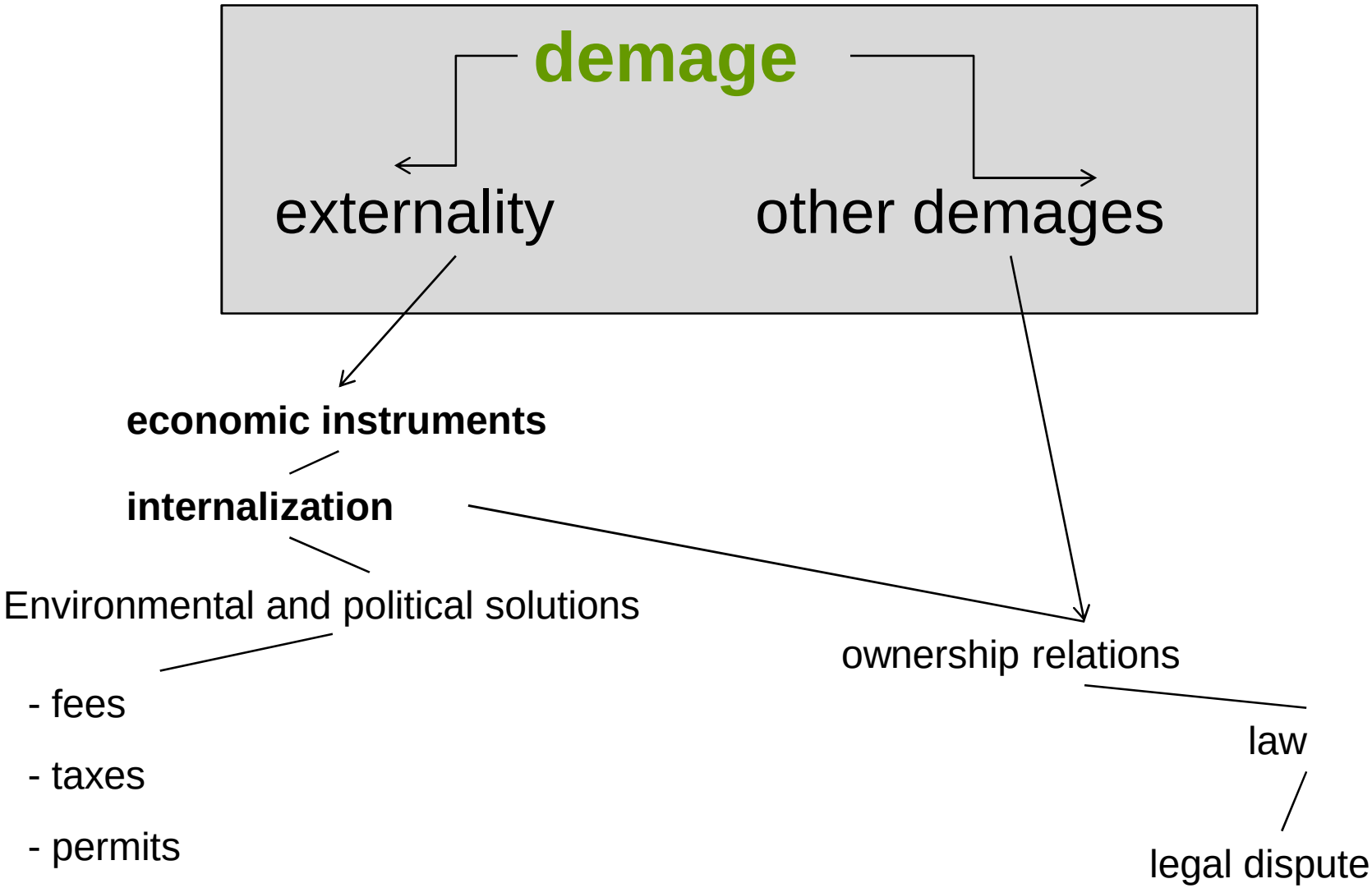
Economics of Sustainable Management

4. Theorems and approachers

INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

Tento projekt je spolufinancován Evropským sociálním fondem a Státním rozpočtem ČR InoBio – CZ.1.07/2.2.00/28.0018


demage
externality
other demages
economic instruments
internalization
Environmental and political solutions
- fees
- taxes
- permits
ownership relations
law
legal dispute

Environmental stress for the economy

• The total cost of the environmental stress are called **ecological stress of economy**

Environmental degradation occurs due to:

• **deprivation of the ecosystem** (NE)

• **introduction of matter and energy in an ecosystem** (in the environment), perceived as its **pollution**

• crowding associated with **the population growth**, which is the basic cause of environmental problems

In the economic dimension has the ecological stress of the economy two basic components:

- **cost for avoidance** - the costs of overloading of environment
- **damage from environmental degradation** (ecological damage) - the negative effects caused by the degradation of the environment

Solution of negative externalities

- Economic solution of environmental protection requires that **negative externalities will be included in the production costs of polluters** (the micro level) and **aggregate indicators of economic performance** (in the macro-level)
- This integration is called **„internalization of externalities"** and bring closer the full cost pricing and reduces the differentiation between private and social costs
- The concept of externalities is similar as the concept of neoclassical economic theory on the efficient allocation of scarce resources among competing limited to use

Solution of negative externalities

If a negative externality is created, is an attempt of the affected (victim) of an entity to change this situation. If the iniciator is known, he has in essence the following options:

- **spend own resources** to eliminate the harmful effects of external effect
- **require such changes** of iniciatiors activities, which removed any emergence of negative external effects (either negotiate these changes with the iniciatior or assign the intervention of government authority)
- **negotiate** with the iniciator the financial compensation of caused damages

