**Calculating National Income – Three Approaches**

Let’s assume a small economy with the following data:

**Data for All Approaches**

* **Production Data:**
  + Total Output = 500
  + Intermediate Goods = 300
  + Taxes = 20
  + Subsidies = 10
  + Depreciation = 15
  + Income from Abroad = 5
* **Income Data:**
  + Wages = 100
  + Rent = 50
  + Interest = 20
  + Profits = 30
* **Expenditure Data:**
  + Consumption (C) = 250
  + Investment (I) = 100
  + Government Spending (G) = 50
  + Exports (X) = 40
  + Imports (M) = 20

**1. Product (Value-Added) Approach**

This method sums up the value-added at every stage of production.

**Step 1:**  
Value Added = Total Output - Intermediate Goods

500−300=200

**Step 2:**  
Add Taxes and Subtract Subsidies:

200+20−10=210

**Step 3:**  
Adjust for Depreciation:

210−15=195

**Step 4:**  
Add Income from Abroad:

195+5=200

**Result: National Income = 200**

**2. Income Approach**

This method adds up all incomes earned by factors of production (labor, capital, etc.).

**Step 1:**  
Add all factor incomes:

Wages+Rent+Interest+Profits=100+50+20+30=200

**Step 2:**  
Adjust for Taxes, Subsidies, and Depreciation (same as above):

200−Depreciation+NFIA=200−15+5=200

**Result: National Income = 200**

**3. Expenditure Approach**

This method adds up total spending in the economy.

**Step 1:**  
Sum up all expenditures:

C+I+G+(X−M)=250+100+50+(40−20)=420

**Step 2:**  
Adjust for Depreciation and Income from Abroad:

420−Depreciation+NFIA=420−15+5=200

**Result: National Income = 200**

**Summary Table**

| **Approach** | **National Income** |
| --- | --- |
| **Product Method** | 200 |
| **Income Method** | 200 |
| **Expenditure Method** | 200 |

Each method gives the same **National Income = 200**, confirming consistency in measurement.

**Scenario: An Orchard and a Juice Factory**

Imagine a small economy with just two businesses:

1. **Orchard:** Grows apples and sells them to the juice factory.
2. **Juice Factory:** Buys apples, makes apple juice, and sells it to consumers.

Here’s the data:

* **Orchard:** Sells apples to the juice factory for $100.
* **Juice Factory:** Sells apple juice to consumers for $200.
* **Wages:** Workers in the economy earn $50 (paid by both businesses).
* **Profit:** Owners of businesses earn $30.
* **Rent:** Landowners earn $20.
* **Consumption (C):** Consumers spend $200 on apple juice.
* **Investment (I):** The juice factory buys a machine for $50.
* **Depreciation:** The machine loses $10 in value this year.
* **Taxes:** Indirect taxes on juice sales are $10.
* **Subsidies:** Government provides $5 in subsidies.
* **Net Factor Income from Abroad (NFIA):** $0 (no international transactions).

**1. Product Approach (Value-Added Method)**

**Step 1:**  
Calculate value added by each business:

* **Orchard:** Value added = Sales ($100) - Intermediate Inputs ($0) = **$100**
* **Juice Factory:** Value added = Sales ($200) - Cost of Apples ($100) = **$100**

**Step 2:**  
Sum the value added by both businesses:

Total Value Added=100+100=200

**Step 3:**  
Adjust for taxes, subsidies, and depreciation:

GDP at Market Prices=200+10(Taxes)−5(Subsidies)=205

NDP at Factor Cost=205−10(Depreciation)=195

**Result:**  
National Income = **195**

**2. Income Approach**

**Step 1:**  
Add all incomes earned by factors of production:

* Wages: **$50**
* Rent: **$20**
* Profit: **$30**

Total Factor Incomes=50+20+30=100

**Step 2:**  
Adjust for taxes, subsidies, and depreciation:

GDP at Market Prices=100+10(Taxes)−5(Subsidies)=105

NDP at Factor Cost=105−10(Depreciation)=195

**Result:**  
National Income = **195**

**3. Expenditure Approach**

**Step 1:**  
Sum up all expenditures in the economy:

* Consumption (C): **$200**
* Investment (I): **$50**
* Government and international trade are excluded here.

GDP at Market Prices=200+50=250

**Step 2:**  
Adjust for taxes, subsidies, and depreciation:

NDP at Factor Cost=250−10(Depreciation)−(10−5)=195

**Result:**  
National Income = **195**

**Summary**

| **Approach** | **National Income** |
| --- | --- |
| **Product Method** | 195 |
| **Income Method** | 195 |
| **Expenditure Method** | 195 |

The **orchard and juice economy** shows how the three methods give the same result when calculated correctly. This illustrates how national income can be measured through production, income, or spending.

1. **The Monopolist's Total Revenue (TR):**

To derive the **monopoly demand curve** and the relationship between price, quantity, and elasticity, we begin by understanding the monopolist's pricing decision based on marginal revenue (MR) and the elasticity of demand (E

A monopolist's revenue is given by:

TR=P⋅Q

Where:

* P is the price of the good.
* Q is the quantity sold.

**2. Marginal Revenue (MR):**

Marginal revenue is the additional revenue from selling one more unit of output. It is the derivative of TR with respect to Q:

MR=d(TR)/dQ=d(P⋅Q)/ dQ​

Using the product rule of differentiation:

MR=P+Q⋅dP/dQ

This equation shows that MRMRMR depends on both the price (PPP) and the rate at which price changes with quantity (dP/dQ​).

**3. Price Elasticity of Demand (E):**

The price elasticity of demand (EEE) is defined as:

E=%Change in Quantity Demanded%/Change in Price ​

In terms of calculus:

E=(dQ/dP) ⋅P/Q​

Rewriting dQ/dP​ as 1/dP/dQ​, we get:

dP/dQ=P/Q⋅1/E​

**4. Substituting Elasticity into MR:**

Substitute dP/dQ into the MR equation:

MR=P+Q⋅P/Q⋅1/E​

Simplify:

MR=P(1+1/E)

**5. Relationship Between MR, Elasticity, and Pricing:**

For profit maximization, a monopolist sets MR=MCMR = MCMR=MC (marginal revenue equals marginal cost). Thus:

P(1+1/E) =MC

Rearranging for price PPP:

P=MC/(1+1/E)

**6. Key Insights:**

1. **Elastic Demand (E<−1):**  
   If demand is elastic, EEE is negative and greater than 1 in absolute value (∣E∣>1). Here, MR>0, and the monopolist reduces price to increase total revenue.
2. **Unit Elastic Demand (E=−1E = -1E=−1):**  
   If E=−1, MR=0. The monopolist maximizes revenue but not profit at this point.
3. **Inelastic Demand (−1<E<0):**  
   If demand is inelastic, E is negative and less than 1 in absolute value (∣E∣<1). Here, MR<0, and increasing price raises revenue but reduces efficiency.

**Monopoly Demand Curve and Elasticity:**

* The demand curve faced by a monopolist is **downward-sloping** because price decreases with an increase in quantity.
* The elasticity of demand varies along the demand curve:
  + **At higher prices (lower quantities):** Demand is elastic (∣E∣>1).
  + **At lower prices (higher quantities):** Demand becomes inelastic (∣E∣<1).

This elasticity-based pricing strategy is the core of monopoly behavior. The monopolist avoids inelastic regions since producing there would decrease total revenue.