$

This table shows that part of the output of Department I (which makes means of production, namely c_1 ,

Part of the output of Department I, of the value of $c_1 + m_1$, remains in the department for replacement of the means of production used up and for expansion of the amount of means of production in the department. The remainder, of the value of $v_1 + m_1 + m_{1v}$, is transmitted to Department II and is exchanged for consumers' goods. In Department II part of the production to the value of $v_2 + \bar{m}_2 + m_{2v}$ is retained within the department and is consumed; the remainder, $c_2 + m_{2c}$, is transmitted to Department I and is exchanged for means of production needed for the replacement of the means of production used up in Department II and for expansion of the quantity of means of production in the department. This balance between the two departments of the economy is expressed precisely by the equation

$$c_2 + m_{2c} = v_1 + \bar{m}_1 + m_{1v}.$$