

Giornate delle Ricerca
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Incomes from Capital in Alternative Economic Theories

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1. Introduction (1)

Piketty 2014, p. 222, fig. 6.5

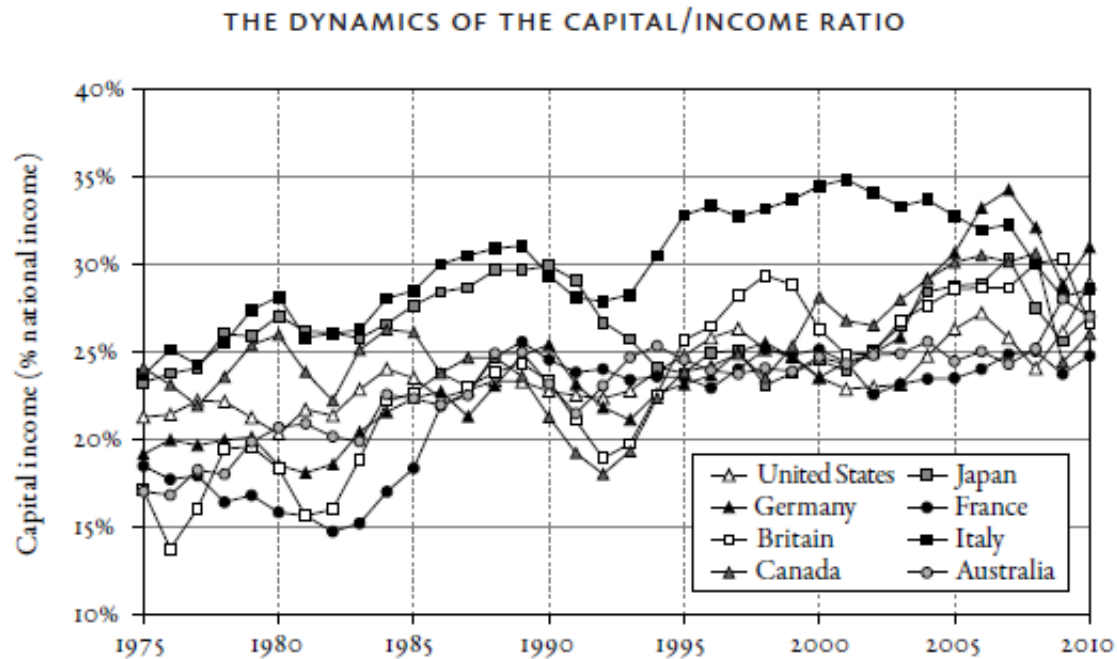


FIGURE 6.5. The capital share in rich countries, 1975–2010

Capital income absorbs between 15 percent and 25 percent of national income in rich countries in 1970, and between 25 percent and 30 percent in 2000–2010.

Sources and series: see piketty.pse.ens.fr/capital21c

1. Introduction (2)

In practice, capital incomes are:

- equity dividends
- capital gains
- interest on loans
- managerial incentives

In theory: ?

We shall look for them in three different approaches:

i) classical/Marxian approach; **ii)** marginalist theory; **iii)** Arrow-Debreu general equilibrium theory.

2. Capital and profit in the classical/Marxian approach (1)

Basic features of the **capitalist model of production**:

- i) Products are commodities. Production is intended for the market and not (directly) for consumption.
- ii) Labour is performed by wage-earning workers. Workers are forced to sell their labour-power due to their separation from the means of production. Labour-power is a commodity.
- iii) Natural resources (lands, mines, oilfields, ...) are of private property. Every natural resource has an owner and the class of landowners is distinct from the class of capitalists.
- iv) Production processes are organized (directly or indirectly) by capitalists. They buy the inputs and sell the outputs.

2. Capital and profit in the classical/Marxian approach (2)

Commodities are produced by means of commodities, labour-power and uses of natural resources.

Production takes time: in every single process, the employment of inputs must precede the production of outputs.

Inputs are generally purchased and employed before outputs are sold.

Costs and revenues of the same process are not simultaneous, as the former generally precede the latter.

Capital is the amount of purchasing power that is required, for each process, to finance the costs.

2. Capital and profit in the classical/Marxian approach (3)

An example:

There are N commodities, A different kinds of labour services and B different sorts of natural resources.

Production process of commodity n

$$(\mathbf{X}_t^n; \mathbf{L}_t^n; \Lambda_t^n) \rightarrow C_{t+1}^n$$

In the economy as a whole.

- inputs in period t : $\mathbf{X}_t = \sum_n \mathbf{X}_t^n$, $\mathbf{L}_t = \sum_n \mathbf{L}_t^n$ and $\Lambda_t = \sum_n \Lambda_t^n$
- output of period $t + 1$: $\mathbf{C}_{t+1} = [C_{t+1}^1, C_{t+1}^2, \dots, C_{t+1}^N]$.

