# Public Economics

## Lecture 1: Introduction to public economics

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1. General introduction
2. Foundations of public intervention
3. Normative and positive public economics
4. Some numbers about public intervention
5. Empirical methods for public economics

# What's public economics?

- Public economics is the study of the role of government in the economy.
- Both positive and normative approaches.
- No broad consensus on appropriate role for government in society.
- Research in public economics has large practical value.

- Academic Perspective: publics economics is often endpoint for other fields of economics.
- Questions often develop based on policy motivations or policy implications.
  - Macroeconomics focuses on institutions that lead to growth, policies that mitigate business cycle fluctuations;
  - Labor economics focuses on minimum wage, unemployment;
  - Development, corporate finance, other fields.
- Natural to combine public economics with another field.
  - Draw new insights about policy from theory or evidence in another area.
  - Understanding public economics can help sharpen research focus and always working on relevant issues.

# Important themes and skill sets in public economics

- Traditionally quite theoretical; now more a combination of theory and evidence;
- Micro-based;
- Two styles of work: structural and reduced-form;
- Tends to be relatively neoclassical, but growing interest in implications of behavioral economics for public policy;
- Long run focus in theory, relatively little focus on short term stabilization – the ultimate question is the ideal design of systems for long run welfare.

# What's a state/government?

- Public authority: state, regional council, city hall, etc.
- Traditional economic approach: firms, households, ... and the state.
- Complex network of contractual relations between individuals (politicians, civil servants, etc.) that produces outputs out of inputs.

- The dividing line between public and private production is fluctuating (both over time and across countries or regions):
  - Superior education: mainly produced in the public sector in France, mainly in the private one in the US;
  - Health services: mainly produced in private hospitals in the US; mainly produced in public ones in Canada or France.
- Yet, there is one good that has never been (at least during a long period) provided by private firms:
  - The elaboration and application of laws and rules that govern human social life.

- There are other goods as well that are almost always produced in the public sector (roads (in cities), police, street lights).
- Are the goods that tend to be produced by the public sector special ?
- Is there a characteristic of the public sector that makes it more efficient in producing these kinds of goods ?

# Tools of public intervention in the economy

- Taxes and transfers;
- Law, institutions;
- Provision of public goods;
- Macroeconomic stabilization, e.g. monetary policy (not quite relevant for this course).

# Why do we need public intervention?

When is government intervention necessary in a market economy?

- When we are inside frontier, government improves efficiency;
- When we are unsatisfied with location on frontier, government improves distributional outcomes;
- To ensure the development of non-violent and mutually beneficial interactions.

# Monopoly of legal violence

> *"[...] a state is a human community that (successfully) claims the monopoly of the legitimate use of physical force within a given territory."*

*Politik als Beruf*, Max Weber (1918).

- The state forces people to pay taxes or to enroll in the army, expropriates, punishes, etc.
- The state is the only actor that has such a power on a given territory.

# Why is it useful?

To avoid the "state of nature", i.e. the "war of all against all" and the absence of any law (Hobbes, 1651):

- No (private) property;
- No (in)justice.

In such a framework, individual self-interest makes unlikely the emergence of a minimally organized social life.

# Illustration

- Imagine a forest without any state nor rule (nor of course property rights), and two hunters/fishers/gatherers: Nathalie and Laurent.
- Nathalie has gathered fruits and Laurent has fished trouts.
- Both have convex preferences so that Nathalie would not mind having some trout to eat before his fruits and Laurent would like to complete her carnivorous meal with some fruits.
- Suppose they meet.

- Two kinds of interaction may arise: brutal stealing or peaceful dealing.
- If both choose to steal, they end up fighting.
- If one steal and the other does not, the stealer gets what he wants for free.
- If both choose to deal, they get a mutually beneficial agreement that is however worse for each guy than the situation where he could steal for free.

| Action chosen by Nathalie | Action chosen by Laurent | Outcome |
|---|---|---|
| Steal | Steal | Fight |
| Steal | Deal | Nathalie gets trouts for free |
| Deal | Steal | Laurent gets fruits for free |
| Deal | Deal | Exchange at a mutually agreed rate |

Nathalie:
Trouts for free $\succ$ Exchange $\succ$ Fight $\succ$ Laurent gets fruits

Laurent:
Fruits for free $\succ$ Exchange $\succ$ Fight $\succ$ Nathalie gets trouts

What outcome is the most likely?

| | | Action chosen by Laurent: Deal | Action chosen by Laurent: Steal |
|---|---|---|---|
| Action chosen by Nathalie | Deal | Exchange | Laurent gets fruits |
| | Steal | Nathalie gets trouts | Fight |

- Steal is the dominant strategy for both guys.
- War of all against all will prevail.

This situation is inefficient:

- Nathalie would prefer trading than fighting;
- So does Laurent.

Assume a "state" emerges. It defines and implements property rights on resources.

- Property right: right given to the owner of the resource to exclude others from using the resource.
- Exclusion is done by a police force and a judicial system who will prosecute and punish those who wants to use the resource without the consent of its owner.
- Police and judicial system are costly and financed by taxes (forced/mandatory payments).

| Action chosen by Nathalie | Action chosen by Laurent | Outcome |
|---|---|---|
| Steal | Steal | Fight (with tax) |
| Steal | Deal | Nathalie is punished |
| Deal | Steal | Laurent is punished |
| Deal | Deal | Exchange at a mutually agreed rate (with tax) |

Nathalie:
Exchange $\succ$ Punishment of L. $\succ$ Fight $\succ$ Punishment of N.

Laurent:
Exchange $\succ$ Punishment of N. $\succ$ Fight $\succ$ Punishment of L.

What outcome is the most likely?

| | | Action chosen by Laurent: Deal | Action chosen by Laurent: Steal |
|---|---|---|---|
| Action chosen by Nathalie | Deal | Exchange | Laurent is punished |
| | Steal | Nathalie is punished | Fight |

- Deal is the dominant strategy for both guys.
- "Doux commerce" will prevail.

- Using properly a monopoly of legal violence help individuals exploiting possibilities of mutual gains and avoiding the war of all against all.
- Argument rides on an efficient police protection.
- Monopoly of legal violence is important: suppose there was a competition, on a given territory, of the sources of legal violence?

- Minimal requirements: design of criminal and contract laws, related enforcement, provision of defense.
- Need of an organization to provide them.
- Need of revenues to finance it.

- Historically, the state has been imposed by brute force from some groups over others. But the basic mission of authoritarian setting of the rule of social life was so helpful to the mankind that all human groups have evolved with such an institution.
- Historical process has been one where the citizens have imposed on their rulers some limitations on their (dangerous) monopoly of legal violence so that it be exerted properly.
  Two main tools:
  - Constitution (limit *ex ante* the power of the State),
  - Democratic (by elections) political competition so that the monopoly of legal violence is temporary.

