# Marginal Analysis

AP Microeconomics | Unit 1 | MB = MC, sunk costs, and utility per dollar

*Running example.* Pizza costs $3 a slice. The first slice is worth $10 to you, the second $7, the third $4, the fourth $1.

## 1. Thinking at the margin

*Marginal* means additional: one more unit, not the total and not the average.

**Marginal benefit (MB)**: the extra benefit from one more unit. **Marginal cost (MC)**: the extra cost of one more unit. Marginal benefit usually falls as you consume more (*diminishing marginal benefit*).

## 2. The rule: MB = MC

| slice | MB | MC | total net benefit | |
|---|---|---|---|---|
| 1 | $10 | $3 | $7 | buy |
| 2 | $7 | $3 | $11 | buy |
| 3 | $4 | $3 | $12 | buy (the last one worth it) |
| 4 | $1 | $3 | $10 | stop |

**The marginal decision rule**

Keep going while $MB \geq MC$. The best quantity is where $MB = MC$ (or the last unit before $MB$ falls below $MC$). That quantity maximizes **net** benefit, total benefit minus total cost.

The goal is the largest net benefit, not the largest total benefit: slice 4 adds $1 of benefit and $3 of cost, so net benefit falls from $12 to $10.

## 3. Sunk costs do not count

Now the same pizza is an all-you-can-eat buffet for $20. The $20 is paid whether you eat one slice or ten, so the marginal cost of a slice is $0: eat while $MB > 0$, all four slices.

**Sunk cost**

A cost already paid that cannot be recovered. It does not change with the decision, so it should not affect the decision.

## 4. Two goods: utility per dollar

With a budget and two goods, spend the next dollar where it gives the most: compare **marginal utility per dollar**, $MU/P$.

$$\text{taco: } \frac{12}{\$2} = 6 \text{ per dollar} \qquad \text{drink: } \frac{4}{\$1} = 4 \text{ per dollar} \qquad \Rightarrow \qquad \text{buy the taco}$$


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**Utility-maximizing rule**

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} \qquad \text{with the whole budget spent}$$

## 5. Total and marginal utility from tables

**Marginal utility is the change in total utility.** Total utility of 1–5 cups: 20, 36, 48, 56, 60, so the marginal utilities are 20, 16, 12, 8, 4; for the third cup $MU_3 = 48 - 36 = 12$. Each unit adds less: diminishing marginal utility.

**Total utility is the sum of the marginal utilities.** Marginal utilities 25, 21, 17, 13, 9 give $TU_5 = 25 + 21 + 17 + 13 + 9 = 85$ utils. The total utility curve rises at a decreasing rate and peaks where $MU = 0$.

**Where students lose points**

1. Comparing total benefit with total cost instead of the next unit.
2. Stopping where total benefit is highest, not where $MB = MC$.
3. Letting a sunk cost change the decision.
4. Comparing $MU$ of two goods without dividing by price.
5. Saying "$MB = MC$" with no numbers from the table.

**Now practise it**

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