Solution of negative externalities

• By internalisation of externalities the external effects change - so that they cease to be external (outside) and get into the expenses (costs) of subjects that caused them, ie., **External effects become internal**.

restrictions:

• problematic **expression external effects** - their exact description, and quantification, determination

• choice of specific methods and techniques for internalisation of external effects is in many cases **the result of negotiations of two or more entities**. In case that the method is precisely determined (for example by law) may be not equivalent and correspond to real costs or quantified adverse effects

• **to partially internalized externalities occurs** directly or indirectly **in several different ways:**

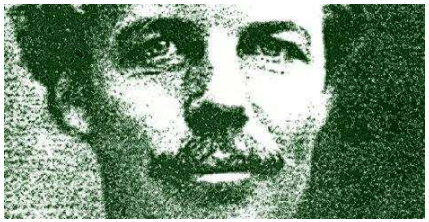
• environmental policy use **direct regulation** (ie prescribed standards, emission limits, technology, etc.) - *indirectly through costs that must be spend to meet the prescribed standards or limits*

• if environmental policy use **economic instruments** (ie fees, taxes, subsidies, etc.), internalizes externalities through the price mechanism and also face one of the symptoms of a dysfunctional market - distorted prices

• if a particular segment of environmental protection are clearly defined and protected property rights, externalities can have the form **of compensation for** (pollution) **damage** between the iniciator and the victims (*Coase theorem*)

Pigovian tax

Arthur Cecil Pigou (1877 - 1959) was an English economist.



Pigouvian tax:

• tax that may **be economically justified (vindicate)**, in case if removes the other, more damaging market inefficiencies, such as negative externalities. In such cases, tax can act as a tool to increase market efficiency

•to solve adverse impacts of external effects on the welfare could be proposed **compensation through taxes** (in the case of negative external effects) **and subsidies** (in the case of positive external effects)

• **the amount of taxes or subsidies correspond to external effects**, so the private marginal costs, including taxes (minus subsidies) correspond to social costs

• means **forced internalization**, which is realized **on the basis of state interference**

Other options address the negative externalities

- **Prohibitions** - but usually not the best solution, and often it **is not** even practically **possible to completely eliminate** the externality. Most effective is its **certain limitations**. In practice, however, well used, see, eg, driving after consuming alcohol or after eating certain substances, or prohibit the use of CFCs,..

- **Command solution** - simply **determined how many externalities could be produced**. This solution faces essentially the same problems as the Piguvion taxes have. (*An interesting modification are negotiable license (permits), when using market principles. There exists remarkable flexibility as crucial as the total amount of emissions. The way how they will reach the final state is up to them. They may choose to purchase dust collecting equipment, fuel switching, conservation programs, or buying and trading of permits)*

Other options address the negative externalities

- **State regulation** - through laws is enacted to entities - obligations to restrict externalities. *Eg. obligation to build sewage disposal plant, use catalytic converter, or to declare an area as a protected, etc.*

- **One-off financial support** – especially suitable where is neccesary to cover one-time investment costs

Coase theorem

Ronald H. Coase (*1910) , British economist and Professor Emeritus of Economics, Nobel Prize winner in Economics in 1991

** The Nature of the Firm (Economica **4** (16): 386–405)*
** The Problem of Social Cost", Journal of Law and Economics **3** (1): 1–44*

" The world of zero transaction costs has often been described as a Coasian world. Nothing could be further from the truth. It is the world of modern economic theory, one which I was hoping to persuade economists to leave."

Coase theorem - an assertion that externalities do not lead to allocation of resources if:

- **property rights** and their content **are clearly defined**, all property has well known owner and it is clear what exactly mean the protection of this property

- **transaction costs** of negotiations between owners **are zero**, respectively. negligible in relation to the costs

Property rights (definition)

: **rights to the ownership and stewardship of, and profits from, land, capital, and other goods**

- extensive property rights of private individuals in most goods is a **basic element of the capitalist system**

- **affect almost every decision** we make and are one of the fundamental **factors that determinate economic performance**

Characteristics of property rights

1.