# First welfare theorem

*The allocation of commodities at a competitive equilibrium is Pareto-efficient.*

Conditions:

- No externalities;
- Perfect competition;
- Perfect information;
- Agents are rational.

Government intervention may be desirable if:

- Externalities require government interventions (taxes or subsidies, public good provision);
- Imperfect competition requires regulation;
- Information is imperfect or asymmetric and causes incompleteness of markets;
- Agents are not rational.

# Second welfare theorem

*Any Pareto-efficient allocation can be made a competitive equilibrium.*

Implication:

- Any equilibrium can be obtained by letting markets work freely after suitable redistribution using lump-sum taxes and transfers.

- There is no conflict between efficiency and equity (first best taxation).
- In reality, the necessary redistribution may not be feasible (because of information problems for example). The government needs to use distortionary taxes and transfers.
- There is a conflict between efficiency and equity (second best taxation).

# Why limit government intervention?

- One solution to issues above: let the government be in charge of all production and allocation.
- Problems:
  - Information problems: how can the government decide what to produce?
  - Deadweight loss of large governments (not necessarily a benevolent planner in reality).
  - Incentive effects.
- This creates an important trade-off in any policy analysis:
  - Providing more public goods requires more distortionary taxation, can lead to inefficiency in spending.
  - Providing more social insurance induces bad incentive effects.
  - Additional redistribution distorts incentives.

# Paternalism vs. individual failures

- In many situations, individuals may not or do not seem to act in their best interests (e.g., many individuals are not able to save for retirement).
- Two polar views on such situations:
  - Paternalism (libertarian Chicago view): Individual failures do not exist and the government wants to impose on individuals its own preferences against individuals' will.
  - Individual Failures (behavioral economics view): Individual failures exist (Self-control problems, cognitive limitations).

- Key way to distinguish these two views:
  - Under Paternalism, individuals should be opposed to programs such as social security;
  - If individuals understand they have failures, they will tend to support government programs such as social security.

# Approaches in public economics

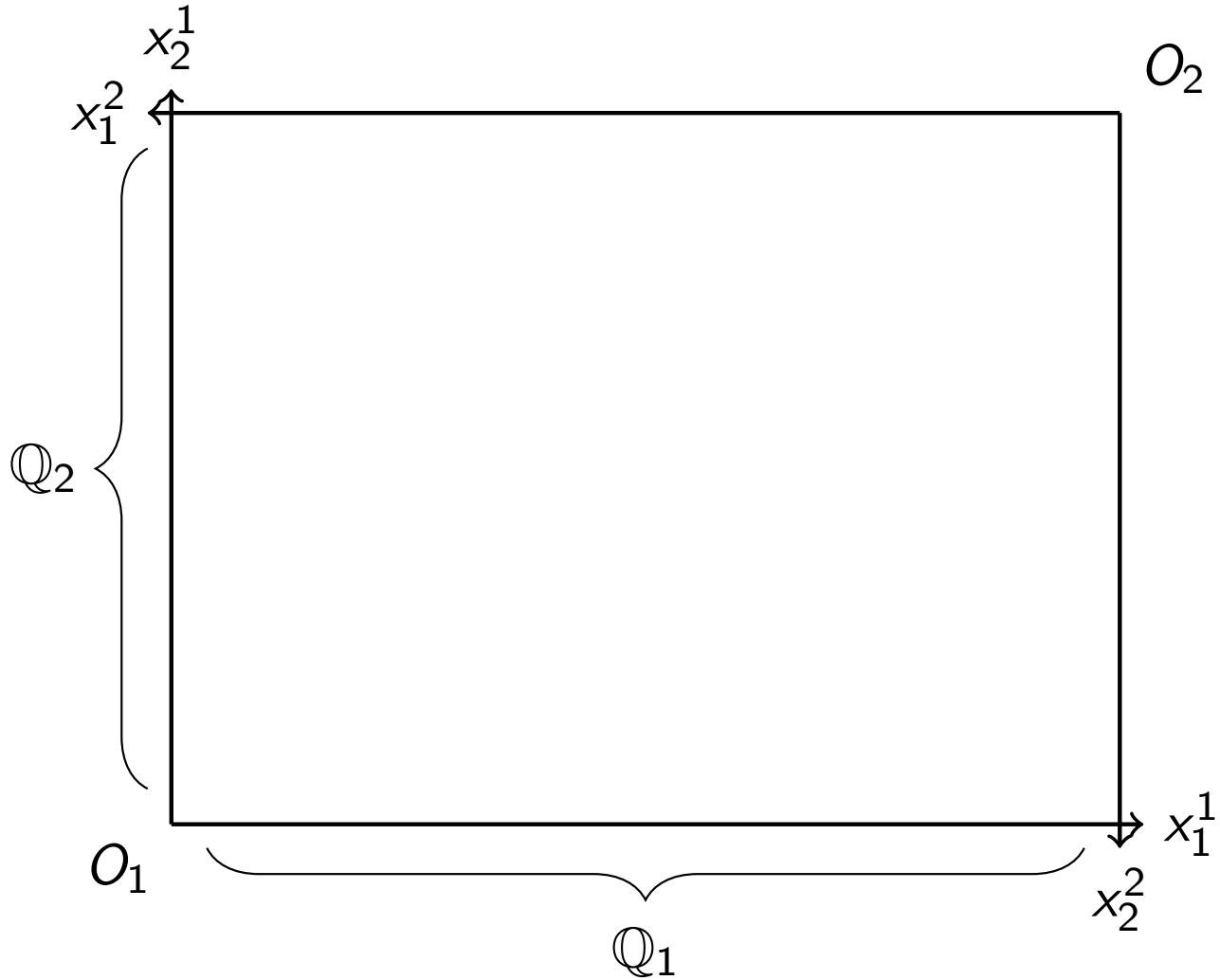
Three types of questions in public economics:

- Normative analysis: Analysis of how things should be. What should the government do? When should it intervene, and what is the best way to intervene (best amount of intervention)? At what level should government intervene? Primarily theoretical.
- Positive analysis: Analysis of how things really are. What are economic effects of government programs and interventions? Primarily empirical.
- Political economy: Why does the government behave the way it does? Develops theories to explain in a positive way. Not really covered by this course.

