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# THE ECONOMICS OF (BIG) DATA

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# The Economics of (Big) Data

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I What about Data?

II What about Economics?

III What about Economics of Data?

IV What about Privacy?

V What about Data Governance?

VI The Importance of Economics of (Big) Data

# What are the Economics of Data and Analytics?

# Economics and Economic Efficiency

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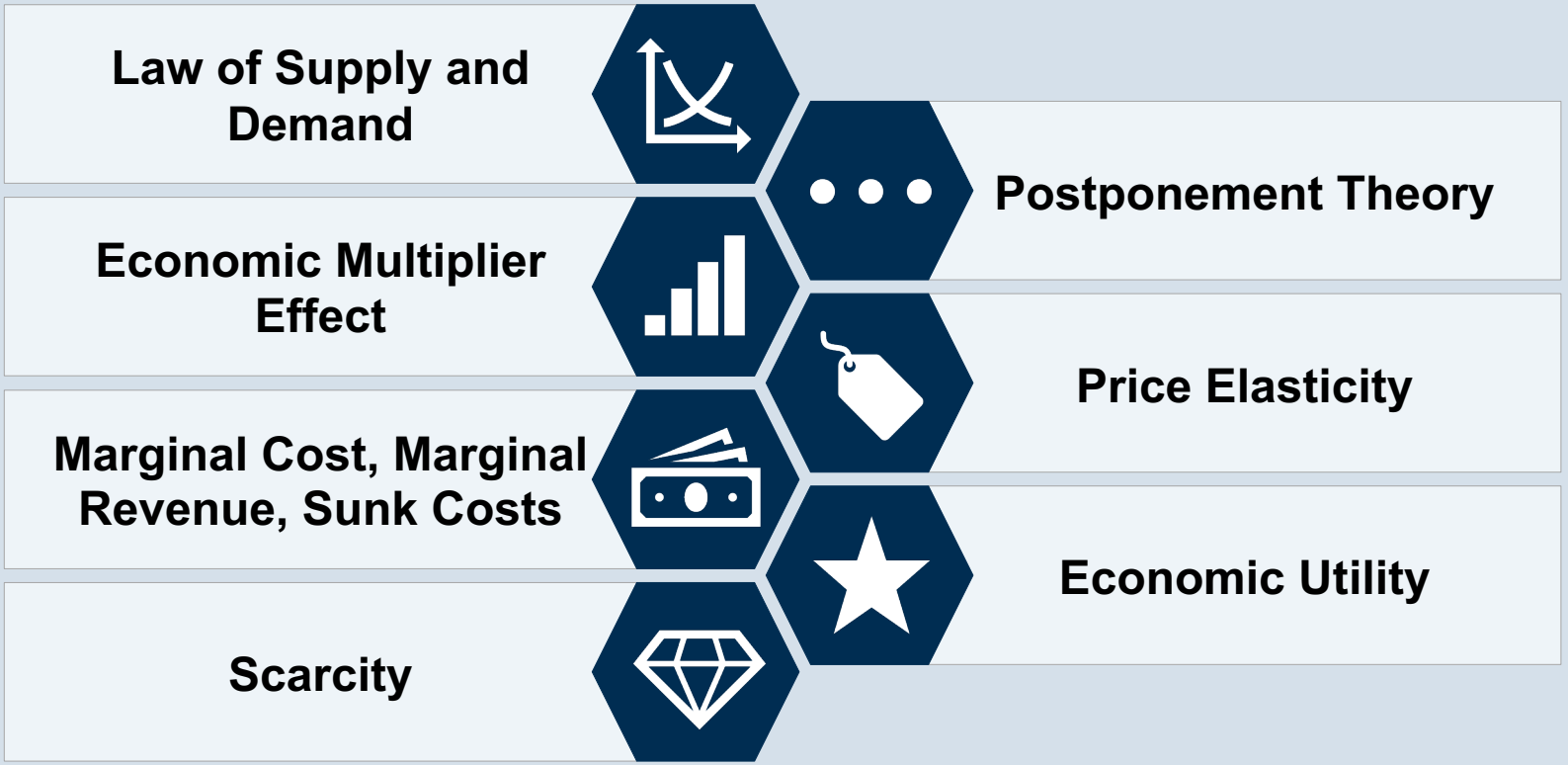
**Economics** is the branch of knowledge concerned with the **production**, **consumption**, and **transfer of wealth and value**. It is the scientific **study of human action and behaviors**, particularly as it relates to **human choice** and the **utilization of scarce assets** to achieve certain outcomes.

**Economic efficiency** is when **all goods** and **factors** of production are **distributed** or **allocated to their most valuable uses** and waste is eliminated or minimized.

