

### National Product

*National product* is the value of all the goods and services produced in the nation.

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### National Income

*National income* is the total income created by producing the national product.

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### National Income Equals National Product

Accounting identity: national income equals national product.

The production of one dollar of goods or services creates one dollar of income.

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### Example

Consider a one-firm economy. It produces \$130 of a good, so the national product is \$130.

The firm pays \$80 of wages and \$20 of interest.

Profit is the residual of the product minus the costs:

$$\$130 - (\$80 + \$20) = \$30.$$

National income is total income—wages plus interest plus profit:

$$\$80 + \$20 + \$30 = \$130.$$

Thus national income equals national product.

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### Accounting Identity

That national income equals national product is an *accounting identity*: they are equal by definition.

If one calculates the national income and the national product and gets two different values, then one has made an error.

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### Profit as a Residual

The accounting identity follows because profit is the residual of product minus other costs:

$$\text{profit} = \text{product} - \text{costs}.$$

Each cost is income to someone, so

$$\begin{aligned} \text{national income} &= \text{costs} + \text{profit} \\ &= \text{national product}. \end{aligned}$$

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### Intermediate Goods

An *intermediate good* is a good used to make other goods. For example, steel is used to make cars.

In the calculation of the national product, there should be no double counting. To count the production of steel plus the production of cars containing steel would count the steel twice and would overstate the national product.

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### Example

Consider an economy with a steel company and an auto company.

The steel company produces \$80 of steel. It pays \$60 of wages. The profit is the residual:

$$\$80 - \$60 = \$20.$$

The auto company produces \$200 of cars. It pays \$90 of wages and buys \$80 of steel. The profit is the residual:

$$\$200 - \$90 - \$80 = \$30.$$

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### National Product

The national product is \$200.

The national product is *not*  $\$80 + \$200 = \$280$ , which would double count the steel.

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### National Income

Total wages are  $\$60 + \$90 = \$150$ .

Total profit is  $\$20 + \$30 = \$50$ .

$$\begin{aligned} \text{national income} &= \text{wages} + \text{profit} \\ &= \$150 + \$50 \\ &= \$200. \end{aligned}$$

National income equals national product.

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### Decomposition of National Product

There are various ways to decompose the national product into parts, such that the sum of the parts equals the national product.

The decomposition can be supply-oriented or demand-oriented.

(In contrast, the national income decomposes naturally into the different kinds of income.)

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### Final Demand, by Industry

A supply-oriented decomposition is final demand, by industry.

One calculates the final demand for the product of each industry, while ignoring intermediate goods.

In the example, the final demand for autos is \$200, and the final demand for steel is zero. Hence the national product is \$200.

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### Value Added, by Industry

The *value added* is product minus the purchases of raw materials and intermediate goods.

A supply-oriented decomposition is the value added, by industry.

In the example, the value added for steel is \$80, and the value added for autos is  $\$200 - \$80 = \$120$ . National product is the sum,

$$\$80 + \$120 = \$200.$$

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### Final Demand, by Purchaser

Decomposition by final demand, by purchaser, is demand-oriented.

$$\text{national product} = \text{consumption} + \text{investment} + \text{government}$$

$$y = c + i + g.$$

Investment  $i$  is the production of machinery and structures. Government  $g$  is the spending on goods and services by the government.

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### Keynesian Macroeconomic Theory

Macroeconomic analysis focuses on the decomposition by final demand, by purchaser.

This focus stems from Keynesian macroeconomic theory. A lack of demand for goods causes recession. Firms produce only to meet demand, so a low demand causes low production. One studies what factors affect the demand for consumption, investment, and government spending,

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### Investment

Investment is the production of capital goods: structures plus machinery.

Investment also includes inventory accumulation, the change in inventory. An increase in inventory represents additional production not yet sold, and to omit it from the national product would miss this production.

In macroeconomics, investment does *not* refer to financial investment, but just to the production of physical goods.

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### Investment as an Intermediate Good

Since investment is an intermediate good, one might think that it should be omitted from the national product.

However to ignore investment would mismeasure the timing of production: investment now will enable greater production in the future, but nevertheless the investment is current production.

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### Example

Year	$c$	$i$	$gnp$	$dep$	$nnp$
1	10	2	12	1	11
2	10	0	10	1	9
Total	20		22	2	20

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To ignore investment would mismeasure production. Consumption is 10 both years, so one would say that production is the same both years.

However indeed production is greater in year 1 than in year 2, because investment goods were also produced. The investment in year 1 allows greater production not just in year 1 but also in year 2.

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Depreciation  $dep$  is one in each year. The investment of 2 depreciates by one the first year, and one again the second year. After two years the investment is exhausted.

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Gross national product  $gnp$  is consumption plus investment. It measures total gross production, while ignoring depreciation.

Net national product  $nnp = gnp - dep$ . By subtracting depreciation, it yields a good measure of product.

Total net production over the two years is 20. To attribute 11 to the first year and 9 to the second year gives an accurate picture of what happened.

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### **Ambiguity: Consumption or Investment?**

Some goods might be counted either as consumption or as investment, and the choice is ambiguous.

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### **Automobiles**

Automobiles bought by consumers are counted as consumption, not as investment. The value of the automobiles counts in the national product during the year of production, but not in later years.

Alternatively, automobiles could be counted as investment goods. During the first year, the production of the automobiles would be counted as investment. In later years, one would subtract the depreciation from the net national product. In addition, each year one would estimate the value of the services of the automobiles; and this value would be included in consumption.

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### **Housing**

Housing is the one consumer good counted as investment.

The production of new houses counts as investment during the year of production. In later years, one subtracts the depreciation from the net national product.

In addition, each year one estimates the value of the services of the houses to the homeowners. The idea is to measure the value by how much one would pay to rent the house. For an owner-occupied house, one speaks of the implicit rent, as if the homeowner paid rent to himself.

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### Government Expenditure on Goods and Services

Government expenditure is the spending on goods and services. The value to the population of the spending is not measured. Instead, the cost is measured.

For example, the cost of a government bureaucracy is part of government expenditure. Whether this value produced by the bureaucracy is high or low is not measured.

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### Intermediate Good?

Many government goods and services can be seen as intermediate goods.

For example, a highway helps firms produce, by reducing the transportation cost. One might argue that counting the production of a new highway in the national product constitutes double counting, as one also counts the value of the goods carried over the highways.

Nevertheless the government goods and services are counted in the national product.

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### Investment Good?

One might also see the government goods and services as investment goods.

Nevertheless this treatment is not done. These items are simply counted in the national product, at the cost in the year of production.

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### National Income

The national income is not total income as seen by the man on the street, but instead it is only the income created by producing the national product.

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### Excluded from National Income

The following types of income are not created by production and so are excluded from the national income:

- Unemployment benefits
- Welfare payments
- Social-security benefits
- Interest on government debt
- Capital gains.

Except for the capital gains, these items are called *transfer payments*.

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### National Versus Domestic Product

The national product is the product of citizens and permanent residents, including production abroad. For example, profit abroad by an American company is part of the national product.

The domestic product is total production within the country, either by citizens and permanent residents or by foreigners. For example, profit in the United States by a Japanese company assembling cars here is part of the domestic product.

The focus now is on the domestic product.

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