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**Disclaimer:**

Slides do not replace the assigned readings and should be complemented with the materials discussed in class.

**Do not use them as a textbook!**

# 1.1. EFFICIENCY AND ORGANIZATION

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Assigned reading: M&R, ch. 2

# Efficiency and Organization

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- Brief intro: economic analysis of organizations
- Pareto efficiency
- The Efficiency Principle
- The Value Maximization Principle
- Coase's "Theorem"

# Brief intro

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- **Microeconomics** (most?) you have seen so far:
  - Consumers and “**atomistic** firms”
  - “Firms”: **black boxes** that
    - have a production function: turn inputs into outputs
    - sell goods to maximize profits
  - Focus on **markets** (no economic transactions within firms)
  - Focus on equilibrium prices and quantities
- This is needed simplification to focus on important issues
- But leaves other important things out ...

# Brief intro

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- A lot goes on **within** firms:
  - Firms are not machines
  - Firms composed of **individuals**, governed by rules and norms,...
  - More economic transactions take place **within** firms than **between** firms or between firms and consumers

# Brief intro: Simon's Martian

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- “Suppose that a mythical visitor from Mars approaches the Earth from space, equipped with a telescope that reveals social structures. The firms reveal themselves, say, as solid green areas with faint interior contours marking out divisions and departments. Market transactions show as red lines connecting firms, forming a network in the spaces between them.”
- “...The **greater part of the space below our visitor would be within the green. Organizations would be the dominant feature of the landscape.** A message sent back home, describing the scene, would speak of "large green areas interconnected by red lines." It would not likely speak of "a network of red lines connecting green spots.”
- “When our visitor came to know that the green masses were organizations and the red lines connecting them were market transactions, it might be surprised to hear the structure called a **market economy.** "Wouldn't '**organizational economy**' be the more appropriate term?" it might ask.”

**Herbert Simon, 1991 (Nobel Prize in Economics, 1978)**

# Brief intro

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- **Markets are organizations too!**
  - Equilibrium prices do not materialize out of thin air (were you ever explained how equilibrium prices are determined in general equilibrium?)
  - Buyers and sellers need to contact each other
  - Prices need to be determined
  - Transfers of goods and money must take place

# Brief intro

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- This course:

Economic analysis of organizations

Organizations?

# What is an organization?

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- Basic economic principle: gains from trade

Specialization + Exchange



Shift of production possibilities frontier, greater welfare

Problem: specialization requires coordination and motivation

# What is an organization?

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- We will not spend time on the question “what is an organization”?
- From economic point of view, working definition:  
organization = mechanism to allocate resources
- Organizations provide means to coordinate and motivate individuals to achieve gains from specialization and exchange

# What is an organization?

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Examples of organizations:

- **Firms**
- Markets (e.g. stock exchanges, electricity markets, over-the-counter markets, e-bay, “El rastro”)
- Universities
- Unions and employers’ associations
- Multinational organizations (UN, World Bank)
- Families
- Economic, political systems ...

# What is an organization?

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## Components of an organization

- **Individuals** (with skills, knowledge, preferences)
- **Transactions**: transfers of goods and services among org members
- **Information** exchanged through information channels
- **Norms/rules/agreements** (explicit or not):
  - regulate activities of org members
  - allocate costs and rewards⇒ **contracts** (explicit / implicit)

# Economic analysis of organizations

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- **Economic** analysis: built upon **individual** choices
- Assumes individuals are (*at least* “**boundedly**”) **rational**:
  - have (*more or less well-defined*) goals/preferences
  - choose most preferred (*not too bad*) alternatives (*most of the time*)
- Uses **mathematical models** to obtain predictions
- **Economics** of organizations: will follow this approach
- ... but other useful approaches:
  - Sociological approaches
  - “Organizational ecology” approach

# Economic analysis of organizations

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- Our points of view:
  - **Manager/consultant:**
    - Best way to achieve organizational goals
  - **Regulator**
    - Best way to achieve societal goals
  - **Researcher, “enlightened” manager/regulator**
    - Explain and predict organizational evolution (to better achieve organizational/societal goals)

# Efficiency and Organization

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# (Pareto) Efficiency

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## Pareto domination:

- There is a group of individuals (I) and a set of feasible alternatives (A)

Alternative X **Pareto-dominates** alternative Y if no one prefers Y to X and at least some one prefers X over Y

- Alternative X **Pareto-dominates** alternative Y if everyone weakly prefers X over Y and at least some one strictly prefers X over Y

# (Pareto) Efficiency

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## Pareto Efficiency.

