

PROPENSITY: CONCEPT AND APPLICATION

A Tutorial with Worked Examples

1. Definition of Propensity

Propensity refers to an inherent tendency or likelihood of something happening, generally related to the **probability of a particular event occurring**. The term is widely used in **statistics, economics, and psychology**, among other disciplines, to describe the tendency or probability that a certain outcome or event will happen under given conditions or factors.

In short, propensity is a measure of **how likely an event is to occur under a specific set of circumstances**.

The general formula for calculating propensity is:

$$\text{Propensity} = \frac{\text{Number of favourable outcomes}}{\text{Total number of possible outcomes}}$$

2. Types of Propensity

- **Statistical propensity:** the probability that an event will occur given certain data or information. It is found by calculating the likelihood of an event from historical or observed data.
- **Economic propensity:** in economics, the term usually appears as a “marginal propensity” — the likelihood that an individual or household will spend or save an additional unit of income.
- **Behavioural propensity:** in psychology and behavioural economics, an individual’s inclination or tendency to perform a particular action or decision.

3. Worked Examples

Example 1 — Statistical Propensity: Rolling a Die

Consider the probability of a specific event when rolling a fair six-sided die. We want the propensity of rolling a “3”.

- Total outcomes on the die: 6 (the die has six faces).
- Number of favourable outcomes: 1 (only one face shows “3”).

The propensity of rolling a 3 is:

$$P(\text{rolling a 3}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{6} \approx 0.167$$

Thus, the propensity of rolling a 3 on a fair die is about 0.167, or 16.7%.

Example 2 — Economic Propensity: Marginal Propensity to Consume (MPC)

In economics, the **marginal propensity to consume (MPC)** is the proportion of any additional income that a household or individual spends on goods and services rather than saving.

Suppose an individual receives an additional \$1,000 in income and decides to spend \$700 of it, saving the remaining \$300. The MPC is:

$$MPC = \frac{\text{Change in Consumption}}{\text{Change in Income}} = \frac{700}{1000} = 0.7$$

This means that for every additional dollar of income, the individual spends 70% and saves 30%.

Example 3 — Economic Propensity: Marginal Propensity to Save (MPS)

The **marginal propensity to save (MPS)** is the proportion of additional income that a household saves rather than spends. Suppose a household receives an additional \$500 in income, and decides to save \$200 and spend \$300. The MPS is:

$$MPS = \frac{\text{Change in Savings}}{\text{Change in Income}} = \frac{200}{500} = 0.4$$

So the household saves 40% of any additional income it receives.

Useful check: $MPC + MPS = 1$ for the same change in income, since every additional unit of income is either spent or saved. (The two examples above use different income changes, so they illustrate the two measures separately rather than summing to 1.)

Example 4 — Propensity in a Card Game

Consider drawing a single card from a standard deck of 52 cards. We want the propensity of drawing a heart.

- Total number of cards: 52.
- Number of hearts: 13 (a standard deck has 13 hearts).

The propensity of drawing a heart is:

$$P(\text{drawing a heart}) = \frac{\text{Number of hearts}}{\text{Total number of cards}} = \frac{13}{52} = 0.25$$

Thus, the propensity of drawing a heart from a standard deck is 0.25, or 25%.

Example 5 — Behavioural Propensity: Likelihood of Purchasing a Product

In behavioural economics, propensity often refers to a person's tendency or likelihood to engage in certain behaviours. Suppose a company runs an advertisement, and 2,000 out of 10,000 viewers decide to purchase the product. The propensity of a viewer purchasing the product after seeing the advertisement is:

$$P(\text{purchasing the product}) = \frac{\text{Number of purchases}}{\text{Total viewers}} = \frac{2000}{10000} = 0.2$$

This means that 20% of viewers purchased the product after seeing the advertisement.

4. Combining Probability and Behaviour

The concept of statistical propensity combines naturally with behavioural economics. Suppose that in a survey of 1,000 people, 600 indicate that they are likely to buy a product if a promotion is offered. The propensity of a person to buy the product is:

$$P(\text{buying the product}) = \frac{600}{1000} = 0.6$$

This means that 60% of the people surveyed have a propensity to purchase the product when a promotion is offered.

5. Summary of the Examples

Example	Calculation	Result	As %
Rolling a 3 (die)	1 / 6	0.167	16.7%
Marginal propensity to consume	700 / 1000	0.7	70%
Marginal propensity to save	200 / 500	0.4	40%
Drawing a heart (cards)	13 / 52	0.25	25%
Product purchase (advert)	2000 / 10000	0.2	20%
Product purchase (survey)	600 / 1000	0.6	60%

6. Conclusion

Propensity is a powerful concept used across statistics, economics, and psychology to understand and measure the likelihood of certain events or behaviours. Whether it is determining the probability of a specific outcome in a random experiment (rolling a die or drawing a card), calculating the economic tendency of households to spend or save income, or measuring a behavioural inclination, propensity provides valuable insight into expected behaviour.

The key to working with propensity is understanding the relationship between the number of favourable outcomes and the total possible outcomes, or the factors influencing the behaviour. By applying numerical examples, propensity can be quantified and used to predict and understand behaviour across many different scenarios.