Public Economics

Lecture 2: Facts and empirical methods

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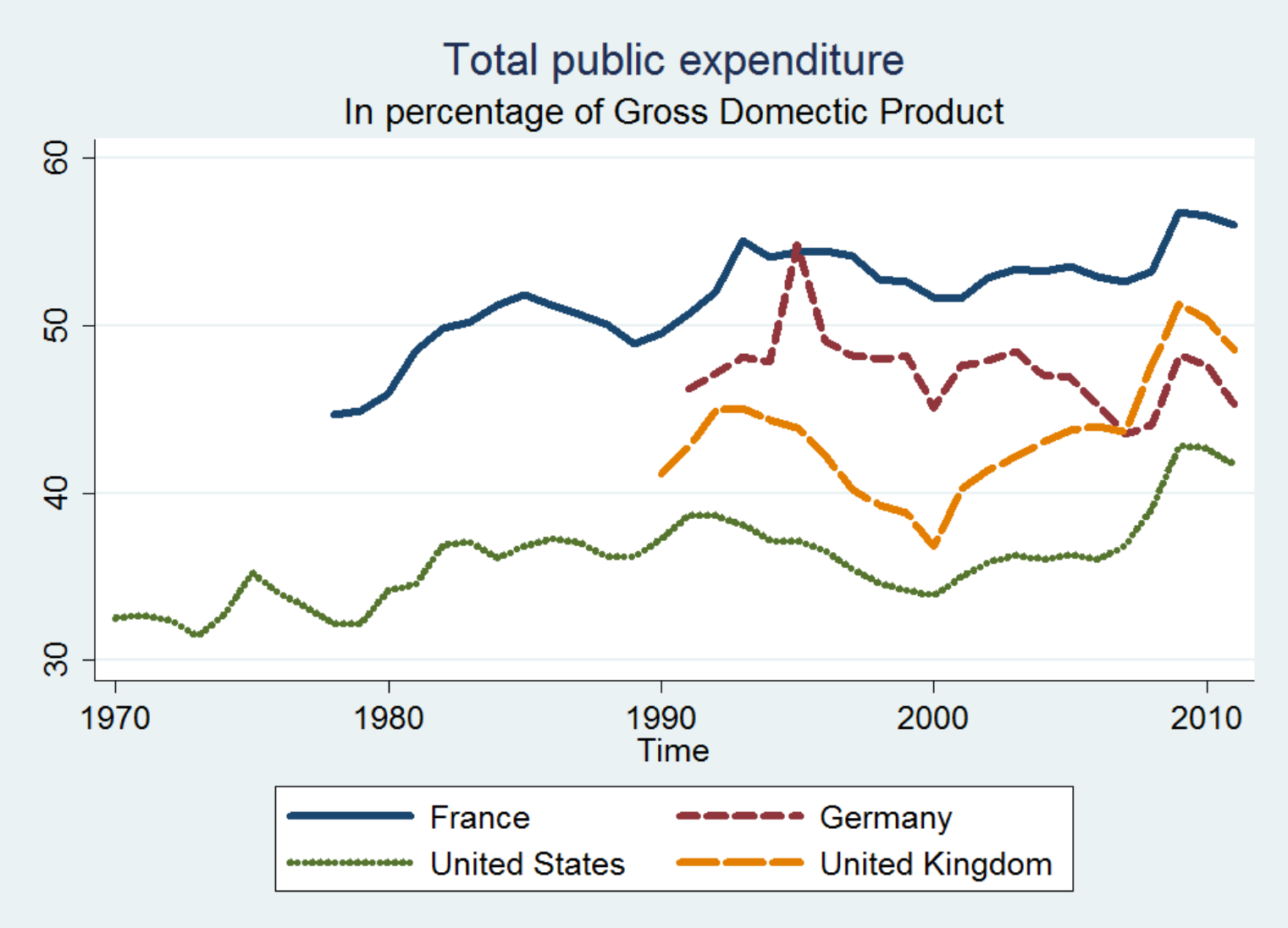
1. Facts about governments and public intervention
2. Empirical methods for public economics

1. Facts about governments and public intervention
   - Raw public expenditure
   - Public expenditure by function
   - Social spendings
   - Revenues
   - Infrastructures & regulation