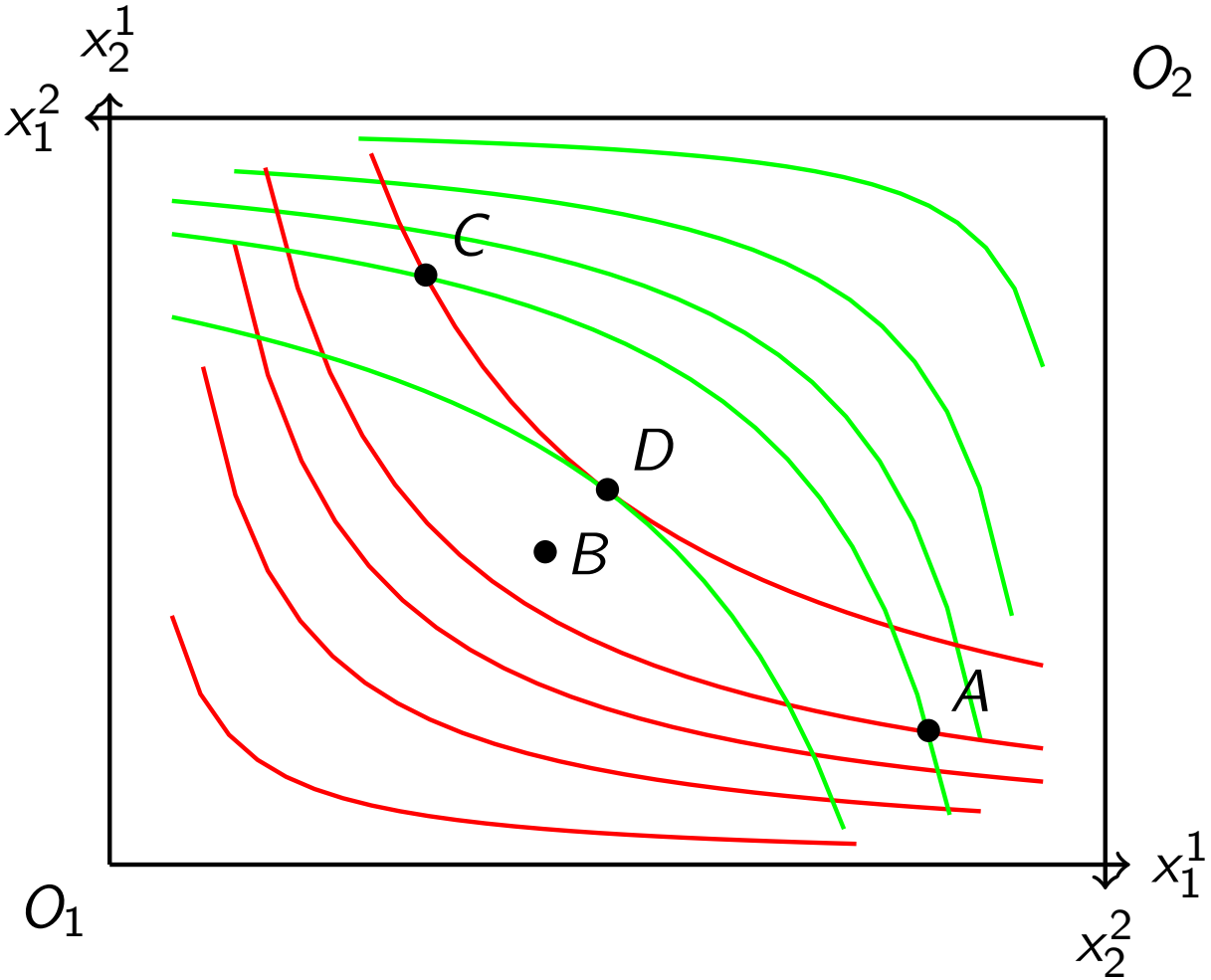
# The economy in an Edgeworth box

- Exchange economy, i.e. no production.
- Two individuals with "normal" preferences over the "consumption" of two goods.
- Two goods available in some given quantities $\mathbb{Q}_1$ and $\mathbb{Q}_2$.

Remember that if individual 1 consumes quantity $x_1^1$ of good 1, then only $\mathbb{Q}_1 - x_1^1$ is left fo individual 2.

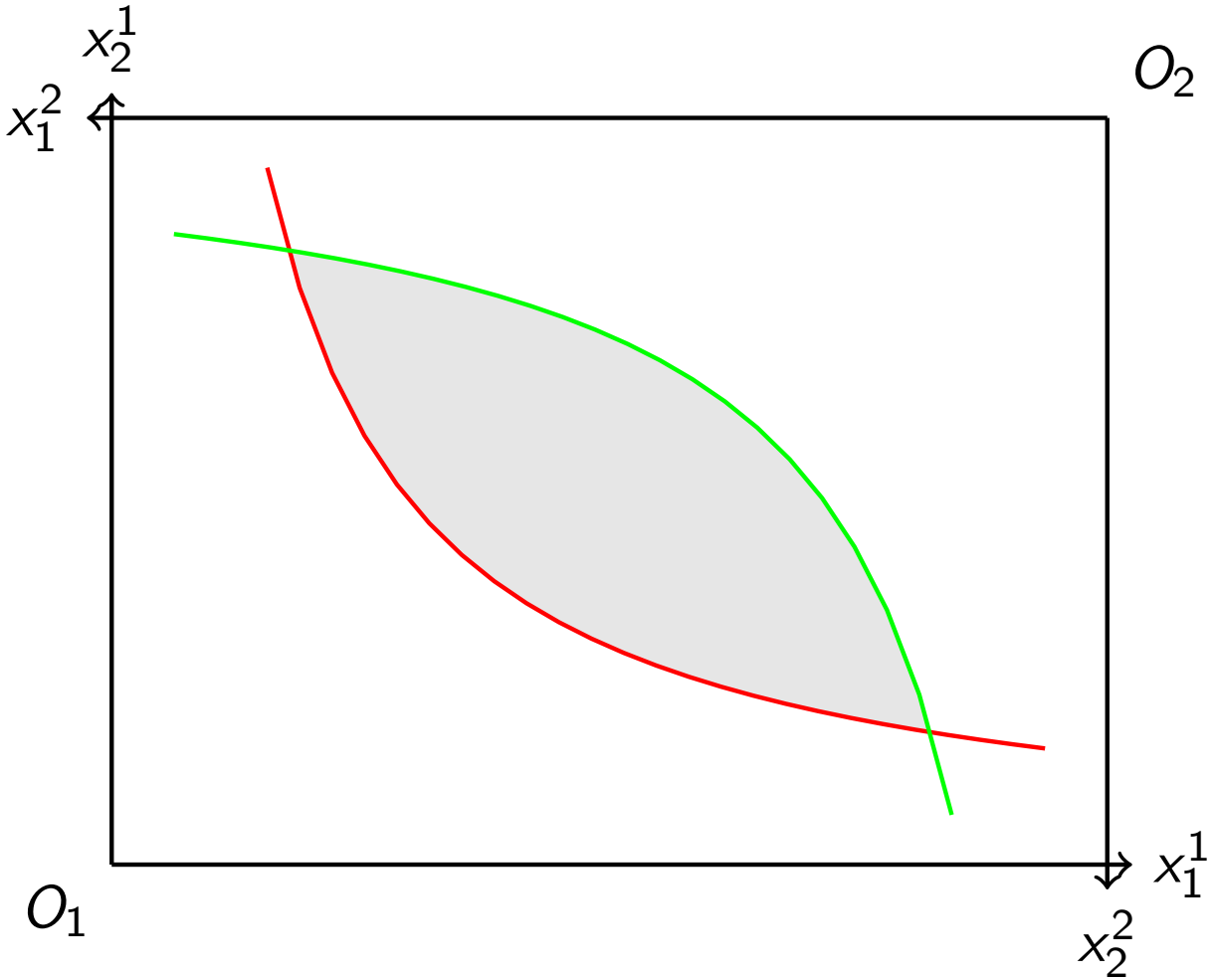



Any allocation within this box is feasible.