$X$  is Pareto efficient if there is no feasible alternative that Pareto-dominates  $X$

- Pareto efficiency = Pareto optimality
- If we just say efficiency/efficient in this course: we mean Pareto efficiency/efficient!!
- Defs. of domination and efficiency can be put together → usual long def. of Pareto efficiency

# (Pareto) Efficiency

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**(Pareto) Efficiency:**  $X$  is Pareto efficient if there is no other feasible alternative  $Y$  that makes some one better off without making any one worse off.

Equivalent def:  $X$  is Pareto efficient if there is no  $Y$  in  $A$  such that every one weakly prefers  $Y$  over  $X$  and at least some one strictly prefers  $Y$  over  $X$ .

# (Pareto) Efficiency

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- Why efficiency as **normative** criterion?
  - Avoids **waste**
  - Based on **unanimity**
    - Rules out unanimously bad alternatives
    - No need to weigh preferences of different individuals (doing this is hard and enters the territory of ethics)

# (Pareto) Efficiency

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- X does not Pareto dominate any other alternative. Therefore, X cannot be Pareto efficient. Is this true?
  - NO!
- If I say: “X is more Pareto efficient than Y”. What do I mean?
  - NONSENSE!
- If I say: “X is Pareto efficient for Anne, but not for Bob, while Y is Pareto efficient for Bob but not for Anne”. What do I mean?
  - NONSENSE!

# (Pareto) Efficiency

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Example.

- A firm has to decide how to distribute a bonus pool of 100 euros between two equally-deserving employees (Anne and Bob) .
- What is an efficient division of the 100 euros between Anne and Bob?

# (Pareto) Efficiency

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- Problems with efficiency as normative criterion:
  - Efficiency has little to do with **fairness**, justice,... (example of Anne and Bob)
  - There may be **many** Pareto efficient alternatives (example of Anne and Bob)

# (Pareto) Efficiency

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- Problems with efficiency as normative criterion:
  - Efficient **for whom?**
    - Efficiency depends on definition of group of individuals ( $I$ )
    - An alternative may be efficient for the shareholders of two firms competing in the same market ... but not efficient if we also take consumers or the local community into account
  - What is **feasible**?
    - Efficiency defined for a set of alternatives
    - Need to be clear about what alternatives are feasible

# (Pareto) Efficiency

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## Example 1:

- Two firms (A and B) are considering a joint investment in an R&D project.
- Two possible projects (1 and 2)
- Each project requires 100.000€ investment
- Initial investment has to be shared equally
- Revenues from project 1: 100.000€ for A, 70.000€ for B
- Revenues from project 2: 80.000€ for A, 60.000€ for B.
- Efficient project?

# (Pareto) Efficiency

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## Example 2:

- Two firms (A and B) are considering a joint investment in an R&D project.
- Two possible projects (1 and 2)
- Each project requires 100.000€ investment
- Initial investment has to be shared equally
- Revenues from project 1: 100.000 € for A, 50.000 € for B
- Revenues from project 2: 70.000 € for A, 60.000 € for B.
- Efficient project?

# (Pareto) Efficiency

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- Given the restriction that the two firms have to invest equally:
  - There are only two feasible alternatives (plus doing nothing)
  - Both alternatives are efficient!

# Efficiency and organization

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- Can we use Pareto efficiency to compare organizations?

Yes: organization A is **efficient** if there exist no organization B that generates outcomes that Pareto dominate the outcomes of organization B.