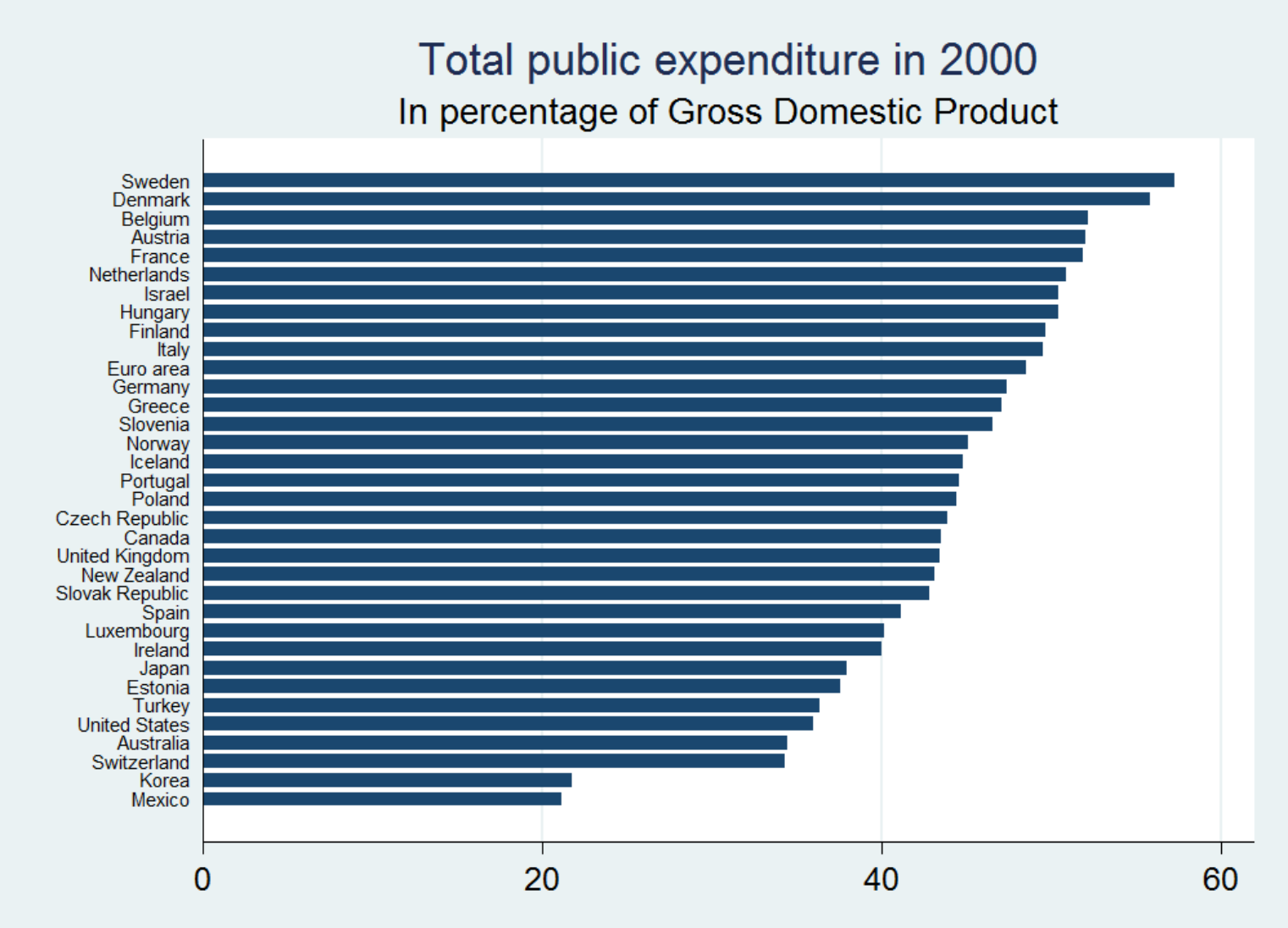
2. Empirical methods for public economics

Tools of public intervention in the economy

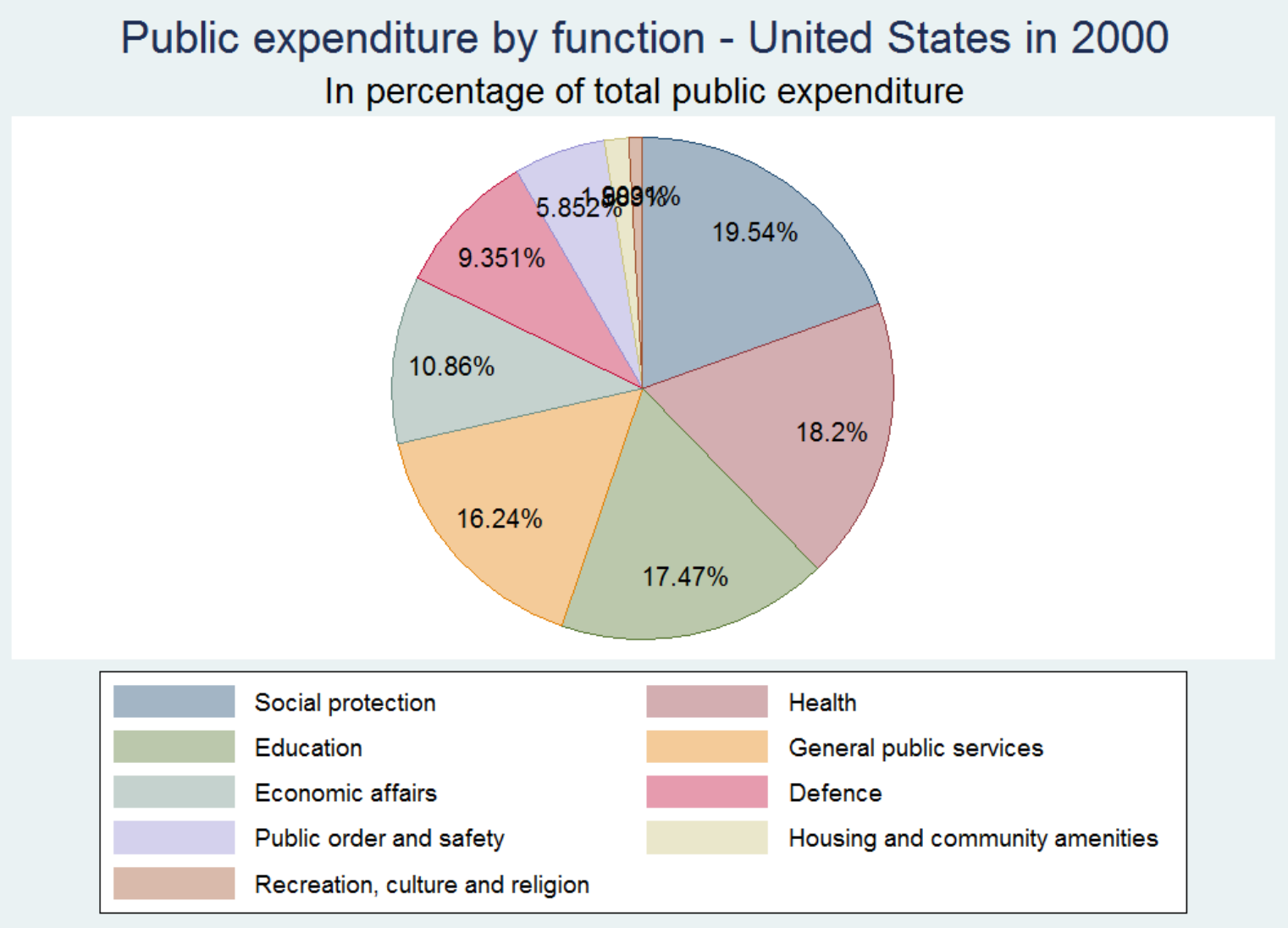
- Taxes and transfers;
- Law, institutions;
- Provision of public goods;