2. Capital and profit in the classical/Marxian approach (4)

Let \mathbf{p}_t , \mathbf{w}_t and $\boldsymbol{\rho}_t$ be the (row) vectors of commodity prices, wage rates and rent rate in period t .

Capital invested in period t

$$K_t = \mathbf{p}_t \cdot \mathbf{X}_t + \mathbf{w}_t \cdot \mathbf{L}_t + \boldsymbol{\rho}_t \cdot \boldsymbol{\Lambda}_t$$

Profit = Revenues – Costs

$$\Pi_{t+1} = \mathbf{p}_{t+1} \cdot \mathbf{C}_{t+1} - K_t$$

Rate of profit

$$\pi_{t,t+1} = \frac{\Pi_{t+1}}{K_t}$$

2. Capital and profit in the classical/Marxian approach (5)

From this example, it should be clear that:

i) The amount of capital K_t is not the quantity of an input. The quantities of inputs employed are \mathbf{X}_t , \mathbf{L}_t and Λ_t .

ii) The rate of profit is not the price of capital. The amount of profit Π_{t+1} is a residuum and not the result of a price-times-quantity multiplication.

2. Capital and profit in the classical/Marxian approach (5)

Ordinary rate of profit

$$p^n C_{t+1}^n = (\mathbf{p} \cdot \mathbf{X}_t^n + wL_t^n)(1 + \pi) \quad \forall n = 1, 2, \dots, N$$

$$\mathbf{p} \cdot (\mathbf{C}_{t+1} - \mathbf{X}_t) = 1$$

The system of price equations allow us to define the price vector as a function of the distribution variables: $\mathbf{p} = \mathbf{p}(w, \pi)$. Substituting this function within the numéraire equation (5):

$$\mathbf{p}(w, \pi) \cdot (\mathbf{C}_{t+1} - \mathbf{X}_t) = 1$$

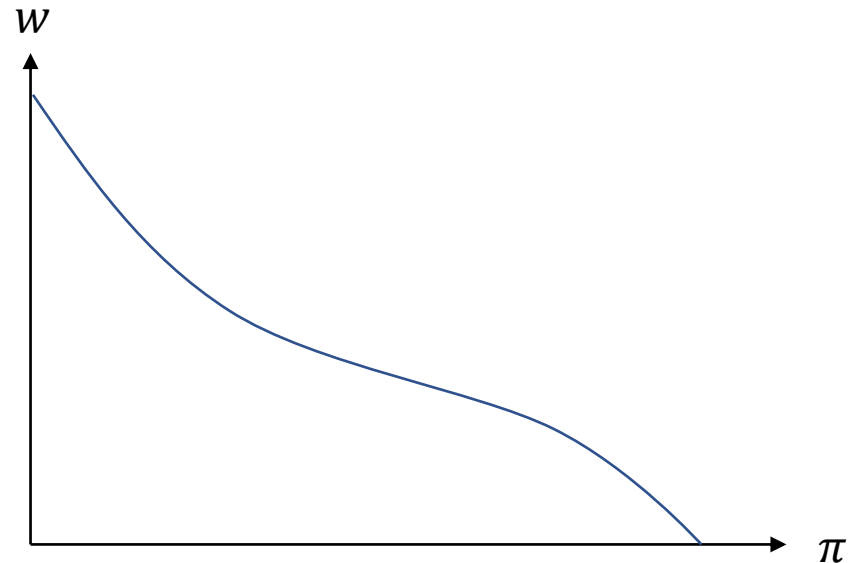
Surplus equation

2. Capital and profit in the classical/Marxian approach (6)

Surplus equation

$$\mathbf{p}(w, \pi) \cdot (\mathbf{C}_{t+1} - \mathbf{X}_t) = 1$$

Under normal conditions, incomes from capital tend to be high when the wage rate level is low. This fact provides the theoretical ground for the conflict between social classes that can be observed in the real world.



3. Capital as a factor of production (1)

In the classical/Marxian approach:

3 social classes \Rightarrow 3 different incomes

In the **marginalist theory**:

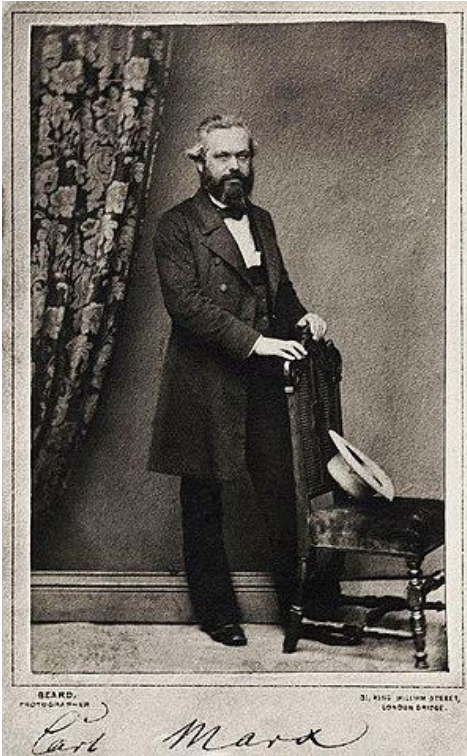
3 different incomes \Rightarrow 3 factors of production

Social classes are transformed into things: the factors of production.