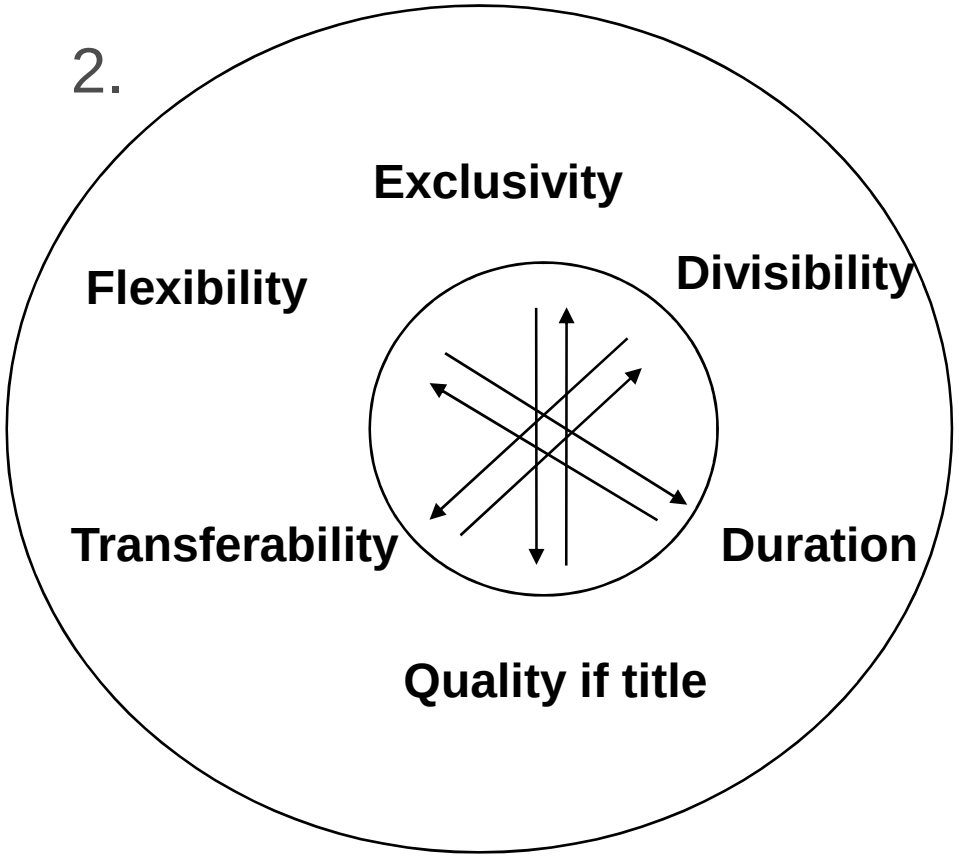
Private rights

Community rights

State rights

Mix of all three

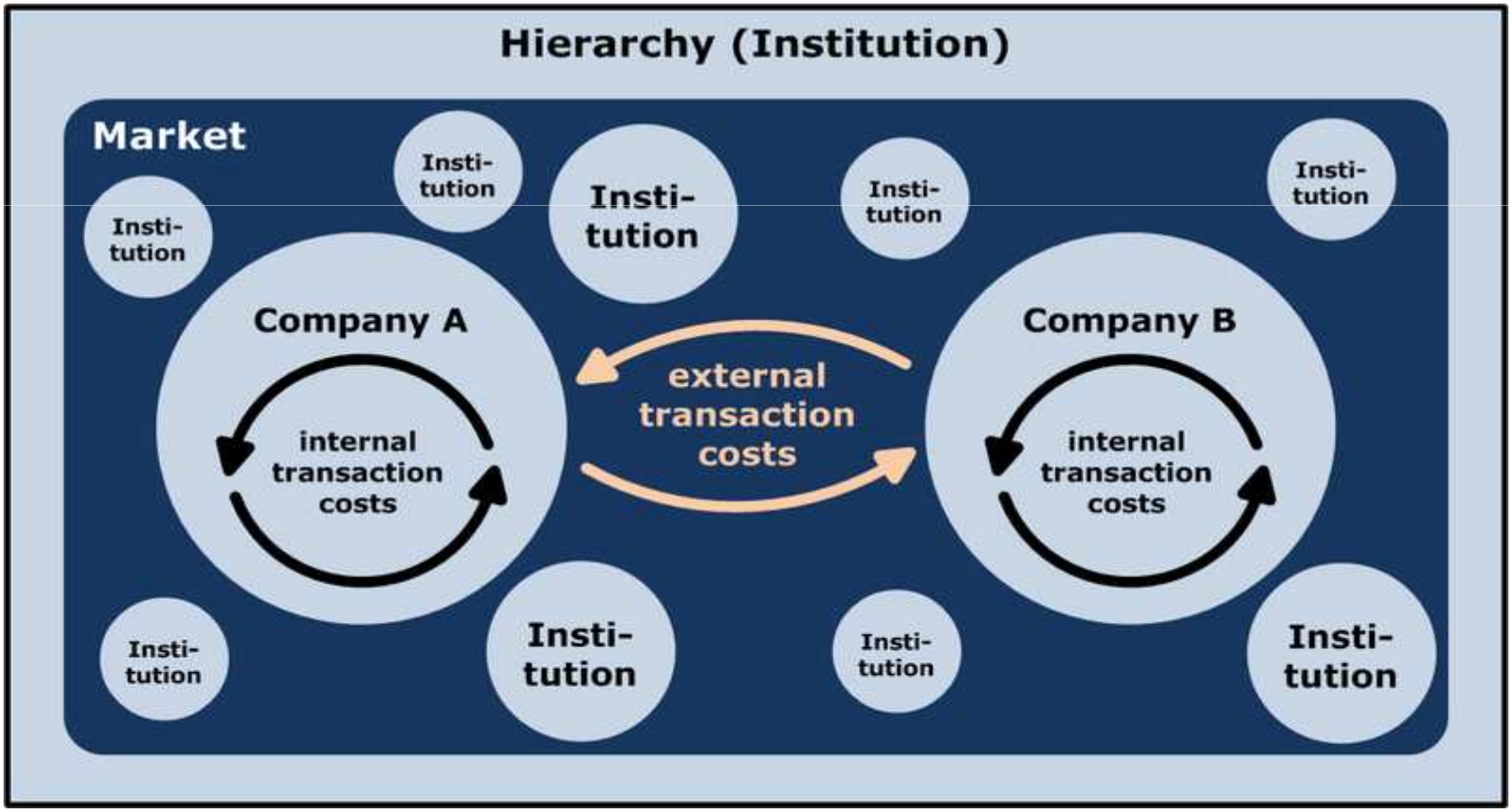
2.



(adapted from Grafton, 1998)

Transaction costs are

- a cost incurred in making an economic exchange (restated: the **cost of participating in a market**)



Exchange of property rights - Coasian solution

Coasian solution - proposes a mechanism by which potential beneficiaries of a public good **band together** and **pool their resources based on their willingness to pay to create the public good**

if the transaction costs between potential beneficiaries of a public good are sufficiently low, and it is therefore easy for beneficiaries to find each other and pool their money based on the public good's value to them

then an adequate level of public goods production can occur even under competitive free market conditions

Exchange of property rights - Coasian solution

Critique

- often extremely costly
- almost always inapplicable in economic reality
- the initial allocation always matters in reality (Hahnel, 2009)

EG: Turbines Too Loud? Here, Take $5,000

(http://www.nytimes.com/2010/08/01/us/01wind.html?_r=1&

Discussion questions:

- Do you think the Coase Theorem presents a realistic tool for solving externality problems? Why or why not?