# Core Economic Concepts

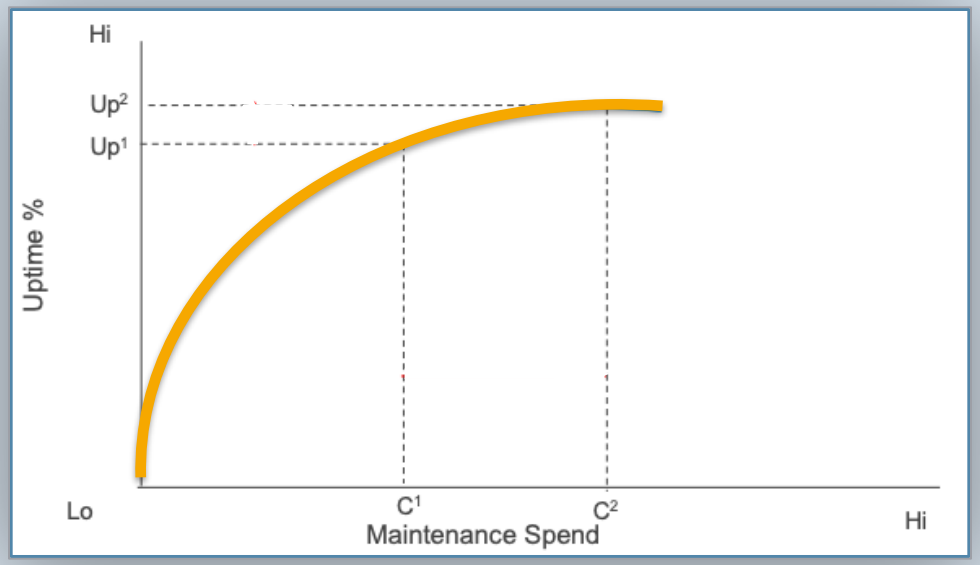




# The Economic Value Curve



The **Economic Value Curve** measures the relationship between a dependent variable and independent variables to achieve a particular business or operational outcome.



# Economic Value Curve Challenge