Distribution variables are prices of these things.

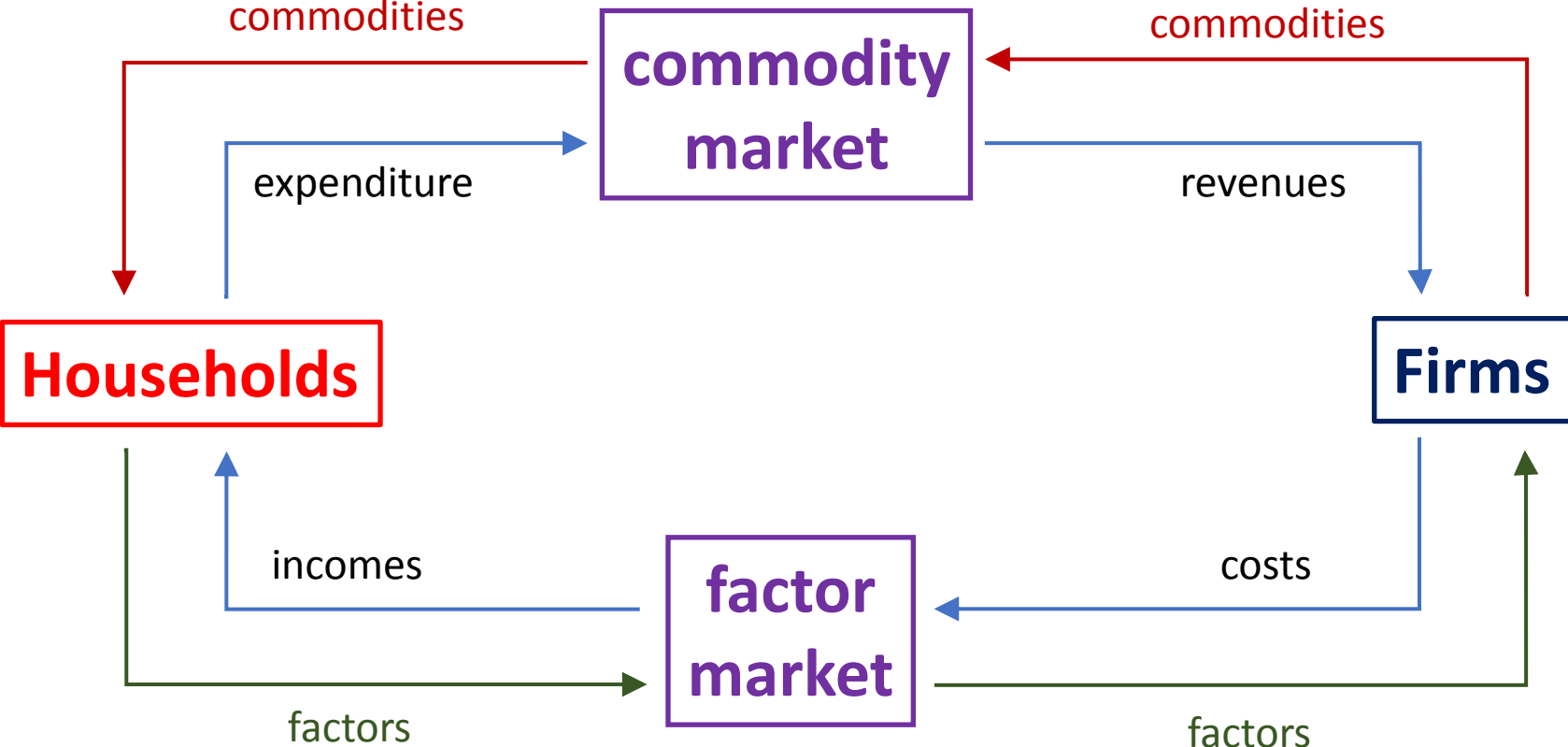
The working of the system depends on the decisions taken by two different sorts of **economic agents**: households and firms.

The “economic trinity”



In capital-profit, or still better capital-interest, land-rent, labour-wages, in this **economic trinity** represented as the connection between the component parts of value and wealth in general and its sources, we have **the complete mystification of the capitalist mode of production, the conversion of social relations into things**, the direct coalescence of the material production relations with their historical and social determination. **It is an enchanted, perverted, topsy-turvy world**, in which Monsieur le Capital and Madame la Terre do their ghost-walking as social characters and at the same time directly as mere things. (Marx, *Capital III*, p. 830)

The household-firm model



3. Capital as a factor of production (2)

Capital is a factor of production supplied by households and demanded by firms.