- Efficiency of organizations = efficiency of **outcomes** generated by organizations

# (Pareto) Efficiency

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## Example 2 (continued):

- Two firms (A and B) are considering a joint investment in an R&D project.
- Two possible projects (1 and 2)
- Each project requires 100.000€ investment
- Initial investment has to be shared equally
- Revenues from project 1: 85.000 € for A, 70.000 € for B
- Revenues from project 2: 90.000 € for A, 60.000 € for B.
- Both 1 and 2 were efficient **under the restriction** that investment has to be shared equally
- Efficiency of organizations: Is organizing joint ventures so that both partners invest equally an **efficient organizational form**?

# The Efficiency Principle

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- Brief intro: economic analysis of organizations
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- Coase's "Theorem"

# The Efficiency Principle

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- Two roommates deciding on a procedure to allocate house cleaning duties (**organization** to do cleaning)
- 5 different procedures/organizations: fixed schedules, random schedules, with/without side payments ...
- Procedures 1 & 3 are efficient; procedures 2, 4 & 5 inefficient
- Will they agree on using procedure 4?
- Roommates will not settle with 2,4 or 5
- 2, 4, 5 are not efficient → Pareto dominated by either 1 or 3
- Roommates will unanimously agree to switch from 2, 4 or 5 to 1 or 3
- A procedure that is **not efficient** is **not stable**

# The Efficiency Principle

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## The Efficiency Principle:

“If agents are able to bargain together effectively and can effectively implement and enforce their decisions, then the outcome of economic activity will tend to be efficient (at least for the parties to the bargain)”

# The Efficiency Principle

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- Intuition behind the principle:  
if an alternative is inefficient, there is another one that is unanimously preferred  
⇒ inefficient alternatives are unstable

# The Efficiency Principle

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- Have introduced efficiency as a **normative concept: evaluate** organizations.
- Efficiency can be, however, understood as a **positive concept: allows us to explain and predict**

# The Efficiency Principle

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## Example (continued):

- Two firms (A and B) are considering a joint investment in an R&D project.
- Two possible projects (1 and 2)
- Each project requires 100.000€ investment
- Initial investment has to be shared equally
- Revenues from project 1: 100.000 € for A, 70.000 € for B
- Revenues from project 2: 80.000 € for A, 60.000 € for B.
- Efficient project?
  - Which one do we expect the firms to agree upon?

# The Efficiency Principle

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## Example (continued):

- Two firms (A and B) are considering a joint investment in an R&D project.
- Two possible projects (1 and 2)
- Each project requires 100.000 € investment
- Initial investment has to be shared equally
- Revenues from project 1: 100.000 € for A, 50.000 € for B
- Revenues from project 2: 70.000 € for A, 60.000 € for B.
- Which project is efficient?
  - Which one do we expect the firms to agree upon?

## (Pareto) Efficiency

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- Both 1 and 2 are efficient **under the restriction** that investment has to be shared equally
- In this case, PE—by itself—does not allow us to predict which project will be chosen.

# The Efficiency Principle

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## Implications of the EP for the study of organizations

- Individuals will *tend* to adopt efficient organizational forms
- More precisely, inefficient organizational forms will *often* be unstable: rational individuals will avoid them
- Why the “tend” and “often”?
- EP implies that if existing orgs are efficient, they will be stable
- ... but it does not imply that all organizations will be efficient all the time
- ... not even most orgs most of the time

# The Efficiency Principle

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Why?

Because of the “ifs” in statement of EP:

## The Efficiency Principle:

“if agents are able to bargain together effectively and if they can effectively implement and enforce their decisions, then the outcome of economic activity will tend to be efficient (at least for the parties to the bargain)”

# The Efficiency Principle

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- Why inefficient orgs may emerge/persist:
  - Easy to **bring all relevant parties together** to bargain?
  - Easy to **determine payoffs** of all alternatives?
  - Do we expect parties to **bargain “effectively”**?
  - Will they be able to **enforce** their agreement?
- A lot of what we’ll do in this course has to do with these “ifs”
- We’ll see examples soon

# The Efficiency Principle

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- **Normative** implications for regulators
  - Are the “if’s” satisfied?
    - Yes → **no** need for **intervention** on the grounds of **efficiency** (there might be other reasons: fairness)
    - No → intervention **may** be needed
    - What form of intervention?
      - Remove the **obstacles** to effective bargaining
      - **Influence directly** the allocation of resources