Total public expenditure
In percentage of Gross Domectic Product
60
50
40
30
1970
1980
1990
2000
2010
Time
France
Germany
United States
United Kingdom

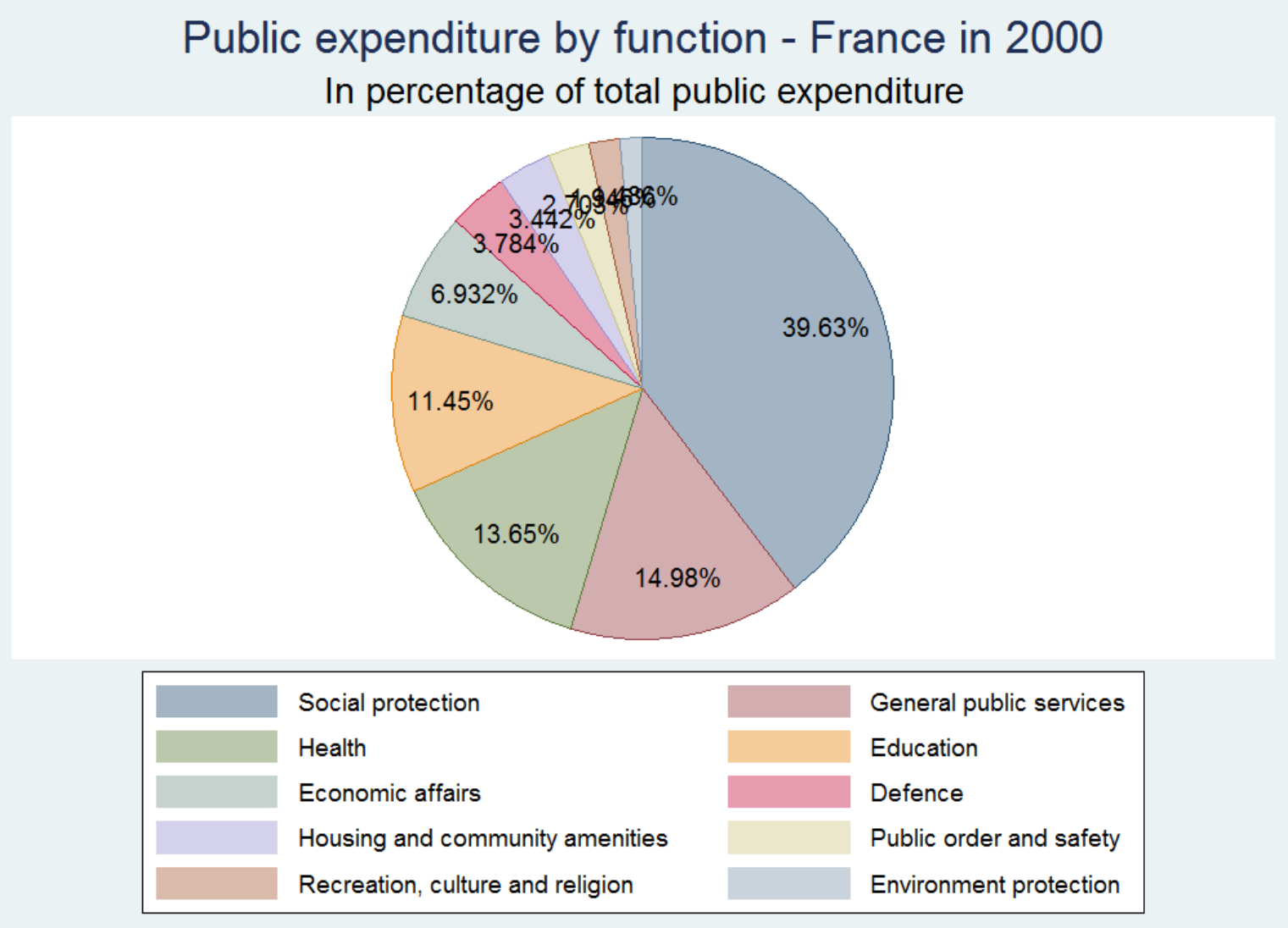
Source: OECD


Total public expenditure in 2000
In percentage of Gross Domestic Product
Sweden
Denmark
Belgium
Austria
France
Netherlands
Israel
Hungary
Finland
Italy
Euro area
Germany
Greece
Slovenia
Norway
Iceland
Portugal
Poland
Czech Republic
Canada
United Kingdom
New Zealand
Slovak Republic
Spain
Luxembourg
Ireland
Japan
Estonia
Turkey
United States
Australia
Switzerland
Korea
Mexico
0
20
40
60