The rate of interest is the price firms pay to households for the use of capital and reflects its marginal productivity.

The first order conditions for firms' (net) profit maximization impose the equality between factor prices and their respective marginal productivity. Hence, in equilibrium, the rate of interest must be equal to the marginal product of capital.

3. Capital as a factor of production (3)

The conception of capital as a factor of production represents the biggest difficulty met by the marginalist theory of distribution.

The idea of capital as something that is materially used in the production process is associated with its identification with the set of capital goods (commodities) employed. The theory tries to present **capital as an amalgam of capital goods.**

We can say that the basic idea is that of the existence of a special substance, a sort of “jelly”, of which all capital goods are made and from which their productivity derives.

3. Capital as a factor of production (4)

Despite several attempts, the last of which was Samuelson's (1962), a substance or jelly with these extraordinary properties has never been found.

The employment of capital was generally identified with **the value of capital goods** used in production. It was therefore tried to create a hybrid between the (right) idea of capital as a value fund that advances costs and the (wrong) idea of capital as an amalgam of capital goods.

However, considering the value of the capital goods as the quantity used of a factor of production can lead to **paradoxical results**.

3. Capital as a factor of production (5)

First, there is, in general, no unambiguous way to say that a process of production is more capital intensive than another.

Second, given a certain interest rate, the method that employs more capital per unit of labour is not necessarily the one that enables the highest output per unit of labour to be obtained.

Third, when an increase in the interest rate results in a change in the production method in use, the method that comes into use does not necessarily employ less capital per unit of labour than the method previously used.

4. Interest and profit in the Arrow-Debreu theory (1)

In the classical/Marxian approach, **profit** is capitalists' income.

In the marginalist theory, **interest** is the income households receive by firms for the use of capital.

In the Arrow-Debreu theory there are **both profit and interest**, but in this approach they are not seen – and actually cannot be – incomes from capital.

4. Interest and profit in the Arrow-Debreu theory (2)

In the Arrow-Debreu models, there is not just one rate of interest, but there are many “**own rates of interest**”.

Let p_t^n and p_{t+1}^n be the prices of commodity n (with $n = 1, 2, \dots, N$) delivered in period t and $t+1$ respectively, then

$$\frac{p_t^n}{p_{t+1}^n} = 1 + r_{t,t+1}^n$$

It is clear that this rate (or factor) of interest is neither the price of a factor of production, nor a source of income. It is the relative price of two commodities.

4. Interest and profit in the Arrow-Debreu theory (3)

Let $\mathbf{p} \in \mathbb{R}_+^L$ be a price vector and $\mathbf{y}^f \in \mathbb{R}^L$ the production plan of firm f —i.e. a list of quantities of inputs, with negative sign, and outputs, with positive sign—then $\pi^f = \mathbf{p} \cdot \mathbf{y}^f$ is the firm's profit.

In a “**private ownership economy**”, this profit—which can be gains or losses—is divided amongst households, and enter into their budget constraints, in accordance with some exogenously given shares.

These shares cannot reflect the investment of capital (savings) households made for the very simple reason that saving and investment are unconceivable within this framework.

4. Interest and profit in the Arrow-Debreu theory (4)

In the Arrow-Debreu model, all the **commodities are traded simultaneously in a single instant**, the initial moment of the first period.

On the producers' side, every firm can trade both inputs and outputs simultaneously, in the single instant in which markets are open. Revenues and costs are necessarily simultaneous and this makes the investment of capital impossible.

On the consumers' side, households cannot move their purchasing capacity across time. Households' income arises and is entirely spent in the one instant in which the markets are open. Saving in order to transfer purchasing power to some future date would thus actually be impossible as no further trade can take place after the initial instant of the first period.

4. Interest and profit in the Arrow-Debreu theory (4)

In the Arrow-Debreu framework, capital is not a factor of production: Arrow-Debreu commodities are produced by means of Arrow-Debreu commodities.

In the Arrow-Debreu framework, capital is not the amount of value that advances the costs of production: markets are open in a single instant only.

In the Arrow-Debreu framework, capital is inconceivable.

5. Conclusion

The Arrow-Debreu general equilibrium theory is unable to provide us with an explanation of incomes from capital.

The marginalist idea of capital as a factor of production and the rate of interest as the price for its use was untenable. This was explicitly admitted by authoritative neoclassical economists, such as Samuelson (1966), Hahn (1982) and Bliss (1975).

The old theory of the classical economists—submerged and forgotten because of the advent of the neoclassical approach—seems to be the only possible way to proceed at the moment.

Thank you!