# The Value Maximization Principle (MVP)

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- Brief intro: economic analysis of organizations
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- The Value Maximization Principle
- Coase's "Theorem"

# The VMP

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- In some scenarios, we can separate resource allocation decisions into two separate decisions:
  - How to allocate resources to “generate value”
  - How to distribute the total value generated among the different individuals
- We can get even stronger implications of efficiency in these scenarios
- What are these scenarios?
  - Situations in which there are no “wealth effects”

# VMP and wealth effects

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**Wealth effects:** There are no wealth effects in a given problem if:

1. The individuals involved **like money**.
2. “There is a price for everything”: For each individual and **any** two alternative decisions ( $x$  and  $y$ ), there is a **definite amount of money** that would be sufficient to **compensate** the individual for switching from  $x$  to  $y$  (or from  $y$  to  $x$ ).
3. The **amount of money** needed to **compensate** an individual for switching from  $x$  to  $y$  (or from  $y$  to  $x$ ) does **not depend on the individual’s wealth**.
4. The individuals involved must have **the means** to pay others for a switch from **less** preferred to **more** preferred alternatives.

# MVP and wealth effects

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## Example:

- Two entrepreneurs, Alice and Bill
- A and B sell unrelated goods
- A's wealth: €1,000
- B's wealth: €1,000
- There is a store that can be used to sell either A's or B's products
- A and B have to decide:
  - Who operates the store: decision about how to deploy resources to **generate value**
  - How much B should pay to A or A to B: decision about how to **share the value generated**

# VMP

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- Example:

Value for A and B of the store:

Wealth	Value A	Value B
€<950	€110	€90
€951-1000	€110	€90
>€1000	€110	€90

Are there wealth effects?

# MVP and wealth effects

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- Is 3. in the definition likely to hold?
  - Firms:
    - Suppose a firm faces 3 investment alternatives
    - Would the value of each alternative change if the firm becomes “wealthier” (e.g. wins a lawsuit and gets a large cash windfall)
  - Individuals: who will give more value to an extra euro, a homeless person or Emilio Botín?
- Is 4. in the definition likely to hold?
  - For individuals? For firms?

# VMP and wealth effects

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So what if there are no wealth effects?

# VMP and wealth effects

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- No wealth effects and the “equivalent value index”:

**Theorem.** 1-3 in the definition hold **if and only** if the individual’s preferences can be represented by the utility function:

$$U(w, Y) = w + v(Y) ,$$

$w$  = wealth (euros);  $Y$  = vector of other variables  
(quasi-linear preferences)

# VMP and wealth effects

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- We will not prove the statement
- But let's check that if preferences can be represented by  $U(w, Y) = w + v(Y)$ , 1-3 in the def of no wealth effects hold:
  1. Individual values money?
  2. Any change can be compensated?
  3. Compensation depends on wealth?

# VMP and wealth effects

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- What's special about the utility function  $U(w, Y) = w + v(Y)$ ?: **monetary units** → 1 extra euro increases utility by 1 euro.
  - This is by no means always the case:
    - I may appreciate 1 euro more when I am poor
    - 1 extra euro may affect the value I give to  $Y$
- $U =$  **equivalent value index** or just “**value**”
- Distinction: **money** and **value-creating** resources / activities
- $v(Y)$  value of allocation  $Y$  of value-creating resources / activities

# VMP and wealth effects

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- In the previous example, the value creating decision is who operates the store:
  - $Y=1$  if A operates the store or
  - $Y=0$  if B operates the store
- The table tells us:
  - $v_A(1)=110$  : value generated by the store for A if A operates the store
  - $v_A(0)=0$  : value generated by the store for A if B operates the store
  - $v_B(1)=0$  : value generated by the store for B if A operates the store
  - $v_B(0)=90$  : value generated by the store for B if B operates the store