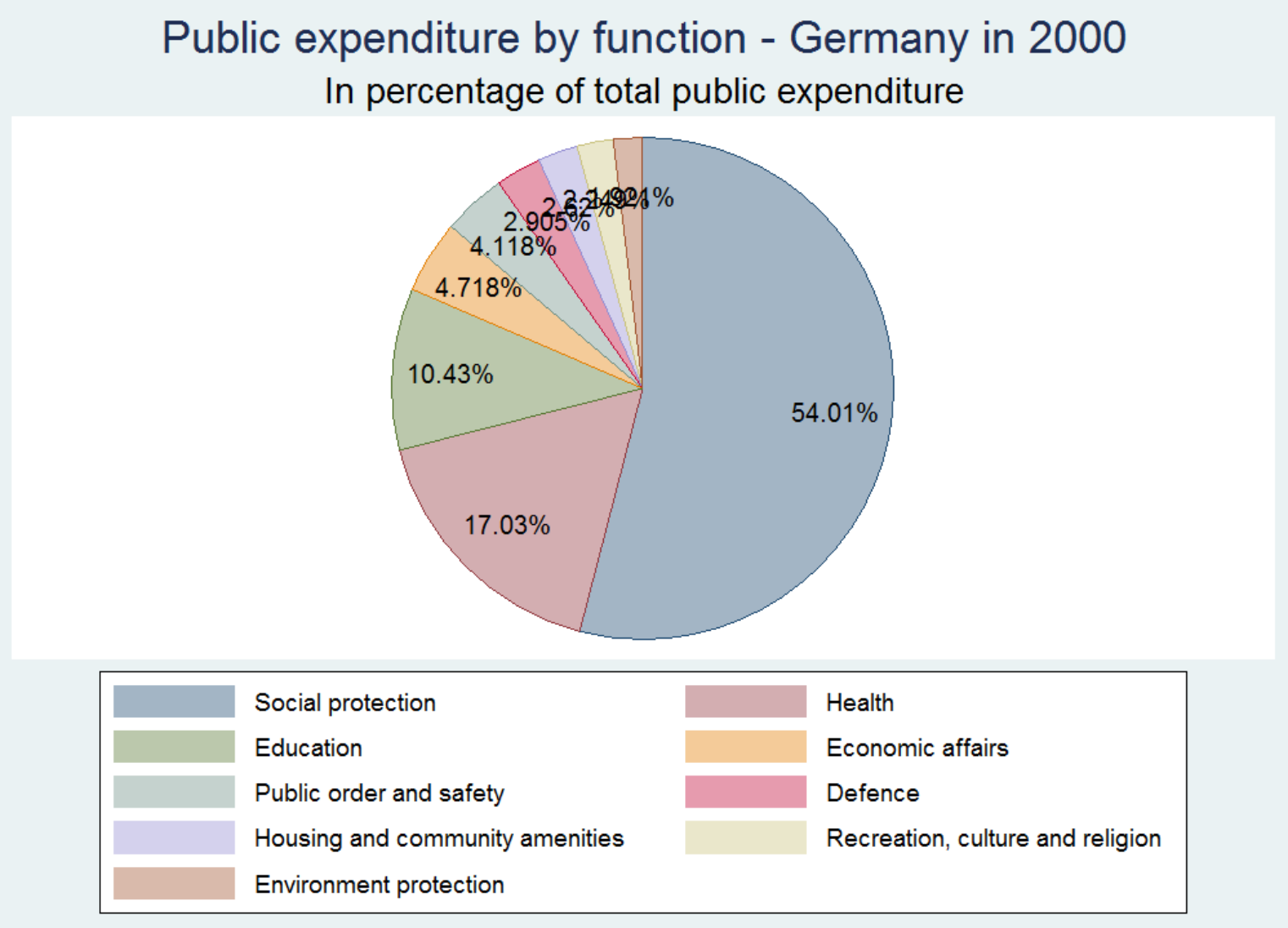
Source: OECD


Public expenditure by function - United States in 2000
In percentage of total public expenditure
19.54%
18.2%
17.47%
16.24%
10.86%
9.351%
5.852%
Social protection
Health
Education
General public services
Economic affairs
Defence
Public order and safety
Housing and community amenities
Recreation, culture and religion