Is it possible to do better than $A$?

$B \succ A$ by both individuals.
$C \succ A$ by individual 1.
$D \succ A$ by both individuals.
$D \succ C$ by individual 2.

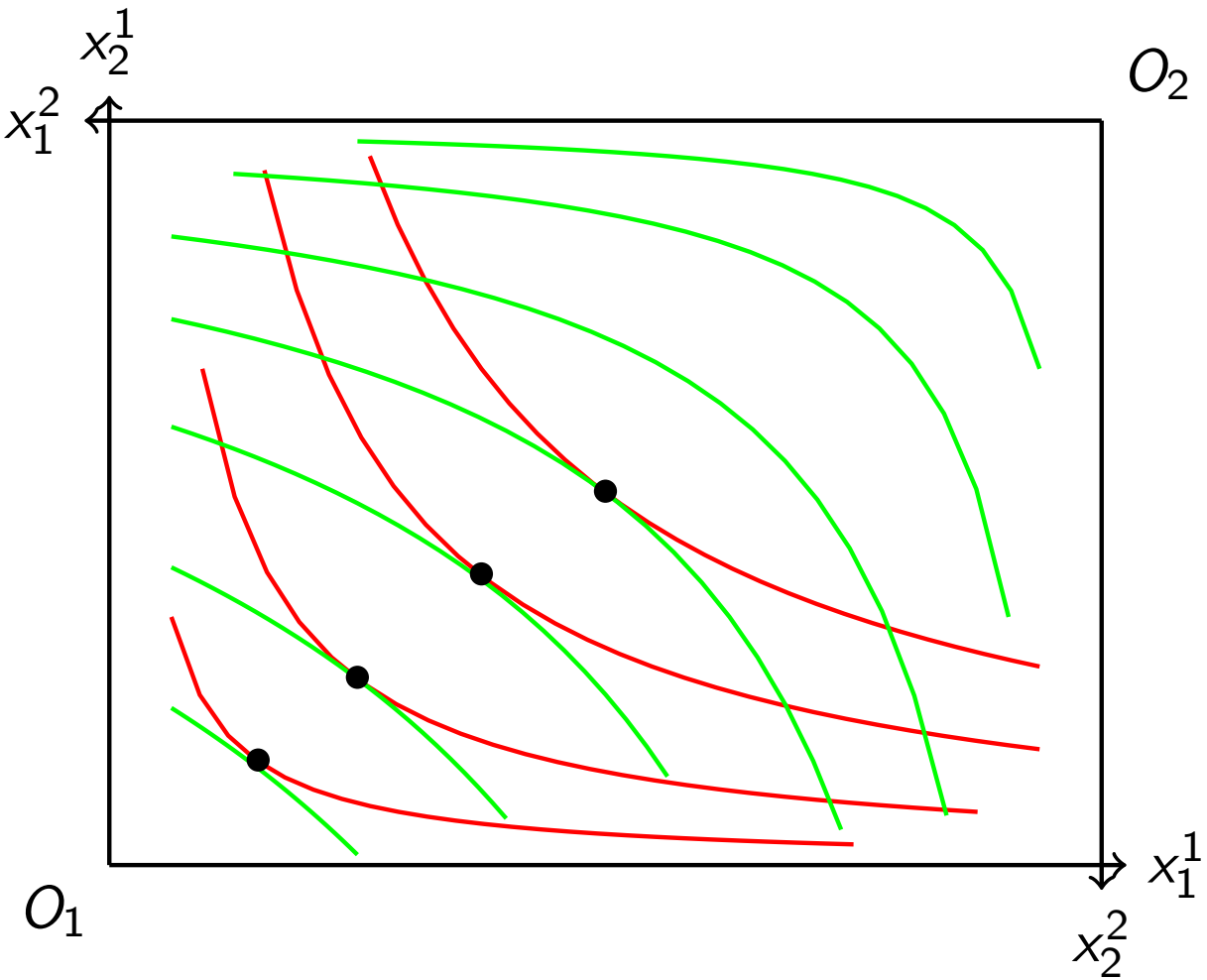



All allocations inside the lens are preferred by at least one individual to all allocations outside the lens.
They are Pareto-superior.

# Pareto efficiency

*An allocation is Pareto-efficient if it is impossible to find a feasible allocation that everybody weakly prefer to the current one and that at least one individual strictly prefers to the current one.*

- The set of Pareto-efficient allocation is also called the "contract curve".
- Formally: set of allocations such that indifference curves are tangent.