- Have you ever been in a situation where you've considered actually paying someone *not to do something?* If so, did your negotiations result in a more desirable outcome than would otherwise have been reached? Explain.

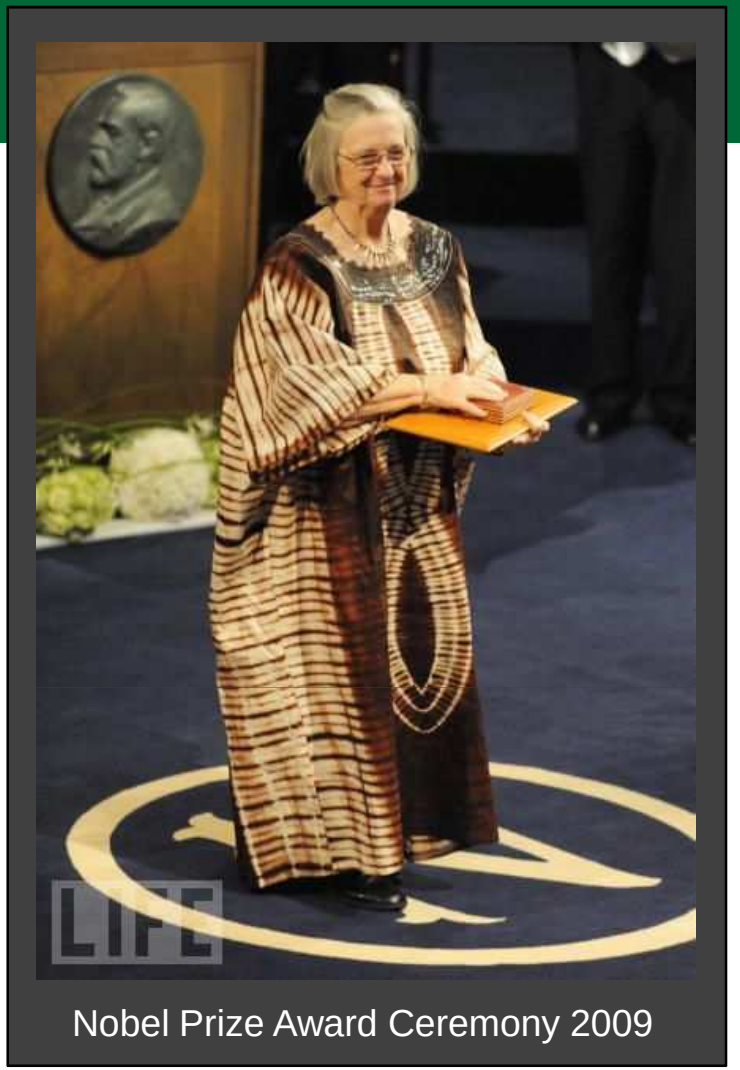
Elinor Ostrom (*1933)

- American political scientist

- 2009 Nobel Prize Winner in Economic Sciences
  (the first woman won the prize in this category)

- emphasized the multifaceted nature
  of human–ecosystem interaction

- developed the "Social-Ecological Systems (SES) framework"



Nobel Prize Award Ceremony 2009

-"Analysis of Economic Governance, esp. the Commons"

- A&Q Elinor available on: http://forestsandclimate.wordpress.com/2009/12/11/trapped-in-a-dilemma-ask-elinor/

eight "design principles" of stable local common pool resource management

1. **Clearly defined boundaries** (effective exclusion of external un-entitled parties);
2. **Rules regarding the appropriation and provision of common resources** that are adapted to local conditions;
3. **Collective-choice arrangements** that allow most resource appropriators to participate in the decision-making process;
4. **Effective monitoring** by monitors who are part of or accountable to the appropriators;
5. A scale of graduated sanctions for resource appropriators who violate community rules;
6. **Mechanisms of conflict resolution** that are cheap and of easy access;
7. **Self-determination of the community** recognized by higher-level authorities;
8. In the case of larger common-pool resources, organization in the form of multiple layers of nested enterprises, with small local CPRs at the base level.