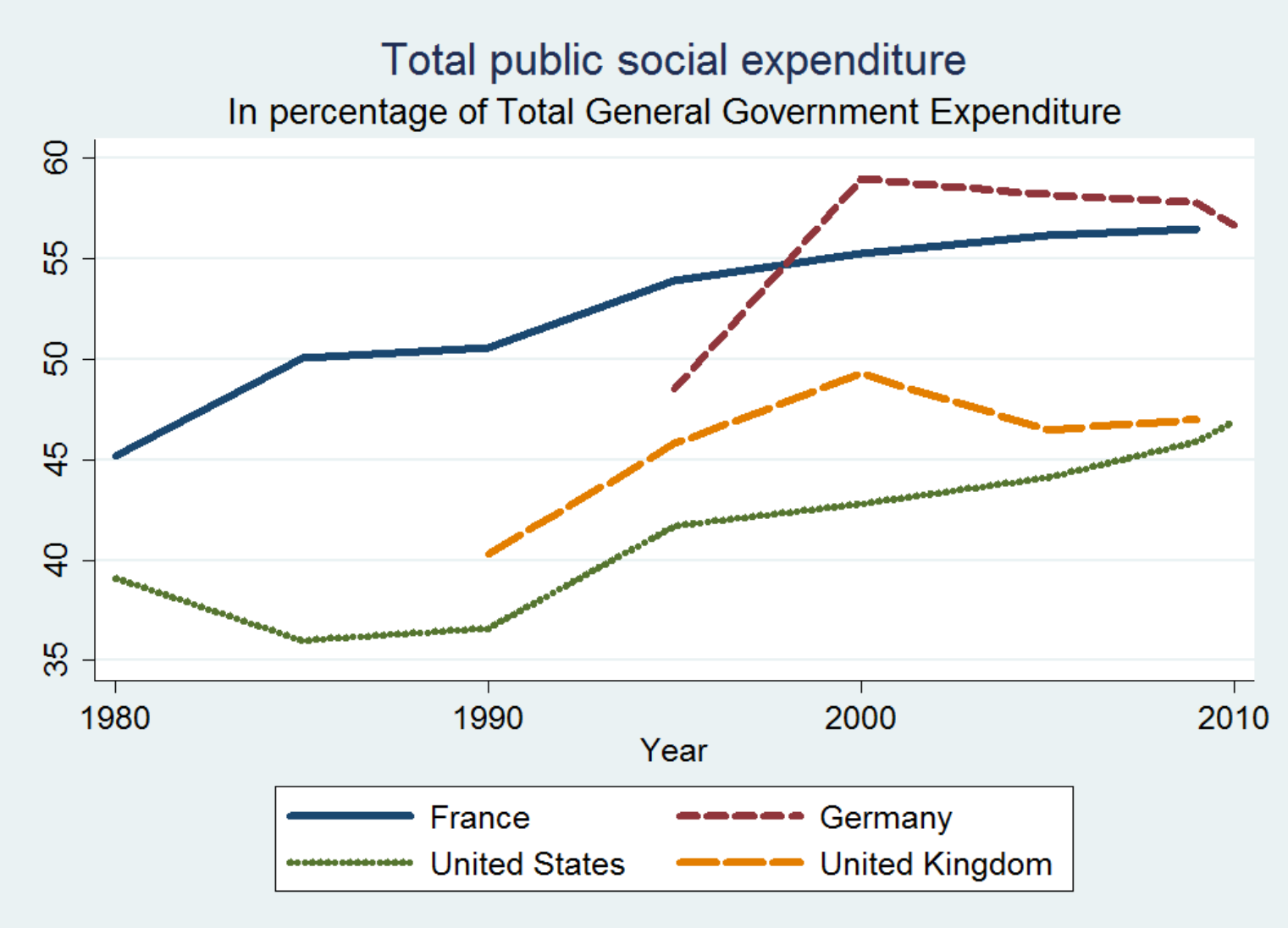
Source: OECD


Public expenditure by function - France in 2000
In percentage of total public expenditure
39.63%
14.98%
13.65%
11.45%
6.932%
3.784%
3.442%
Social protection
Health
Economic affairs
Housing and community amenities
Recreation, culture and religion
General public services
Education
Defence
Public order and safety
Environment protection

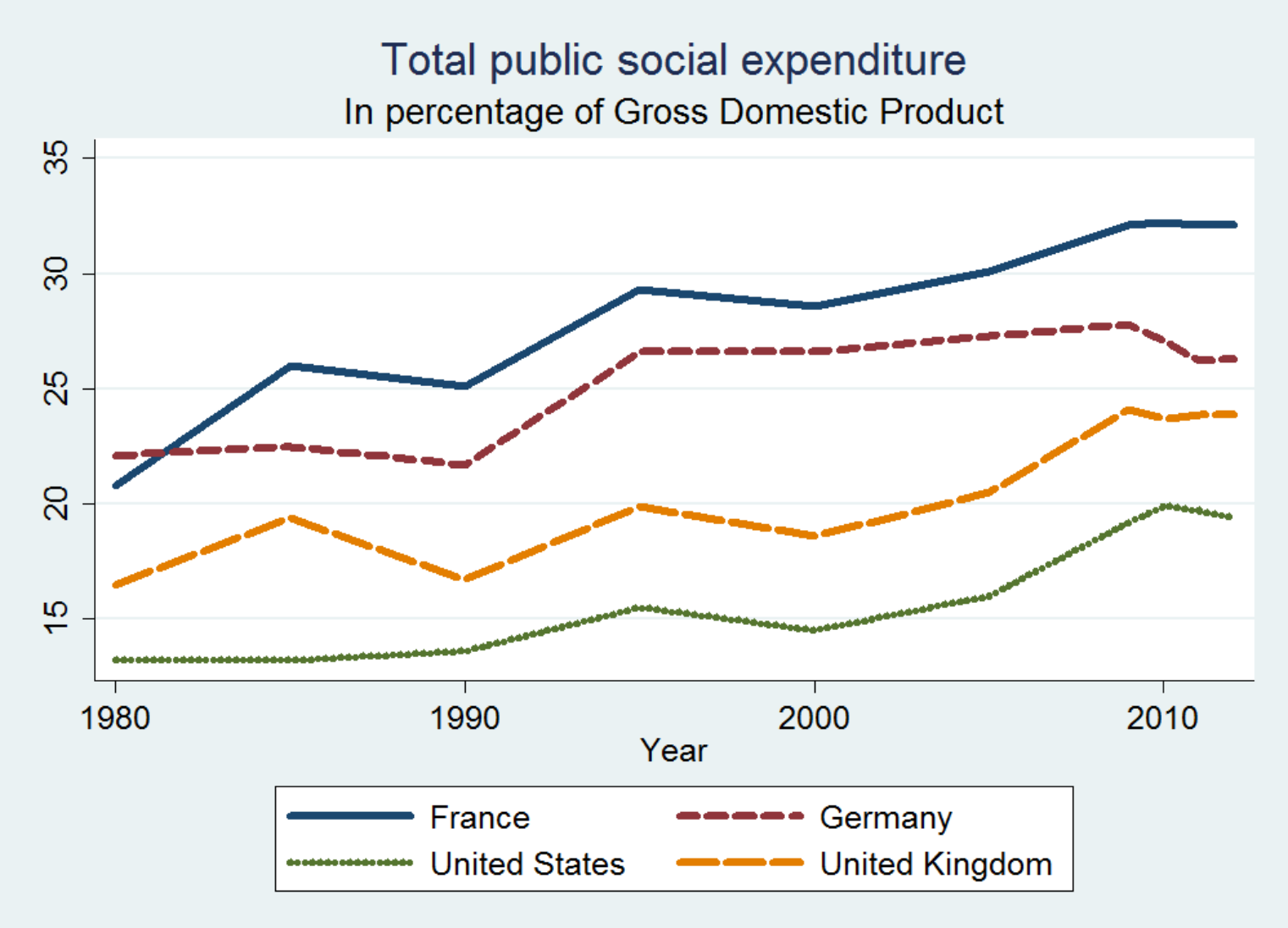
Source: OECD


Public expenditure by function - Germany in 2000
In percentage of total public expenditure
54.01%
17.03%
10.43%
4.718%
4.118%
2.905%
Social protection
Education
Public order and safety
Housing and community amenities
Environment protection
Health
Economic affairs
Defence
Recreation, culture and religion