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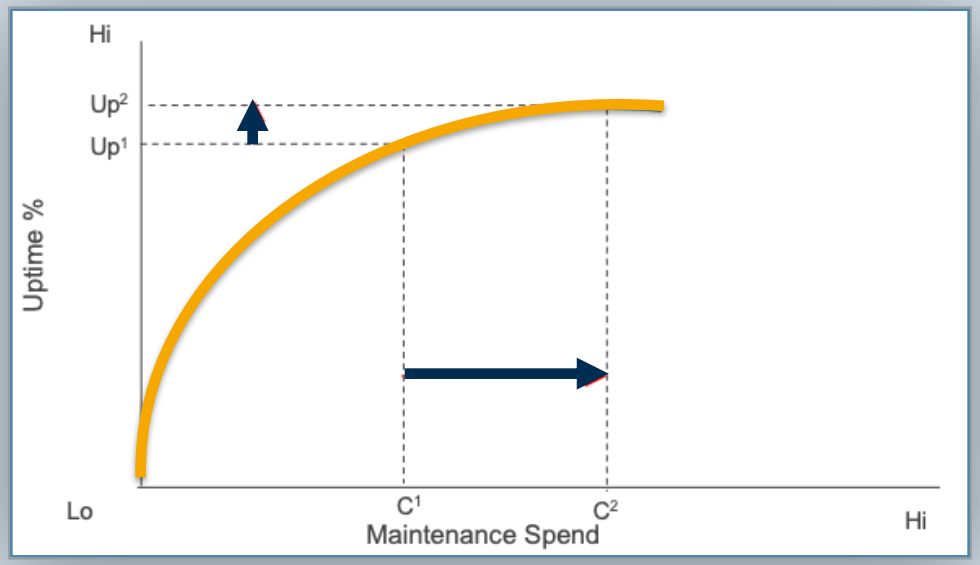
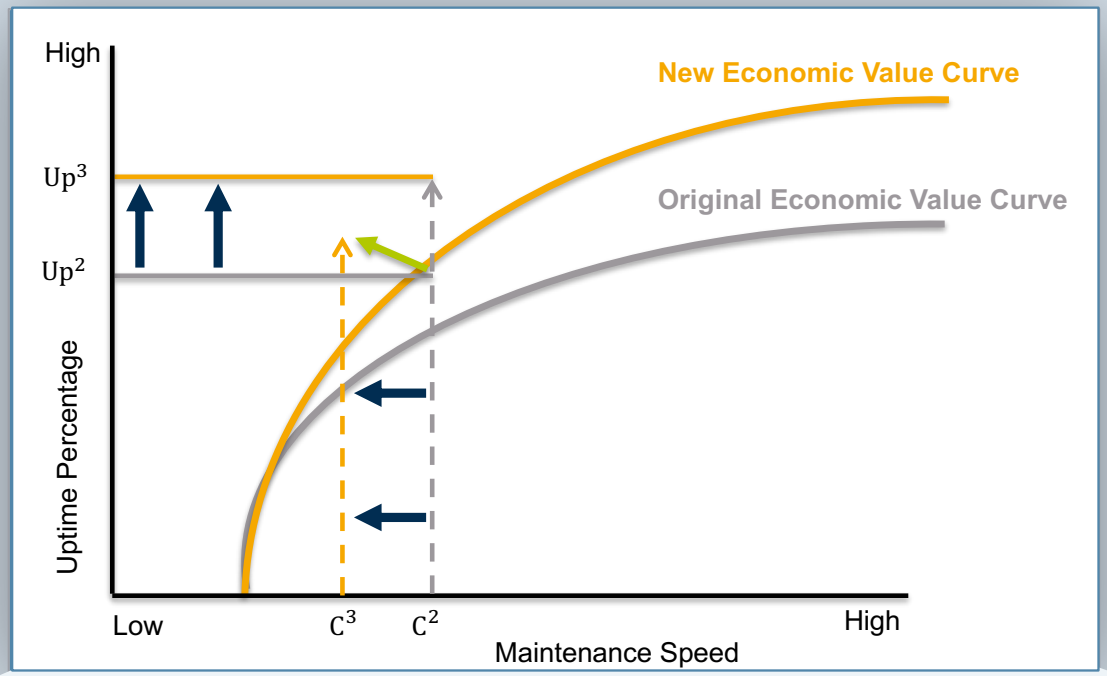
The **Law of Diminishing Returns** is a measure of the decrease in marginal or incremental output of production as the amount of a single factor of input is incrementally increased, while the amounts of all other factors of production stay constant.