Connected Local Economies

http://vimeo.com/47254235

Sharing Wealth in the 21st Century

http://vimeo.com/47939517

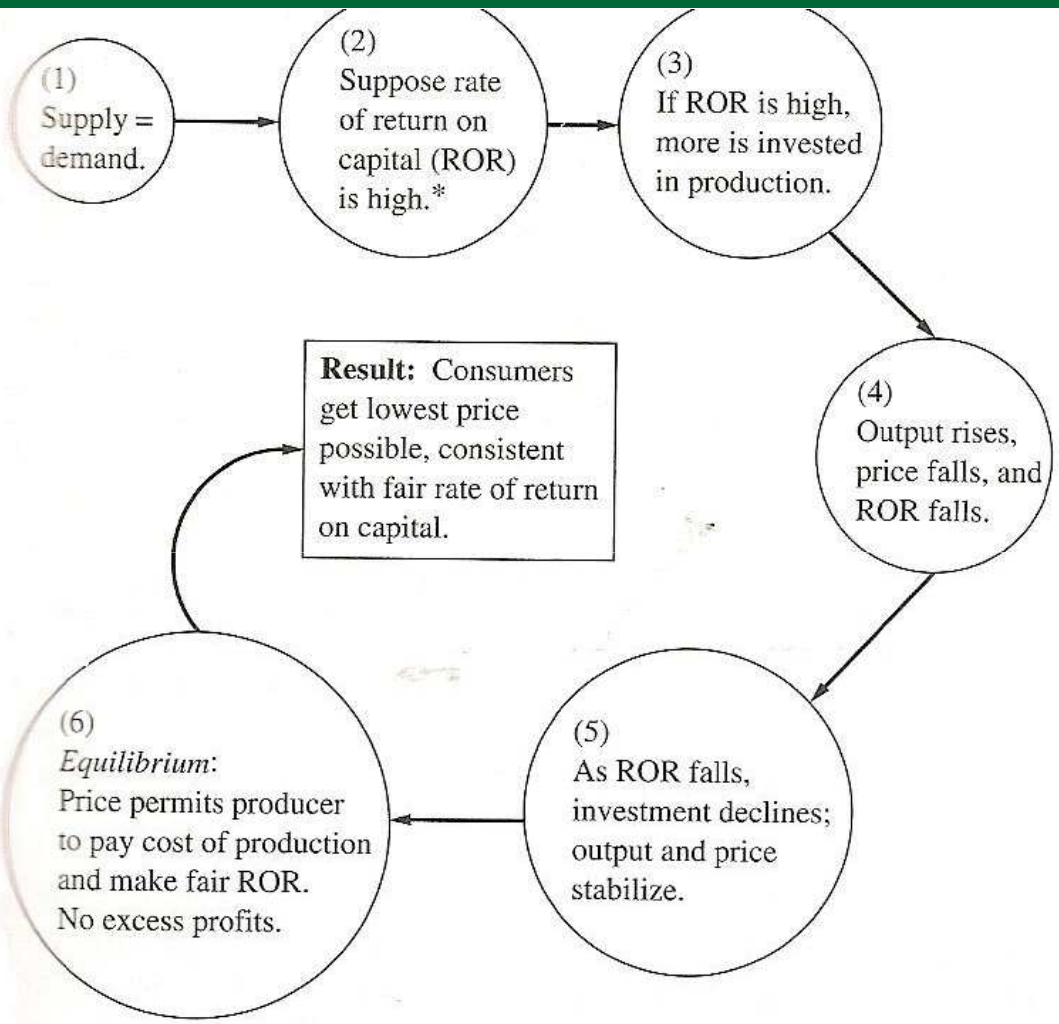
Stories from BALLE

http://vimeo.com/46784111

Supply and demand

- model of **price determination**
- economic **equilibrium** of price and quantity

- **elasticity** - central concept - refers to how strongly the quantities supplied and demanded respond to various factors, including price and other determinants (% of relative changes)



* You could start with a low rate of return, say due to increased competition from low-priced substitutes. In that case, the stages would read: (2) Suppose rate of return on capital (ROR) is low. (3) If ROR low, less invested in production. (4) Output falls and price rises. (5) As price rises, investment-decline tapers off; output and price stabilize. The equilibrium results are the same.