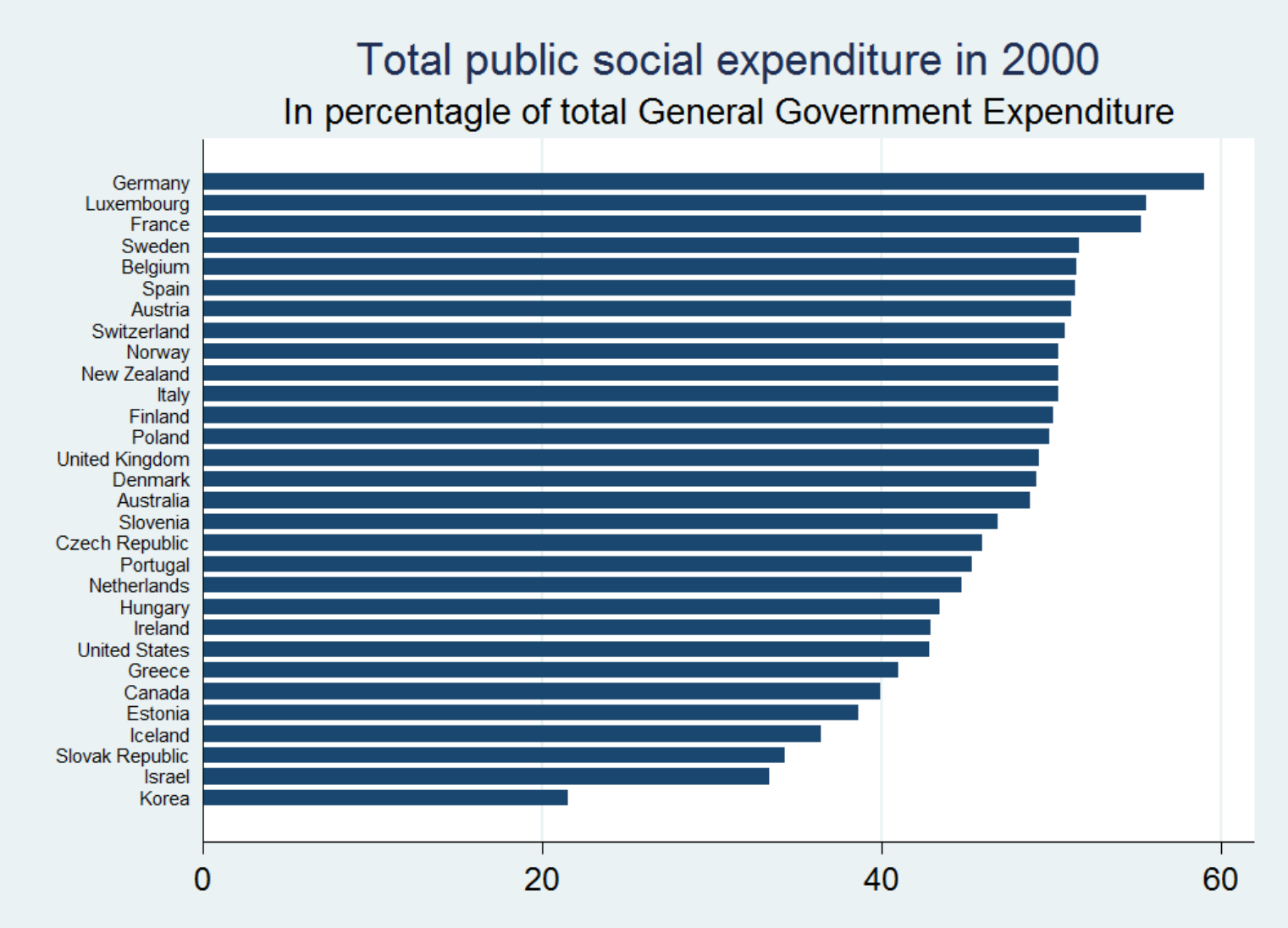
Source: OECD


Total public social expenditure
In percentage of Total General Government Expenditure
60
55
50
45
40
35
1980
1990
2000
2010
Year
France
Germany
United States
United Kingdom