# VMP and wealth effects

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- In the previous example, A and B have some initial wealth:  $w_A^0$ ,  $w_B^0$ .
- A and B can decide on a payment  $P$  so that final wealth is:
  - $w_A^f = w_A^0 + P$
  - $w_B^f = w_B^0 - P$
- Since there are no wealth effects, the utility for A of a given decision  $Y$  and payment  $P$  is:
  - $U_A(w_A^0 + P, Y) = w_A^0 + P + v_A(Y)$
- For B:
  - $U_B(w_B^0 - P, Y) = w_B^0 - P + v_B(Y)$

# The Value Maximization Principle (VMP)

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- Total value:
  - If there are  $i=1, \dots, I$  individuals
  - **Total value** of value-creating alternative  $Y$ :

$$V(Y) = \sum_{i=1}^I v_i(Y)$$

- Def. **alternative**:
  - a) **Allocation  $Y$  of value-creating resources / activities** (e.g.: class schedule, who operates the store, allocations of goods or tasks)
  - b) **Monetary transfers ( $P$ )**

# Value Maximization Principle

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## The Value Maximization Principle (VMP):

If there are **no wealth effects**:

An alternative is **efficient if and only if** it maximizes the total value of the individuals involved in the problem

# Value Maximization Principle

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- VMP → distribution of money (monetary transfers) **irrelevant** to determine which alternative is efficient
- If no wealth effects → efficiency determined solely by allocation of value-creating resources / activities
- Logic:
  - If  $V(A) > V(B)$  → we can make everyone better off by choosing A and making the necessary monetary transfers
  - Why does this work? No wealth effects → we can redistribute money without affecting the value of the value-creating resources

# VMP

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## Example (continued)

Wealth	Value A	Value B
€<950	€110	€90
€951-1000	€110	€90
>€1000	€110	€90

Using the definition of efficiency: Which alternatives are efficient?

# VMP

## Example (continued)

Wealth	Value A	Value B
€<950	€110	€90
€951-1000	€110	€90
>€1000	€110	€90

$Y=1$  "A uses the store"

$Y=0$  "B uses the store"

$$V(1) = 110 + 0 = 110$$

$$V(0) = 0 + 90 = 90$$

➤ B uses the store, A and B have €1000

Dominated by:

➤ A uses the store, A has €900 and B has €1100

# VMP

- Initial wealth:  $w_A^0, w_B^0$ .
- No wealth effects
- Alternative 1:  $Y=0$ , no transfers →
  - $U_A(w_A^0, 0) = w_A^0 + 0 \leftarrow v_A(0)$
  - $U_B(w_B^0, 0) = w_B^0 + 90 \leftarrow v_B(0)$
- Alternative 2:  $Y=1$ , A pays  $P$  to B →
  - $U_A(w_A^0 - P, 1) = w_A^0 - P + 110 \leftarrow v_A(1)$
  - $U_B(w_B^0 + P, 1) = w_B^0 + P + 0 \leftarrow v_B(1)$
- Both better off if:
  - $110 - P \geq 0$  y  $P \geq 90$
- If A pays 90-110 to B → both better off
- Same argument for any other alternative with  $Y=0$  and some transfer.

# VMP and wealth effects

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- VMP: If there are no wealth effects, efficiency is determined only by  $Y \rightarrow$ 
  - Final distribution of money does not matter to determine efficiency!
  - In the example, as long as  $Y=1$ , the decision  $(Y, P)$  is efficient!
  - Key idea: since a euro is worth the same for either A or B, changing  $P$  benefits A as much as it harms B and leaves total value unchanged.

# VMP and wealth effects

Example (continued):

Wealth	Value A	Value B
€0-950	€110	€90
€951-1000	€110	€90
€> 1000	€110	€90

- Both A and B have wealth of €80
- Does the problem exhibit **wealth effects**?
- What allocation of the store **maximizes total value**?
- **Using the definition of efficiency**:
  - Is  $Y=1$  (“A operates the store”) and  $P=0$  efficient?
  - Is  $Y=0$  (“B operates the store”) and  $P=0$  efficient?
- Key: What is **feasible**?