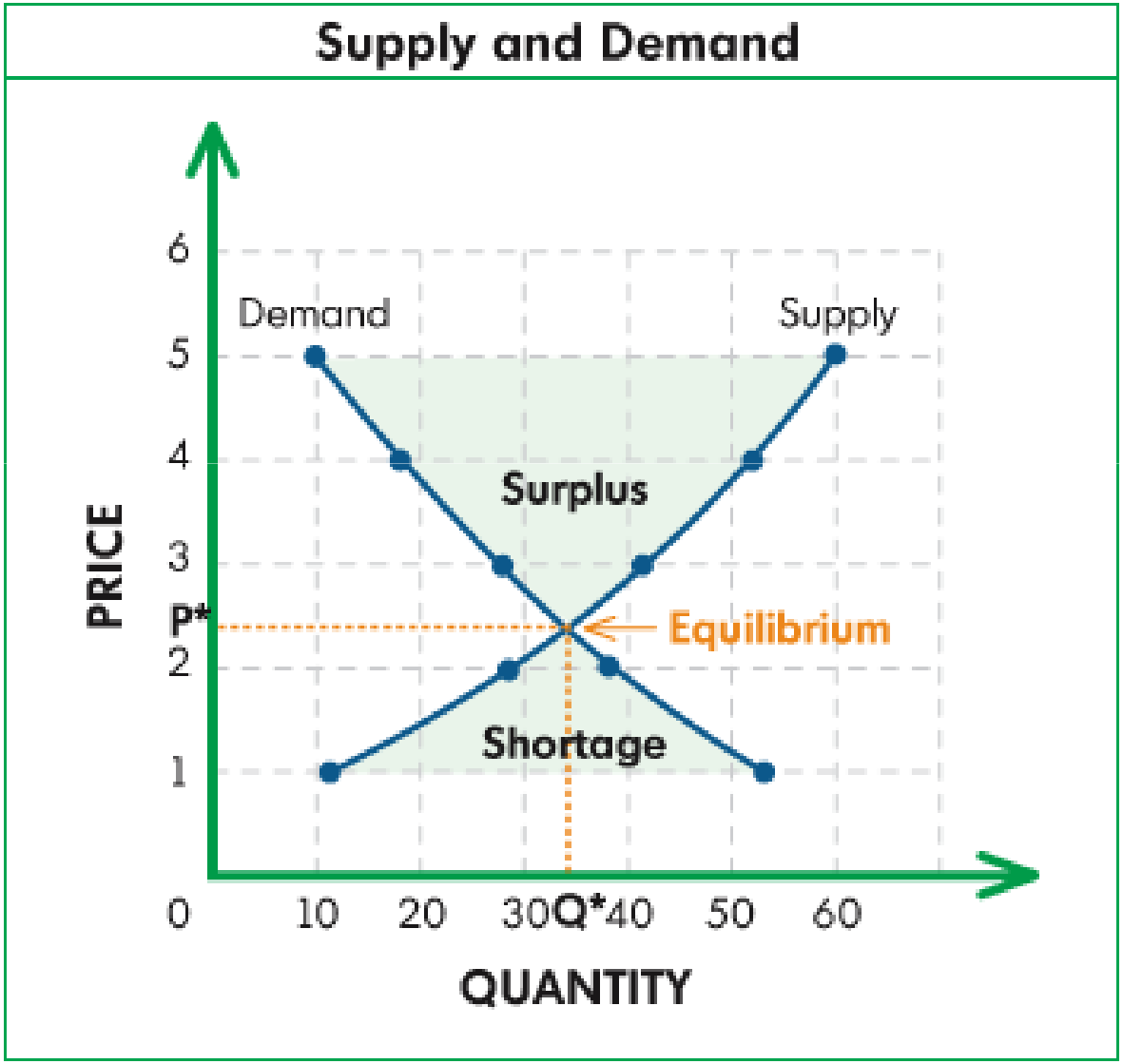
4 basic laws

1. If demand increases and supply remains unchanged then higher equilibrium price and quantity.

2. If demand decreases and supply remains the same then lower equilibrium price and quantity.

3. If supply increases and demand remains unchanged then lower equilibrium price and higher quantity.

4. If supply decreases and demand remains the same then higher price and lower quantity.


Supply and Demand
PRICE
6
5
4
3
P*
2
1
0
Demand
Supply
Surplus
Equilibrium
Shortage
10
20
30
Q*
40
50
60
QUANTITY