$x_2^1$
$O_2$
$x_1^2$
$x_1^1$
$O_1$
$x_2^2$

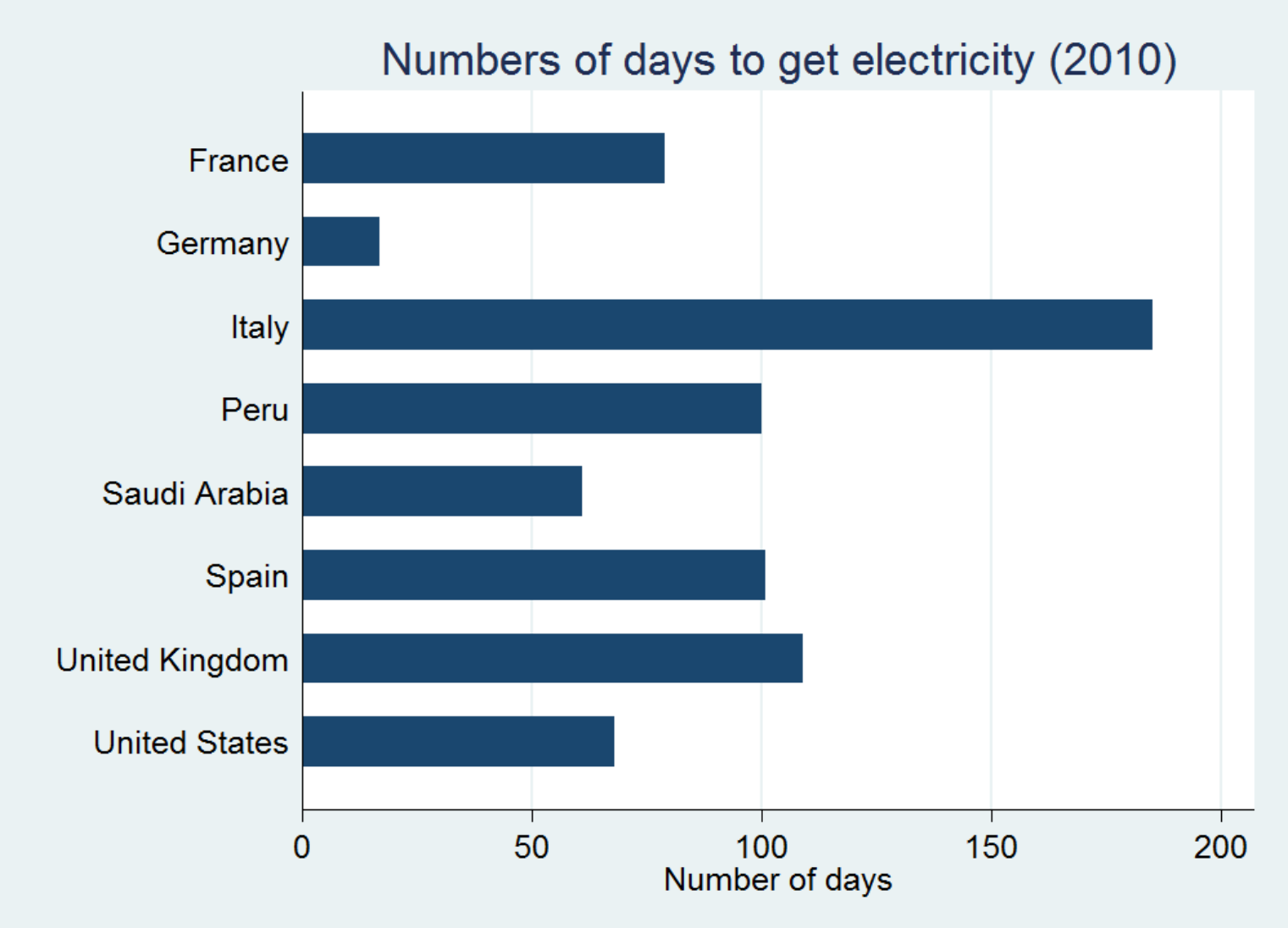
- An inefficient allocation is unsatisfactory.
- Pareto-efficiency is a minimal normative requirement.
- But: Pareto-efficient allocation can be highly unequal.

> *"[A society may be efficient] even when some people are rolling in luxury and others are near starvation, as long as the starvers cannot be made better off without cutting into the pleasures of the rich. In short, a society can be Pareto optimal and still be perfectly disgusting."*

A. Sen (1970).

| Source: OECD (2000) | France | Unites States | Germany |
|---|---|---|---|
| Total public expenditure (in percentage of GDP) | | | |
| | 52 | 34 | 45 |
| Among which (in percentage of total public expenditure): | | | |
| Health | 14 | 18 | 17 |
| Social protection | 40 | 19 | 54 |
| Education | 11 | 17 | 10 |
| Public order and safety | 2 | 6 | 4 |
| Defence | 4 | 9 | 3 |
| Total public social expenditure (in percentage of GDP) | | | |
| | 29 | 15 | 27 |
| Among which (in percentage of total public social expenditure): | | | |
| Unemployment | 5 | 1 | 5 |
| Health | 28 | 41 | 30 |
| Old age | 37 | 35 | 32 |
| Incapacity related | 6 | 7 | 9 |
| Family | 11 | 5 | 8 |

| Source: OECD (2000) | France | Unites States | Germany |
|---|---|---|---|
| Public revenues (in percentage of GDP) | | | |
| Taxes on income and profits | 11 | 26 | 11 |
| Social security contributions | 16 | 7 | 15 |
| Taxes on goods and services | 11 | 5 | 10 |
| Taxes on property | 3 | 3 | 1 |

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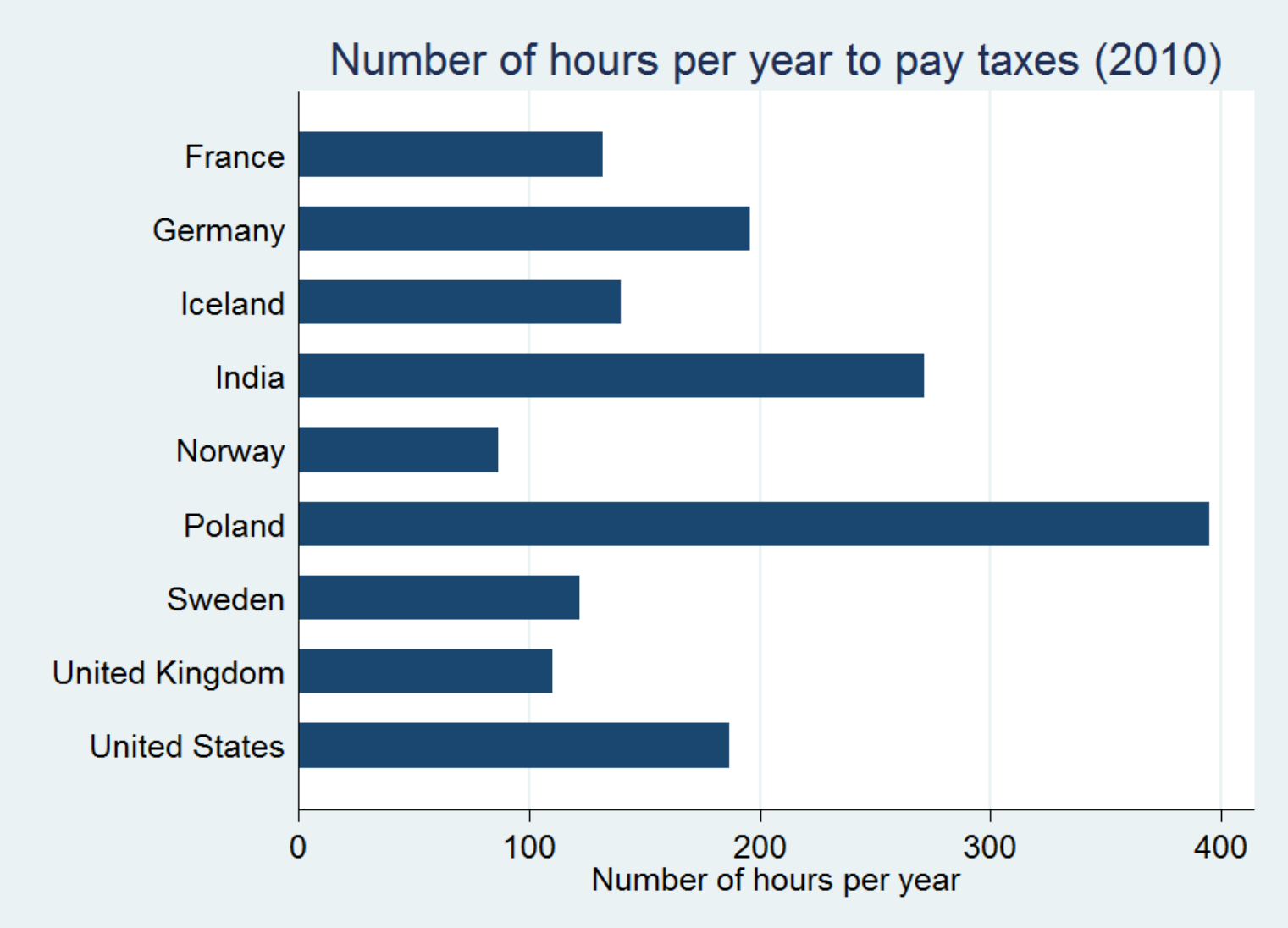