# VMP and wealth effects

Let's assume that value of the commercial space is:

Wealth	Value A	Value B
€0-950	€80	€70
€951-1000	€110	€90
€>1000	€110	€110

- Both A and B have wealth of €1,000
- **Wealth effects?**
- What allocation of the store **maximizes total value?**
- **Using def of efficiency:**
  - Is  $Y=1$  ("A operates the store") and  $P=0$  efficient?
  - Is  $Y=0$  ("B operates the store") and  $P=0$  efficient?
- Key: wealth affects the value of the store → wealth is itself a "value creating activity"

# VMP and wealth effects

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- Example shows why VMP does not hold if there are wealth effects:
  - If there are wealth effects, an alternative can be efficient even if it does not maximize total value
  - Even with wealth effects, if an alternative maximizes total value, it is efficient

# VMP and wealth effects

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Implications of VMP:

- Finding efficient outcomes simple
- Independence of efficiency and distribution:
  - Can distinguish two problems:
    - Finding the efficient value-creating alternative
    - Redistribute wealth to obtain desired distribution of utility

# VMP and wealth effects

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Example. VMP and mathematical optimization:

- A firm has four partners ( $i = 1, 2, 3, 4$ )
- Have to decide how much to invest,  $y$ , in new project
- Benefit for the partners depends on  $y$ :
  - $I_1(y) = I_2(y) = 7y - 0.5y^2$
  - $I_3(y) = 4y - y^2$
  - $I_4(y) = 3y - 0.5y^2$
- Efficient investment level?
- If there are no wealth effects?

# The Coase Theorem

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- Brief intro: economic analysis of organizations
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- Coase's "Theorem"

# The Coase Theorem

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- Efficiency Principle  $\Rightarrow$  bargaining outcomes efficient
- VMP  $\Rightarrow$  if no wealth effects, efficiency and distribution separate

# The Coase Theorem

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## The Coase “Theorem”:

If the parties bargain to an **efficient** agreement (for **themselves**) and if there are **no wealth effects**, then the **value-creating** activities ( $Y$ ) that they will agree upon do **not** depend on the **bargaining power** of the parties or on what **assets/wealth** each owned when the bargaining began.

Rather, **efficiency** alone determines the choice of value creating activity.

The **other factors can affect only** decisions about how the costs and benefits are to be **shared**.

# The Coase Theorem

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Alternative formulations:

- (If there are no wealth effects and the parties can bargain effectively), economic outcomes are not affected by the initial allocation of property rights
- (If there are no wealth effects) and property rights are clearly allocated, agents will produce the efficient level of externalities, independently of the initial distribution of property rights.

# The Coase Theorem

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- Example (continued):

Value for A and B of the store

Wealth	Value A	Value B
€0-950	€110	€90
€951-1000	€110	€90
€>1000	€110	€90

# The Coase Theorem

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- Both A and B have €1,000
- We saw that in this case, there are no wealth effects
- Suppose A is initially the owner of the store: who will end up operating the store?
- What if B is the initial owner?
- What if they have to pay €30 to the city to transfer ownership?

# The Coase Theorem

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- Let's assume again that values are:

Wealth	Value A	Value B
€0-950	€80	€70
€951-1000	€110	€90
€>1000	€110	€110

# The Coase Theorem

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- Both A and B have €1,000
- We saw that in this case there are wealth effects
- Suppose A is the initial owner: who will end up owning the store?
- What if B is the initial owner?

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## Normative implications of the Coase Theorem:

- If the premises of the theorem hold:
  - we should expect efficient outcomes even if unequal wealth/bargaining power of the parties
- if efficiency is the goal of the regulator, no need for intervention
- if regulator cares about distribution, no need to intervene in the determination of  $Y$ , rather redistribute directly (taxes, subsidies)

# Summary

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## Key ideas:

- **Economic** analysis of organizations:
  - Based on analysis at the level of **individuals**
  - Individuals **(approximately) rational**
- **(Pareto) Efficiency** useful tool to analyze organizations
  - **Normative** criterion (but with important limitations)
  - **Predictive/explanatory** value: the **Efficiency Principle**
- In some cases (when there are **no wealth effects**), decisions about total value and about distribution can be separated:
  - Efficiency independent of distribution, determined by choice of “value creating” alternatives (**VMP**)
  - **Coase Theorem** applies