Determination of the price

Effects of shifts in the demand curve

movement along S curve and new D curve

rise in demand (rightward shift) $\rightarrow$ P rises

fall in demand (leftward shift) $\rightarrow$ P falls

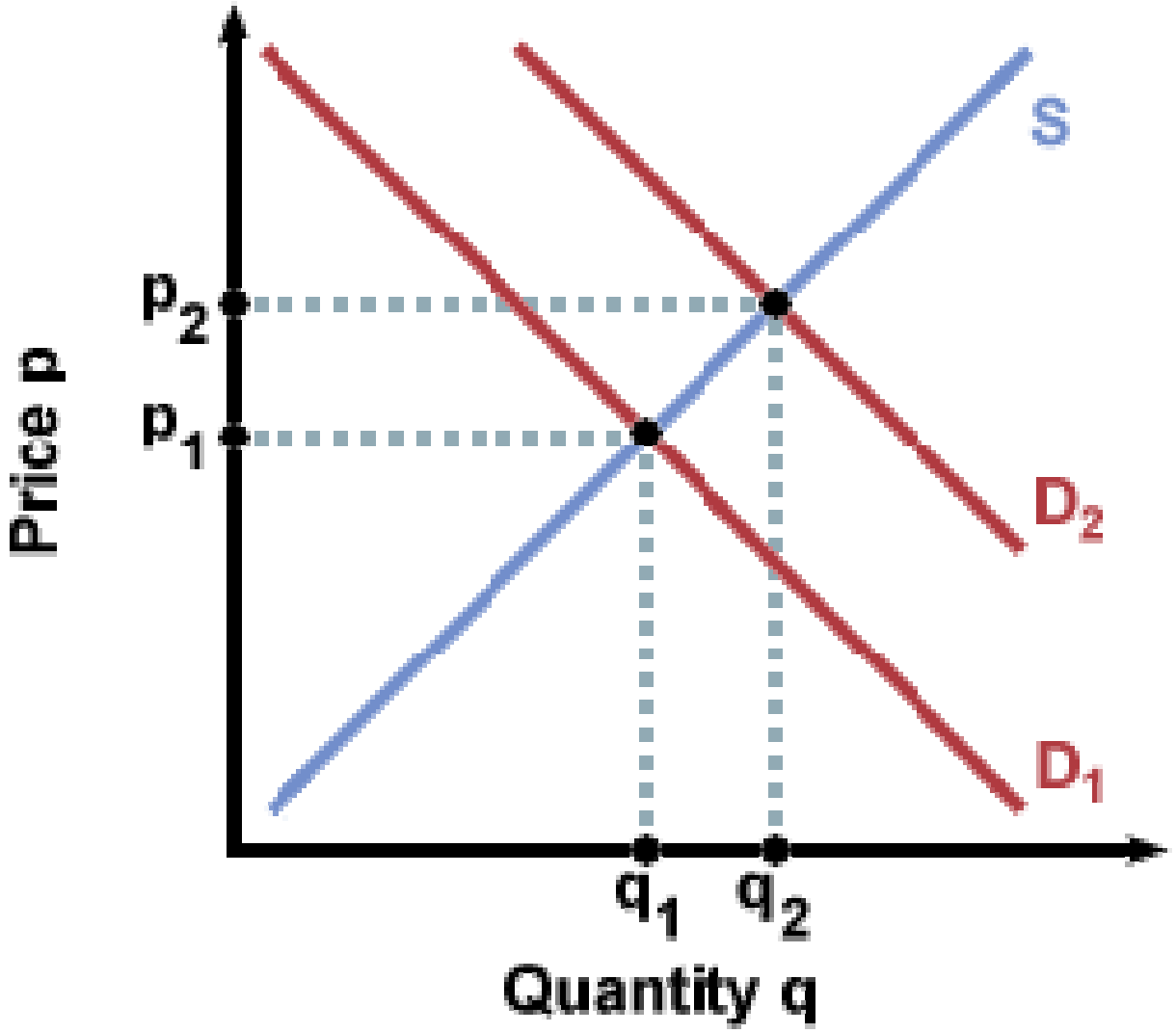
Effects of shifts in the supply curve

movement along D curve and new S curve

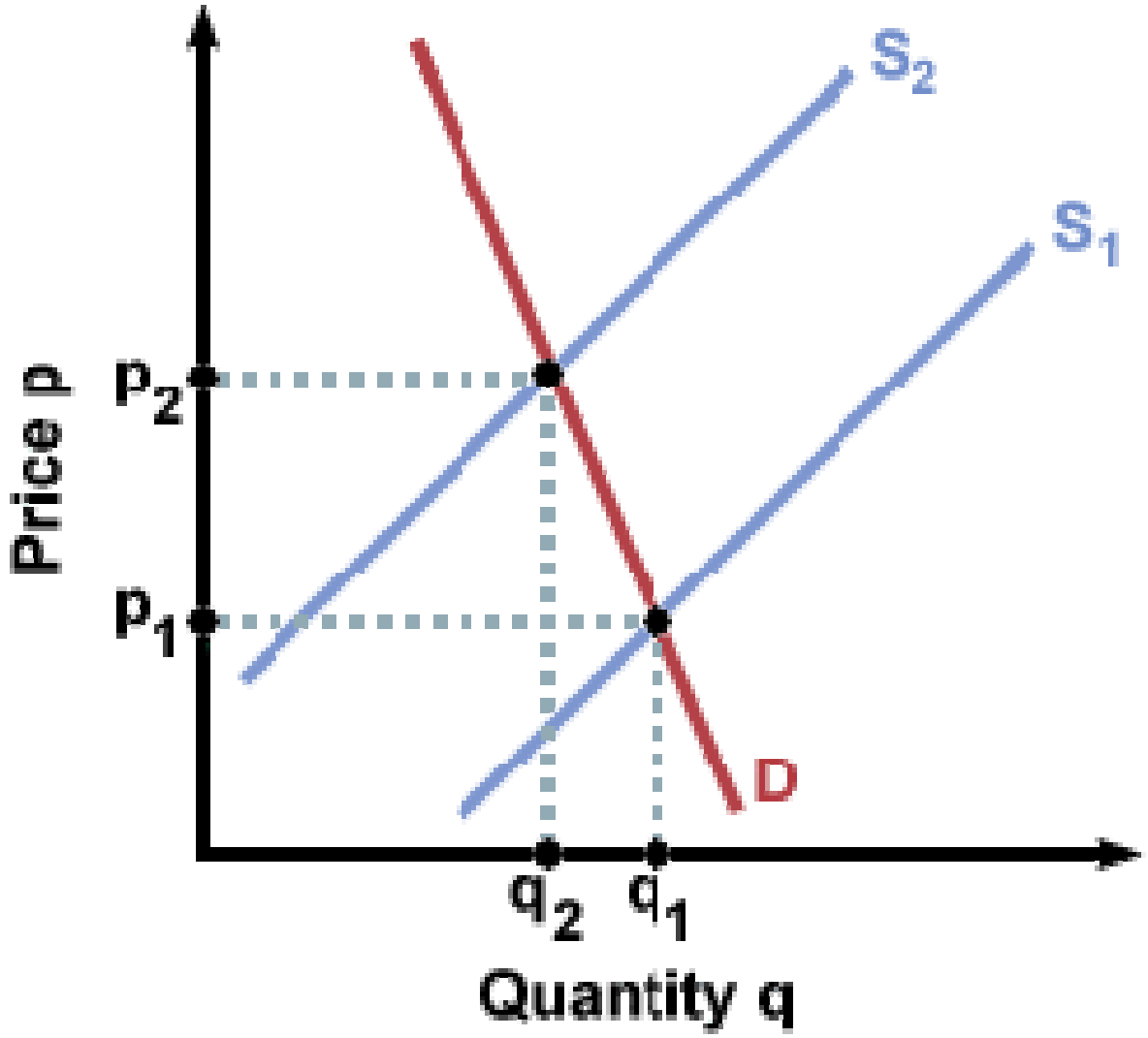
rise in supply (rightward shift) $\rightarrow$ P falls

fall in supply (leftward shift) $\rightarrow$ P rises

Effect of a shift in the demand curve



Effect of a shift in the supply curve



Interest (definitions)

- a fee paid on borrowed assets
- the charge for the privilege of borrowing money, typically expressed as an annual percentage rate
- the amount of ownership a stockholder has in a company, usually expressed as a percentage

Terms for interest rate

interest rate, discount rate, rate of return, alternative rate of return, minimum acceptable rate of return (MAR), guiding rate of interests, hurdle rate, reinvestment rate, opportunity cost

Interests rate

- the amount charged, expressed as a percentage of principal, by a lender to a borrower for the use of assets
- a rental, or leasing charge to the borrower, for the asset's use
- nominal and real interest rates

Note: on an annual basis, known as the **annual percentage rate (APR)**

Interest Rates - Real and Nominal

nominal rates - observable rates, they include an inflationary premium

real rates - interest rates adjusted for inflation

Interest rates can also adjust due to risks. Risks may be specific to a project, sector or economy wide.

Inflation adjusted rates go up in war time and I expect that they were higher in in CR in early 90's than now

Economic and time (cont.)

Suppose that the price for delivery in a year is € 55/bushel and the price for immediate delivery is € 50/bushel (note a bushel is a volume measure not a weight measure)

P_0 = current price for immediate delivery

P_1 = price for delivery in a year

Interest rate:

$i = (P_0 - P_1)/P_0$ ……..in our example (55-50)/55 = .10

Or $P_1 = P_0 (1+i)$ ……compounding for one period

$P_0 = P_1/(1+i)$ ……..discounting for one period

Some elements of compound interest

Suppose that you expect to earn 5% per year on a two year loan of € 100. At the end of one year you will have € 105. In two years you will have € 110.25.

Why not € 110 ?

100*1.05 = 105 and 105 *1.05=110.25

$P_2 = P_0(1+i)(1+i)$ or **$P_0(1+i)^2$**

(here you calculate a terminal value)

You can also calculate the present value by solving for P_0

Interest

interest is commonly calculated using one of 2 methods:

a) simple interest calculation

b) compound interest calculation

Simple interest calculation

SI = P (principal) x I (annual interest rate) x N (y)

Example:

Borrowing € 1,000 at a 6% annual interest rate for 8 months means that you would owe € 40 in interest (1000 x 6% x 8/12).