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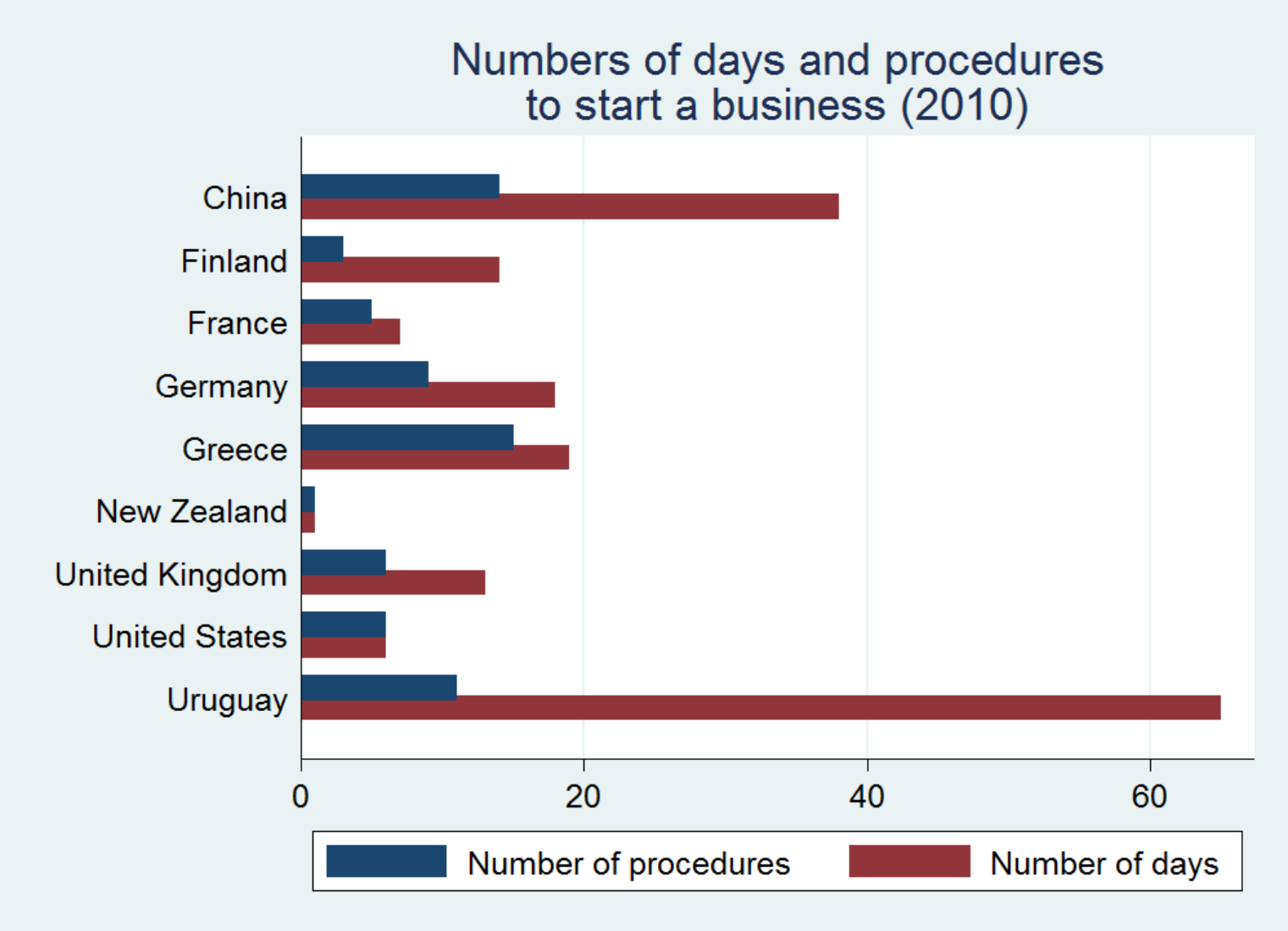