# Transforming the Economic Value Curve






The way to beat the **Law of Diminishing Returns** is to leverage analytics to create a new **Economic Value Curve.**
That is, increase Uptime with less maintenance spend.

# Transforming the Economic Value Curve

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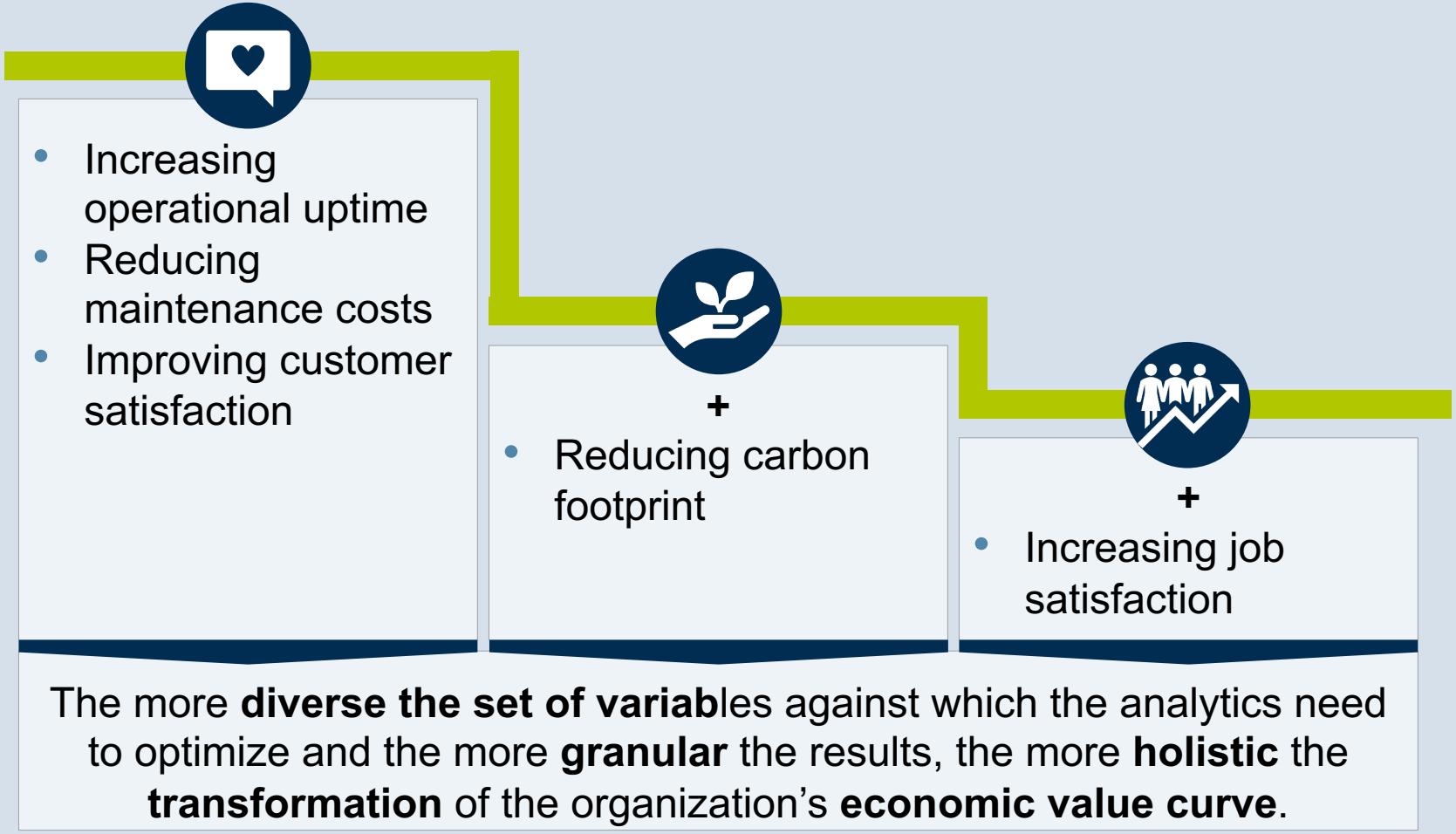
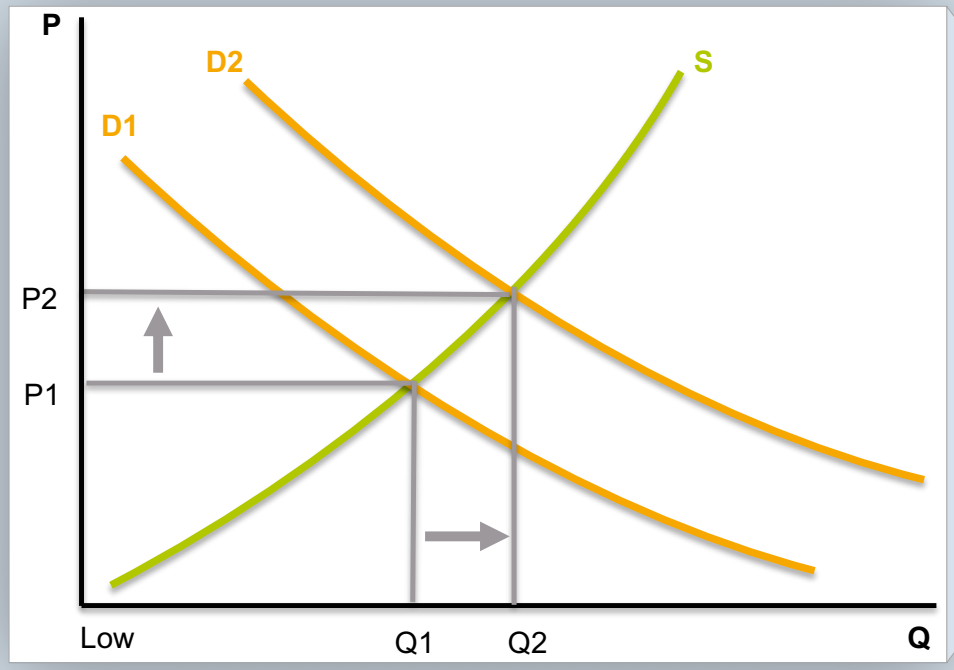


# The Law of Supply and Demand



The **Law of Supply and Demand** dictates the relationship between the quantity of a commodity that producers wish to sell at various prices and the quantity that consumers wish to buy.