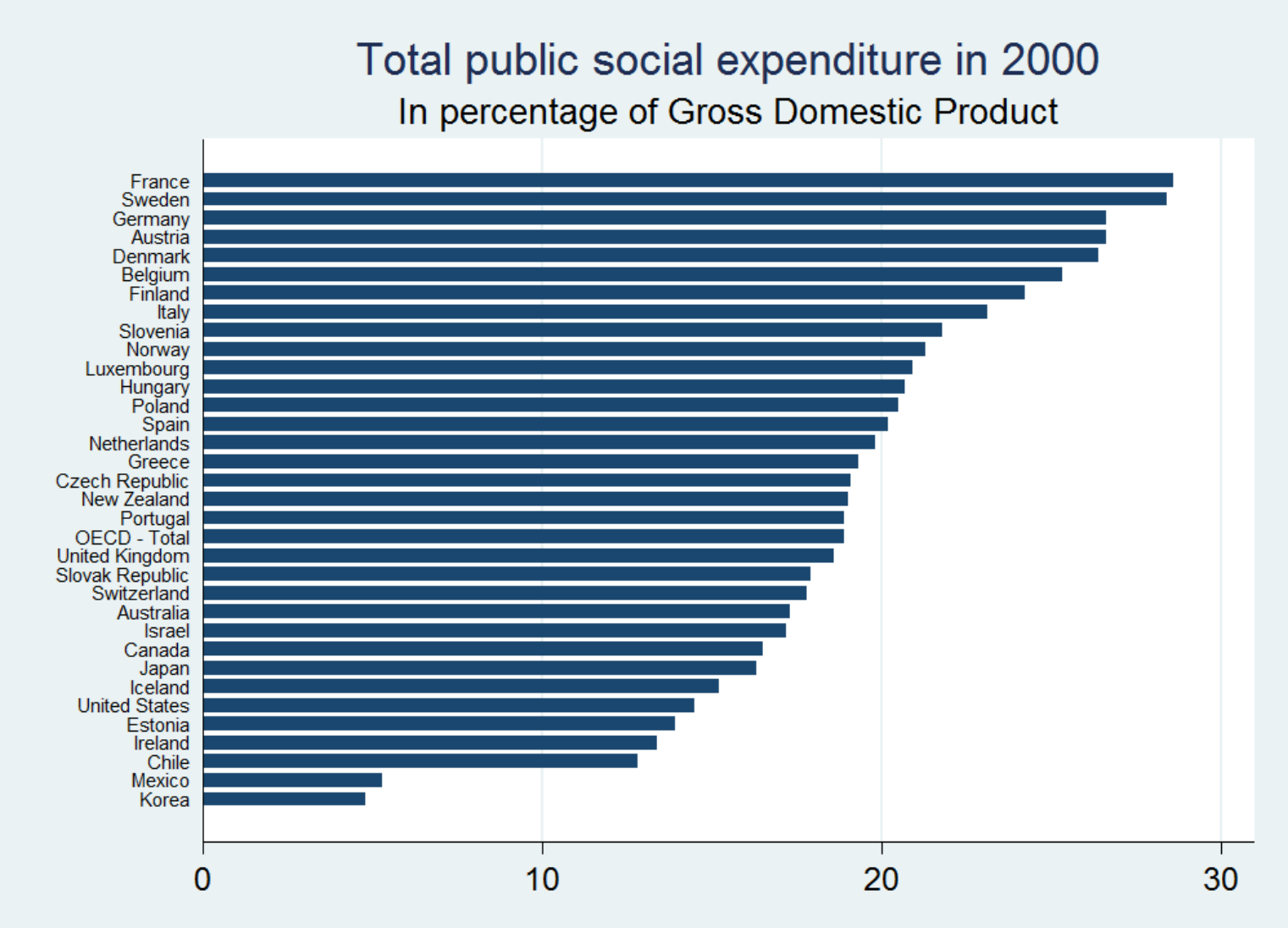
Source: OECD


Total public social expenditure
In percentage of Gross Domestic Product
35
30
25
20
15
1980
1990
2000
2010
Year
France
Germany
United States
United Kingdom