Simple interest calculation

SI = P (principal) x I (annual interest rate) x N (y)

Example:

Borrowing € 1,000 at a 6% annual interest rate for 8 months means that you would owe € 40 in interest (1000 x 6% x 8/12).

Compound interest calculation

CI = P (principal) x [(1 + I(interest rate) ^{N} (months) - 1]

Example:
Borrowing € 1,000 at a 6% annual interest rate for 8 months means that you would owe € 40.70

Note: as the lending time increases, though, the disparity between the two types of interest calculations grows

Q1: Which interest owned is higher? Why?

Q2: Will be the calculations similar for both methods for shorter time frames?

Topics

Negative externalities

Coase theorem

Pigovian tax

Supply and demand

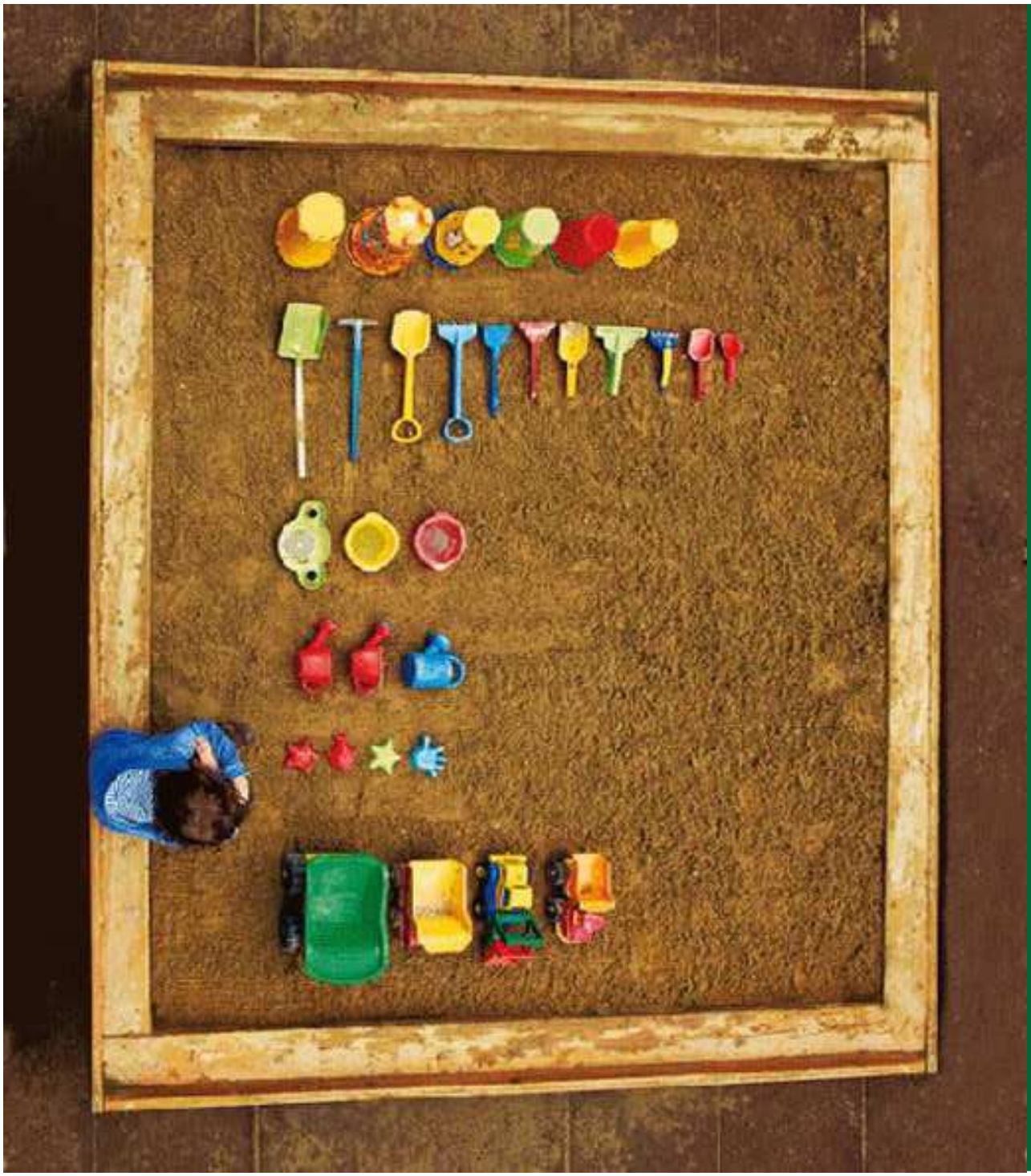
Interest rate

References

- Anderson, Terry L., Grewell, J. Bishop (2000) "Property Rights Solutions for the Global Commons: Bottom-Up or Top-Down?" In: Duke Environmental Law & Policy Forum, Vol. X, No. 2
- Hahnel R.,Sheeran K. (2009): Misinterpreting the Coase Theorem, Journal of Economic Issues, Vol 43, No 1, pp.: 215–238
- Hess, C. und Ostrom, E. (2003), "Ideas, Artifacts, and Facilities: Information as a Common-Pool Resource", Law and Contemporary Problems 66, S. 111-146
- Hirshlieifer, Glazer, Hirshleifer. Price Thoery and Applications: Decisions, Markets, and Information (seventh edition, 2005). Cambridge University Press

Available online on:

- The global network on global public goods UNDP http://www.sdnp.undp.org/gpgn/



Thank you..