**S** = supply

**D** = demand

P = price

Q = quantity

# The Economic Multiplier Effect

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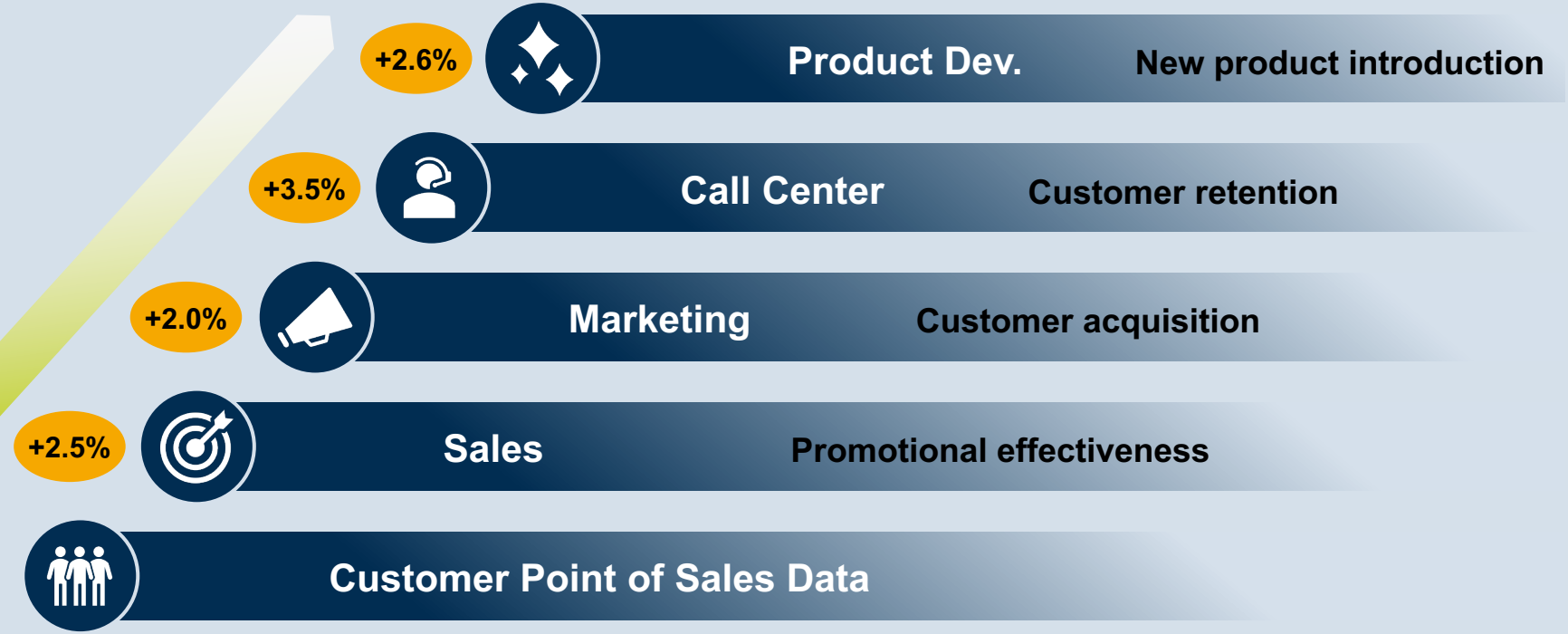
The **Economic Multiplier Effect** is a ratio of the impact of an incremental increase in investment on the resulting incremental increase in value.



# Marginal Propensity to Consume

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The **Marginal Propensity to Consume (MPC)** equals change in output as a ratio to the change in investment.

$$MPC = \frac{\text{Change in Output/Production}}{\text{Change in Input/Investment}}$$

Marginal Propensity to Consume

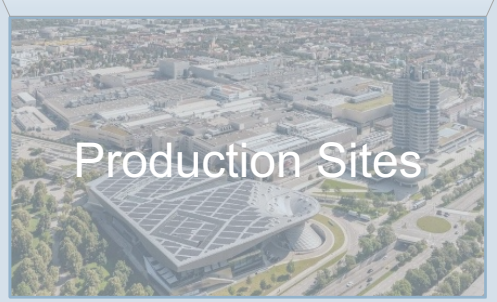
By focusing marketing spend on the top 5 deciles of customers (propensity-to-buy analytic score), we can capture 90% of predicted customer spend with only half the budget.

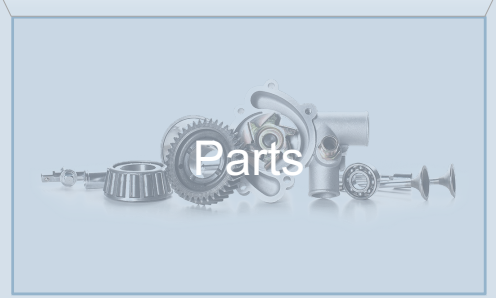
# Marginal Costs



**Marginal Cost** is the incremental change in the total cost that arises when the quantity produced is incremented by one unit; that is, it is the **cost of producing one more unit of a good**.

| Fixed Costs | Variable Costs |
| --- | --- |
| do not vary with the level of production | vary with the level of production |