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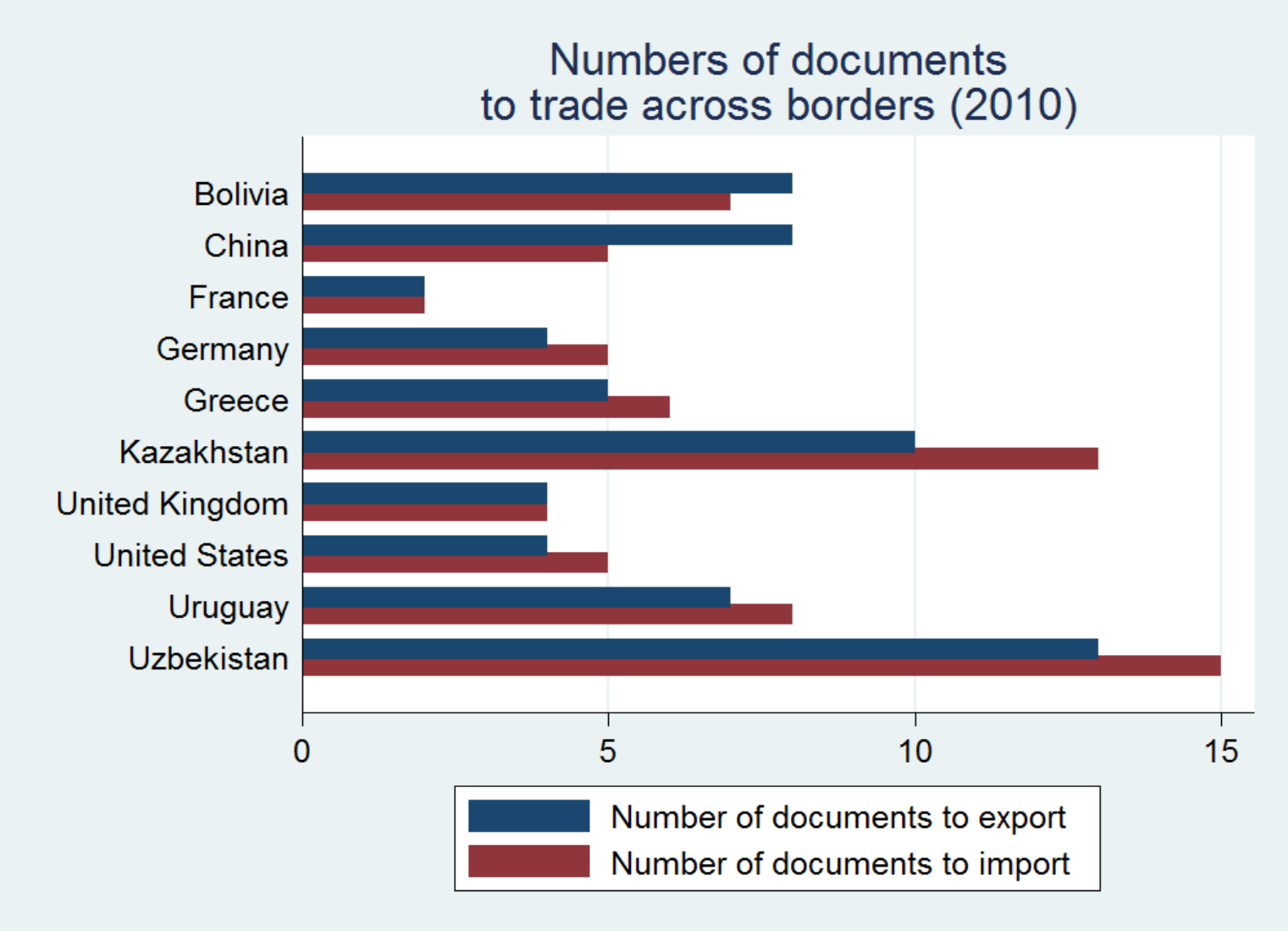



Source: World Bank

# Why evaluating?

- Beyond normative and positive approaches in economics: policy recommendations.
- Policies have costs: "cash" costs, opportunity costs, general equilibrium effects.
- Evaluate already implemented policies to know how they work and what was their impact.
- Evaluate new policies before general implementation (allow to design *ex ante* evaluation).

# Canonical problem

What is the effect of some policy $T$ on an outcome $y$?

$$y = f(T, X, \varepsilon)$$

In linear form:

$$y = \alpha T + \beta X + \varepsilon$$

Basic threat to identification:

- Treatment is correlated with the error term, i.e. with unobservable characteristics.
- Holy Grail: random treatment.

Examples:

- Labor supply and net wages;
- Impacts of public assistance programs on labor supply, family structure, health;
- Medical eligibility and crowd-out, health utilization and health outcomes.

Standard simple OLS regressions are not adequate. The sign of the bias can often be predicted, sometimes not.

# Illustration: Taxes and labor supply

- Question: How does labor supply respond to changes in wages? How do taxes affect labor supply?
- Theory: Labor supply is a function of wages and non-labor income. Taking taxes into account, labor supply is a function of *net of tax* wages and *net of tax* income.
- Model to estimate:

$$h_i = \alpha w_i (1 - \tau_i) + \varepsilon_i.$$

- Problem 1: Net of tax wages are endogenous.
  In the real world, marginal tax rate is a function of earnings (progressive taxation). There is an explicit relationship between earnings and the tax rate faced by individuals. This is a classical endogenetiy problem.
- Problem 2: People with high (unobservable) taste for work supply more labor, have higher income and face higher (marginal) tax rate.
  People with high hours have higher unobservable taste for work. So, when $\varepsilon$ is high, $h$ is high, $t$ is high (because of progressive taxation), $w(1-t)$ is low. This will lead to a downward bias in the estimate of wage elasticity.
- Other Issues: Non-participation, measurement errors.

# Solutions

For taxes and labor supply:

- Use panel data to distinguish entry/exit from intensive-margin changes
- Focus on subgroups of workers for whom hours are better measured, e.g. taxi drivers
- Only use reform-based variation in tax rates

More generally, pay attention to theoretical mechanisms at play and to the source of identification:

- Non-experimental approaches;
- Experimental approaches.

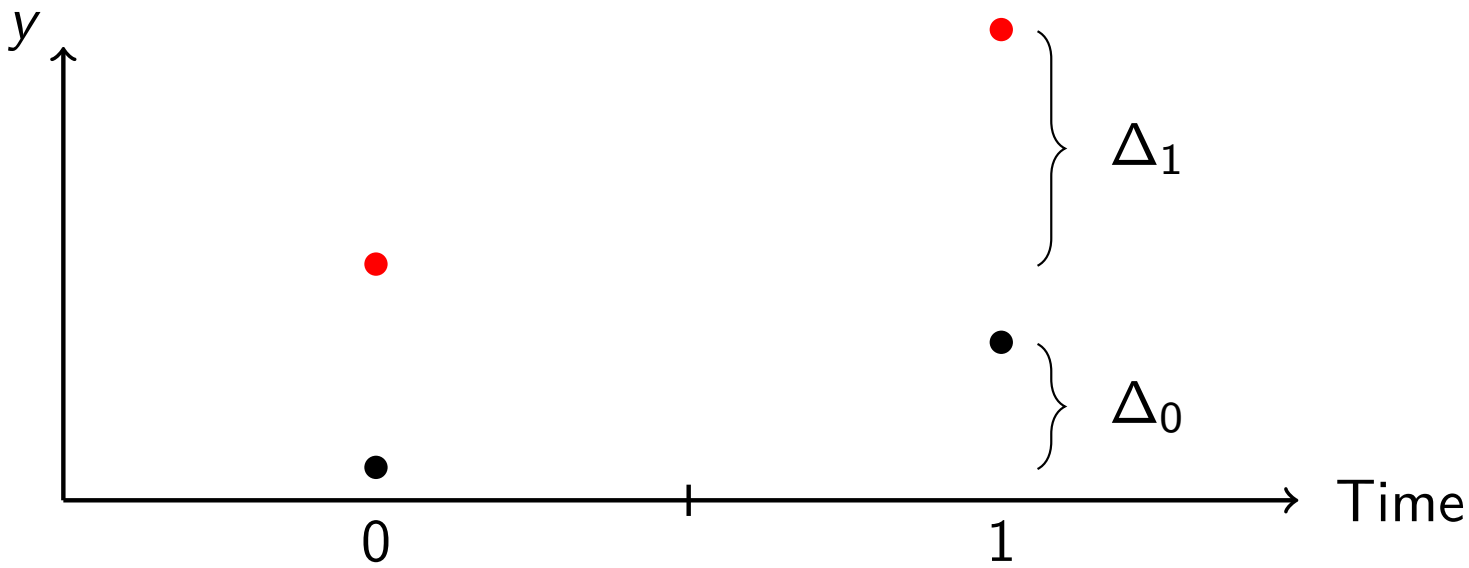
# Difference in differences

Before-after estimator:

- Compare treated group before and after the treatment.
- Assumption: nothing else affects the change.