# Marginal Revenue versus Marginal Cost

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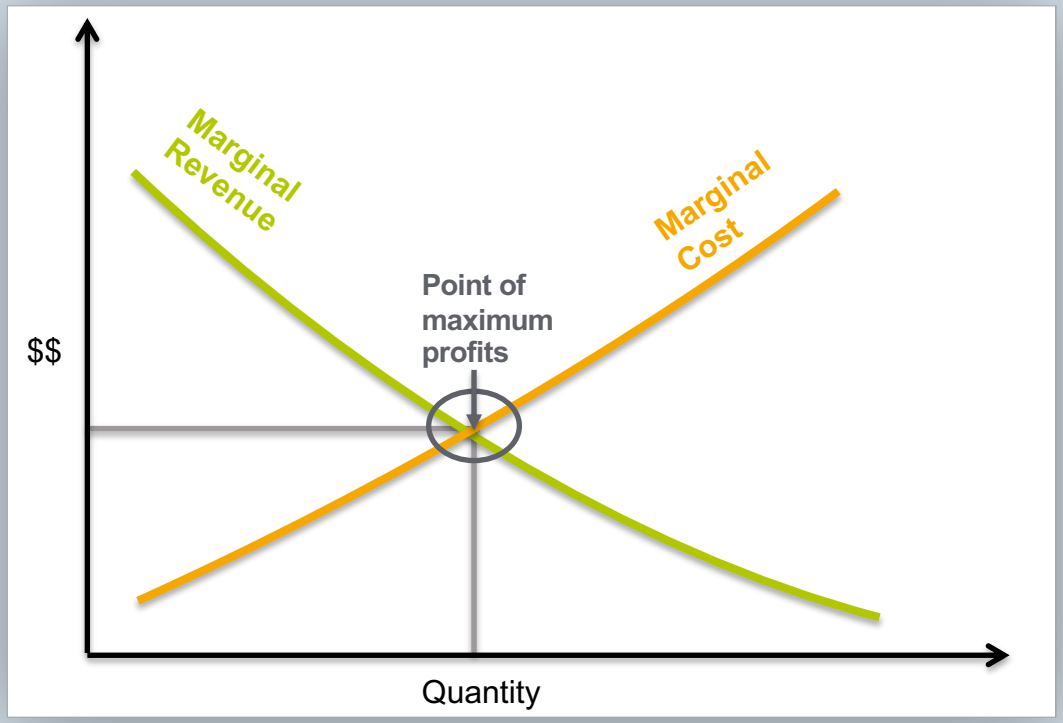
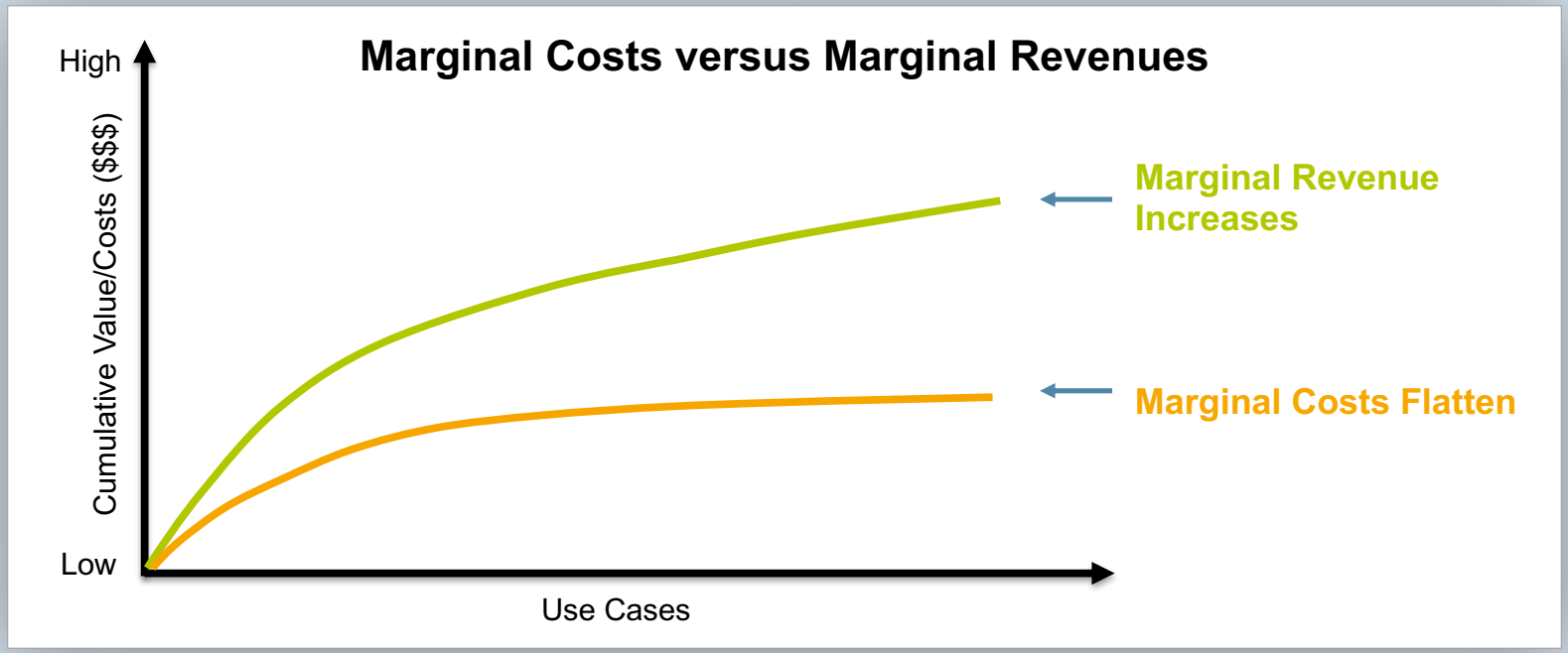
An organization seeking to maximize its profits should produce up to the point where the **Marginal Cost** equals the **Marginal Revenue** for each additional unit of production.



# Marginal Costs and Sunk Costs

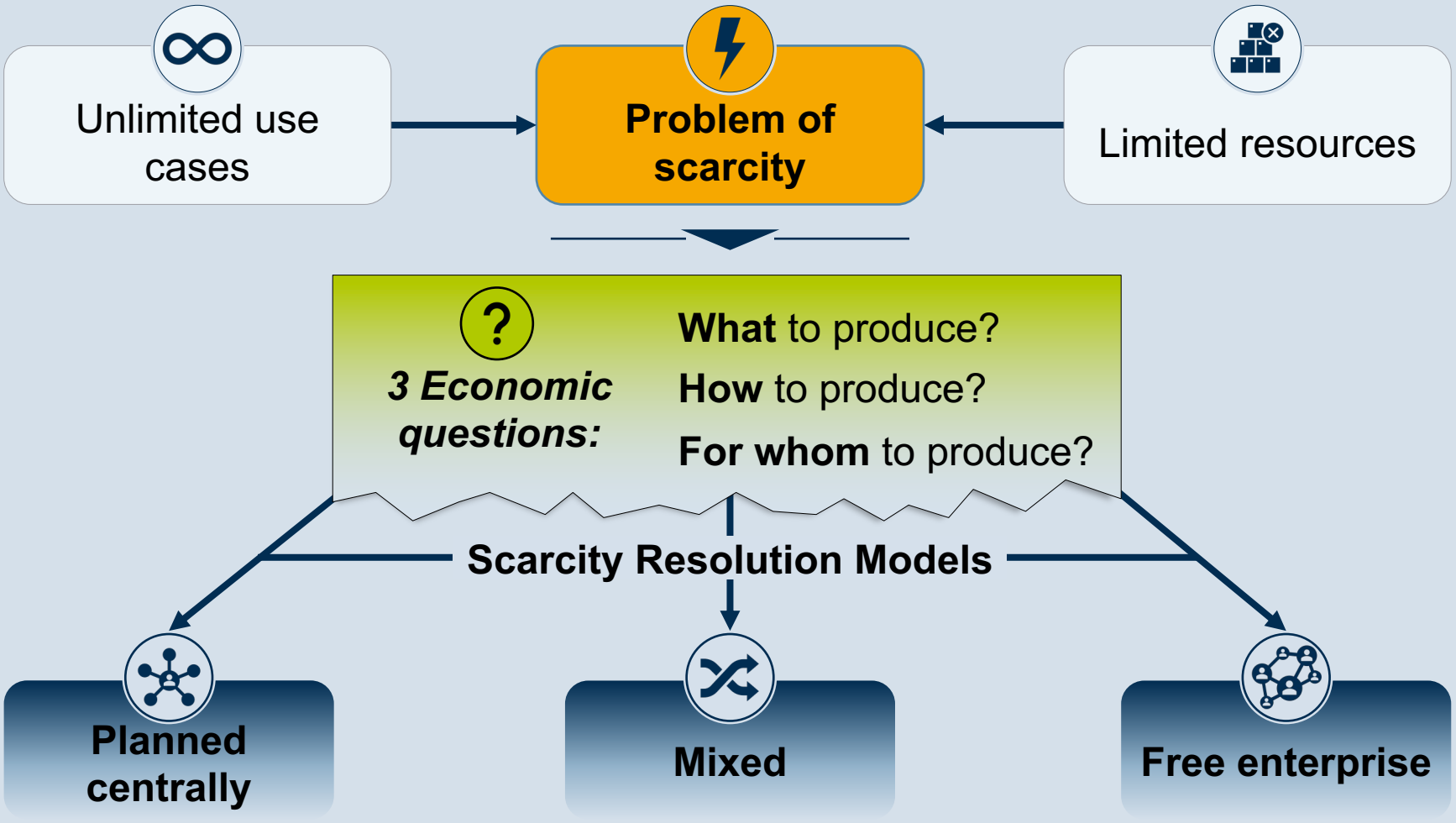


**Sunk Costs** are costs that have already been incurred and cannot be recovered.



# Dilemma of Scarcity

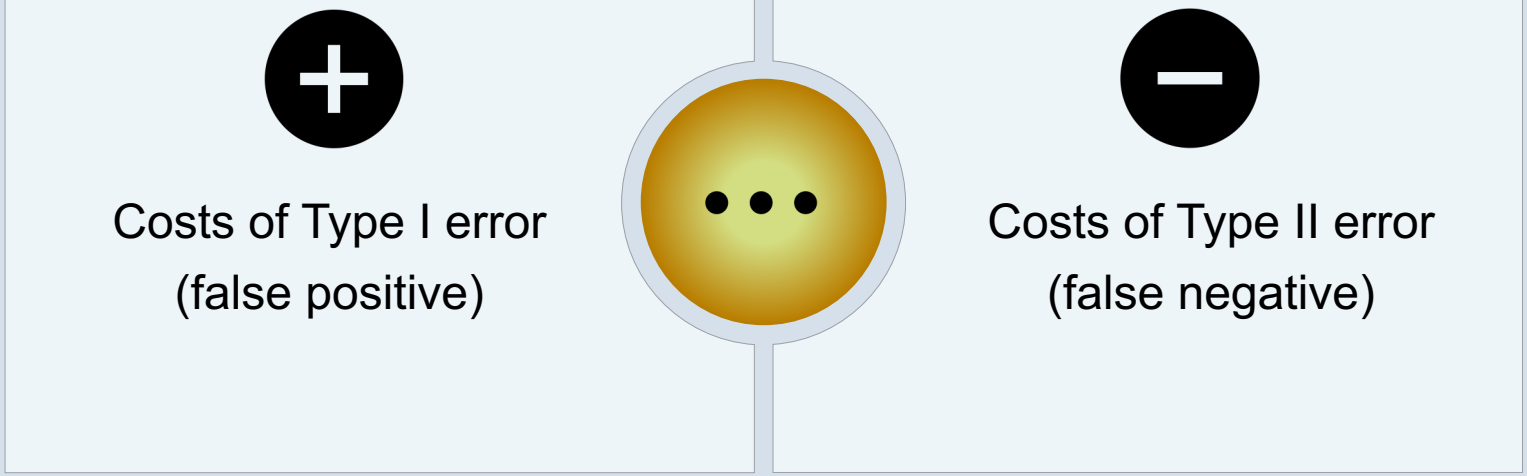




# Postponement Theory



**Postponement Theory** is an economic strategy that maximizes possible benefits and minimizes risks by delaying a decision in order to gain additional data or analytic insights.



# Making Use of Postponement Theory

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What are the **Type I Error** (False Positive) and **Type II Error** (False Negative) risks and costs associated with the decision?

What is the **estimated effectiveness** of the current decision given the Type I and Type II decision risks?

**What data *might* be needed** to improve the effectiveness of that decision given the Type I and Type II errors?

**How much more accurate** can the decision be made given these new data sources and additional data science time?

# Price Elasticity

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**Price Elasticity** of demand is the quantitative measure of consumer behavior that indicates the quantity of demand for a product/service depending on its increase or decrease in price.

$$\varepsilon = \frac{\Delta q/q}{\Delta p/p} = \frac{\text{\% change in quantity}}{\text{\% change in price}}$$

**Price Elasticity of Demand**

$\varepsilon > 1$: **elastic** demand → demand is **sensitive** to a price increase

$\varepsilon < 1$: **inelastic** demand → demand is **insensitive** to a price increase

# Elastic and Inelastic Goods

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## Inelastic Goods


- Demand only reacts weakly or not at all to price changes
- E.g., Energy

## Elastic Goods



- Demand reacts strongly to price changes
- E.g., Beverages

# Price Elasticity and Data Ramifications

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## Take into consideration all the costs associated with data:


**Confidence in data is everything!**

# The Economic Utility Function

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**An economic good yields utility** to the extent to which it is useful for satisfying a consumer's want or need.

Consumers will strive to **maximize their utility** or value.

**Marginal utility** is the utility gained by consuming an additional unit of a good/service.

**Utility** from data and analytics is measured by the perceived value received from the consumption or **usage of an additional unit of data** and analytic assets.