Difference in differences estimator:

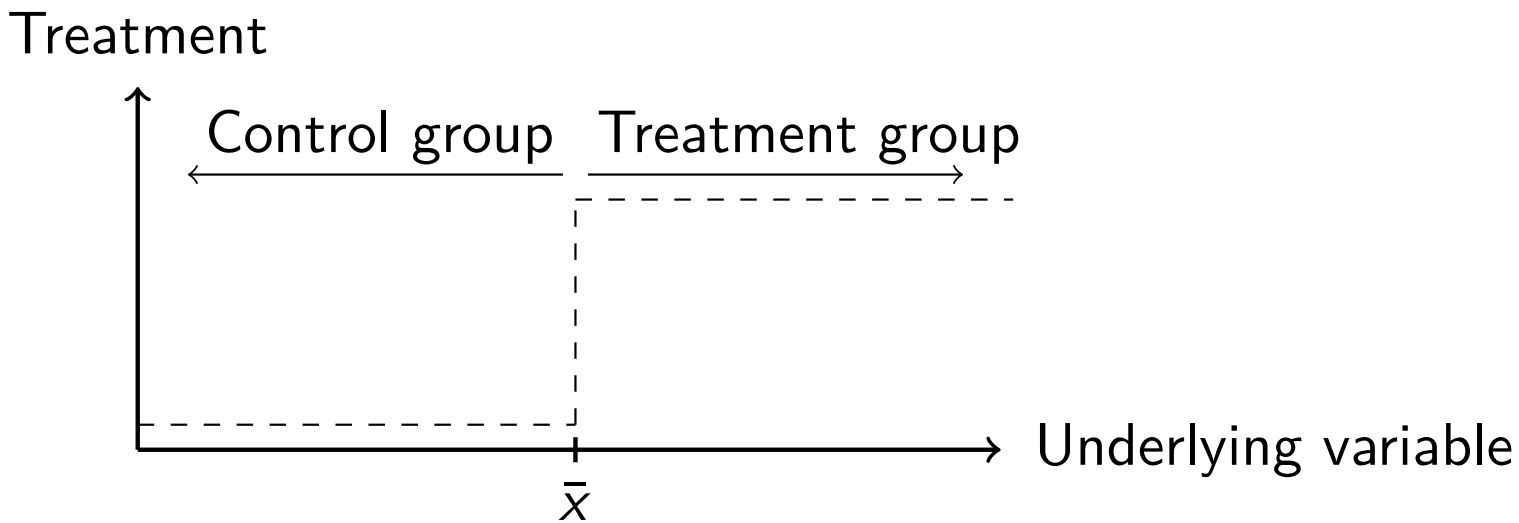
- Compare the change in outcome between a treated group and an untreated group.
- Control group captures what would have happened to the treated individuals if they were not treated.
- Assumption: there are no contemporaneous shocks specific to each group and/or there are no group-specific trends that are correlated with the treatment.




| | Before | After | Difference |
|---|---|---|---|
| Treated | $y_{10}$ | $y_{11}$ | $\Delta_1 = y_{11} - y_{10}$ |
| Control | $y_{00}$ | $y_{01}$ | $\Delta_0 = y_{01} - y_{00}$ |
| Difference in differences | | | $\Delta_1 - \Delta_0$ |

# Regression discontinuity

- Extreme application of the difference in differences approach.
- Implementable when some underlying variable determines the treatment, i.e. there is a sharp discontinuity in the treatment at some point.
- Method: create treatment and control group on either side of the threshold.
- Idea: groups close to the threshold should be comparable.



# Instrumental variables

- Find an instrument that is correlated with the treatment and not with the error term.
- Instrument must not influence the outcome by another channel than through the treatment.
- Allow to capture the exogenous determinants of treatment.

# Matching on observables

- Idea: Conditioning on some observables eliminates the selection bias. Use observable characteristics to match observations in the treatment and control groups that are "similar" prior to treatment.
- Propensity score matching is appealing because it reduces the dimensionality of characteristics down to a single index. Still, there is a possibility of a non-overlap between treatment and control in the support of the index.
- The method relies on an assumption of conditional independence: once you condition on observable characteristics, program participation is independent of the outcome in the non-participation state.
- People like matching methods because they are non-parametric and require no regression based functional form. However, it does require variable selection, i.e. right observables.

# Reduced form non-experimental approaches

All these methods are reduced form non-experimental approaches.

- Advantages:
  - Source of variation is clear;
  - Model free.
- Disadvantages:
  - Identifying assumption may not be valid;
  - Results hardly generalizable and potentially useless for policy simulations.

# Structural approaches

- In some cases, we can use theory to model the endogeneity.
- In the original structural literature, there was little attention to identification and the results may be identified by nonlinearities and parametrization.
- This is no longer the norm, with more attention being placed on identification.

Advantage:

- Once you recover the parameters of the utility function, you can use these parameters to simulate what will happen if policy changes.

Disadvantages:

- Have to implement possibly untestable assumptions about economic and statistical model;
- Often generate wide range of estimates.

# Laboratory experiments

- Idea: Let volunteers take decisions under different situations in a perfectly controlled framework.
- Advantage: Can design whatever situation you wish and control all parameters.
- Disadvantage: External validity highly questionable (selection of volunteers, games, etc.).
- Difficult and costly to generalize.

# Natural experiments

- In fact: natural "quasi-"experiments.
- Idea: An event affects "randomly" individuals. Nature is considered as random.
  Most of the time, "nature" does not really refer to nature, but to something else beyond the control of the researcher.
- Advantage:
  - Treatment is arguably random and exogenous.

  Disadvantages:
  - Exogeneity and randomness may be challenged.
  - May not be available for all questions and sufficiently frequent.

# Randomized control trials

- There is increasing use of social experiments in public finance applications. Even more applications in labor and development.
- Inspired by medical experiments.
- Idea: Design some intervention and randomly assign individuals to treatments.

- Advantages:
  - Setting is controlled;
  - Model free;
  - The difference in outcomes groups is a valid estimate of the impact of the intervention;
  - Prospective and creative;
  - Appealing to test at a small scale before generalization and to "rank" policies.
- Disadvantages:
  - Relatively expensive;
  - Only local validity;
  - No general equilibrium effects.

End of lecture.

Lectures of this course are inspired from those taught by R. Chetty, G. Fields, N. Gravel, H. Hoynes, and E. Saez.