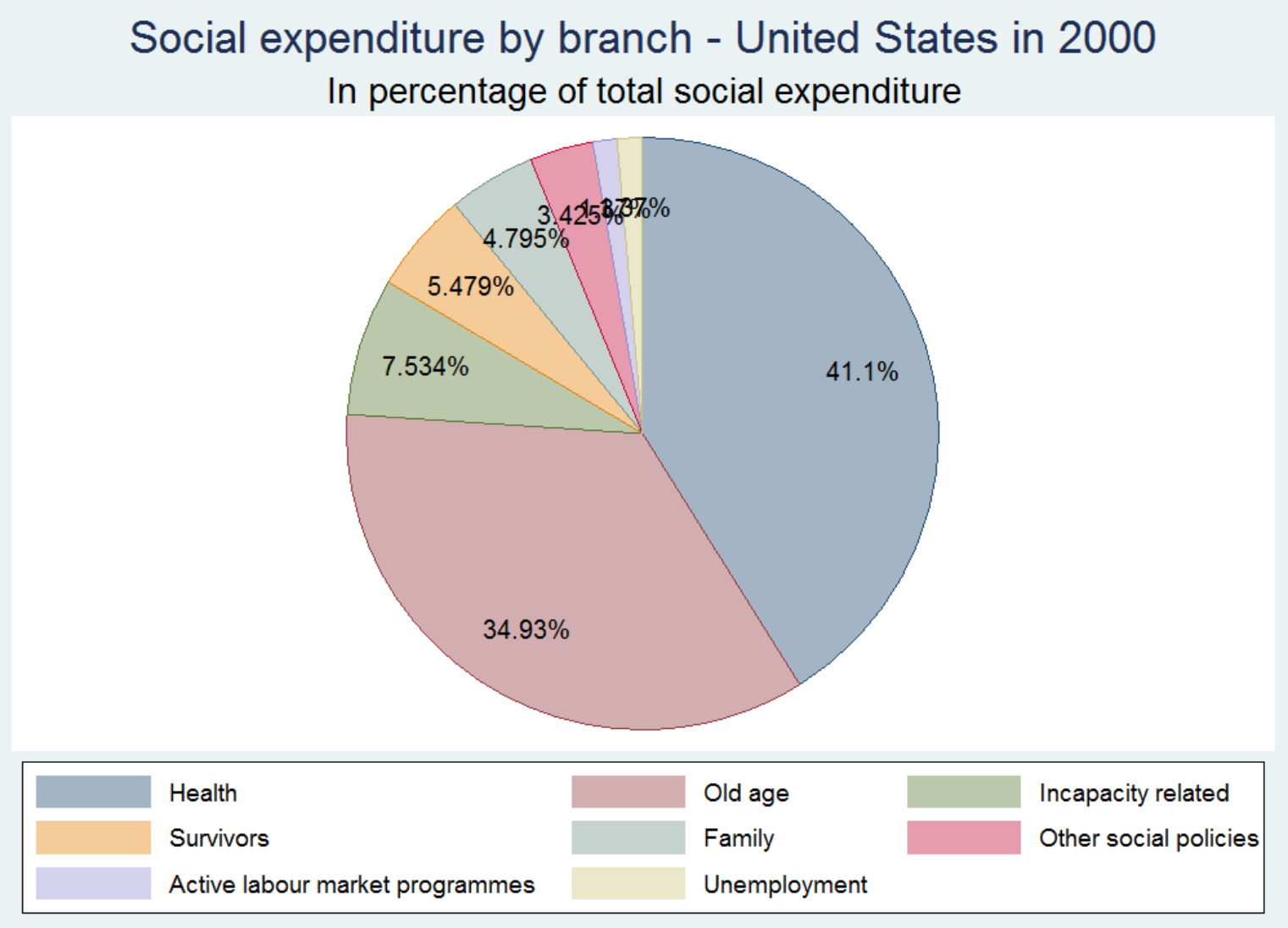
Source: OECD


Total public social expenditure in 2000
In percentagle of total General Government Expenditure
Germany
Luxembourg
France
Sweden
Belgium
Spain
Austria
Switzerland
Norway
New Zealand
Italy
Finland
Poland
United Kingdom
Denmark
Australia
Slovenia
Czech Republic
Portugal
Netherlands
Hungary
Ireland
United States
Greece
Canada
Estonia
Iceland
Slovak Republic
Israel
Korea
0
20
40
60

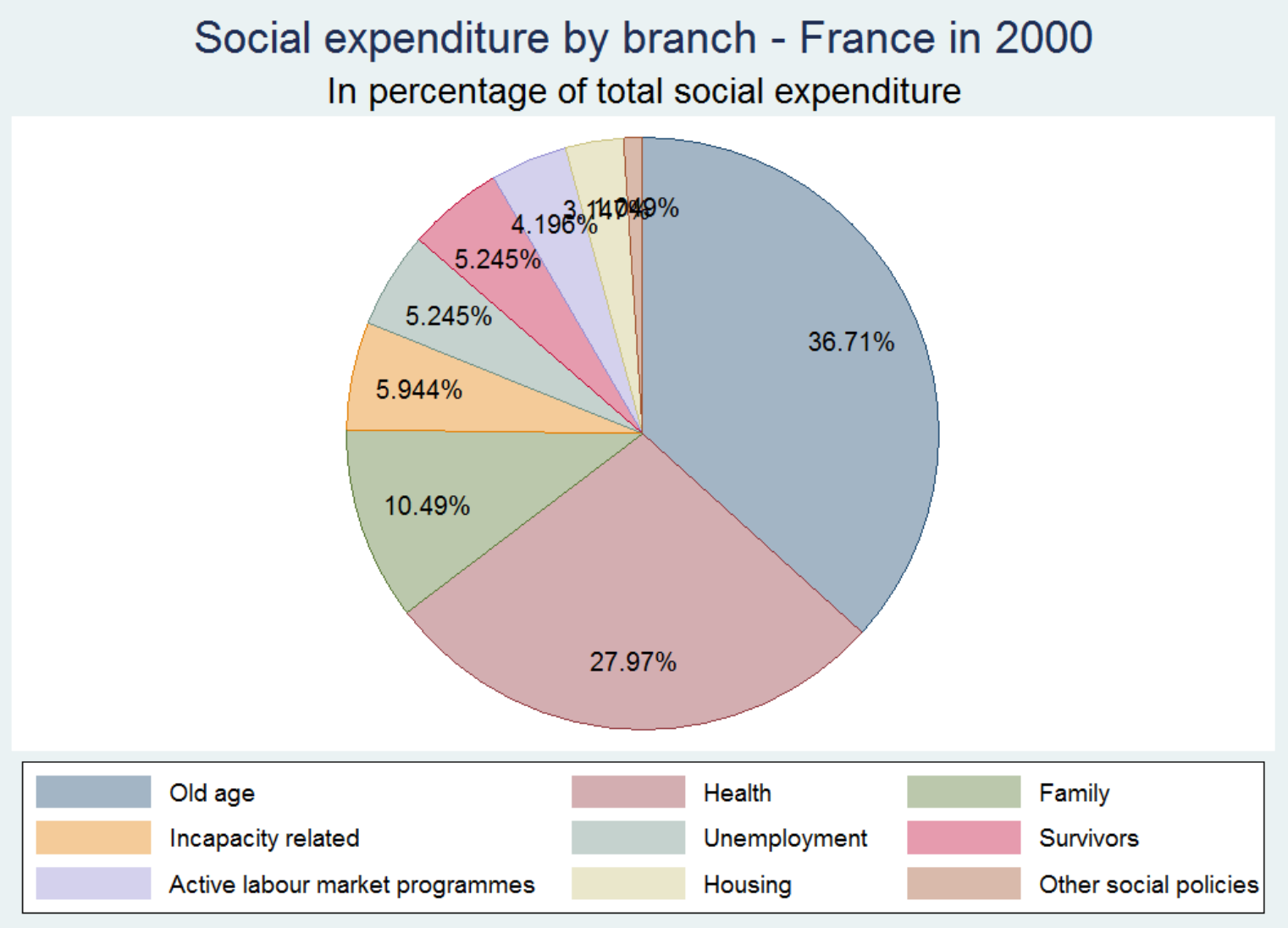
Source: OECD


Total public social expenditure in 2000
In percentage of Gross Domestic Product
France
Sweden
Germany
Austria
Denmark
Belgium
Finland
Italy
Slovenia
Norway
Luxembourg
Hungary
Poland
Spain
Netherlands
Greece
Czech Republic
New Zealand
Portugal
OECD - Total
United Kingdom
Slovak Republic
Switzerland
Australia
Israel
Canada
Japan
Iceland
United States
Estonia
Ireland
Chile
Mexico
Korea
0
10
20
30

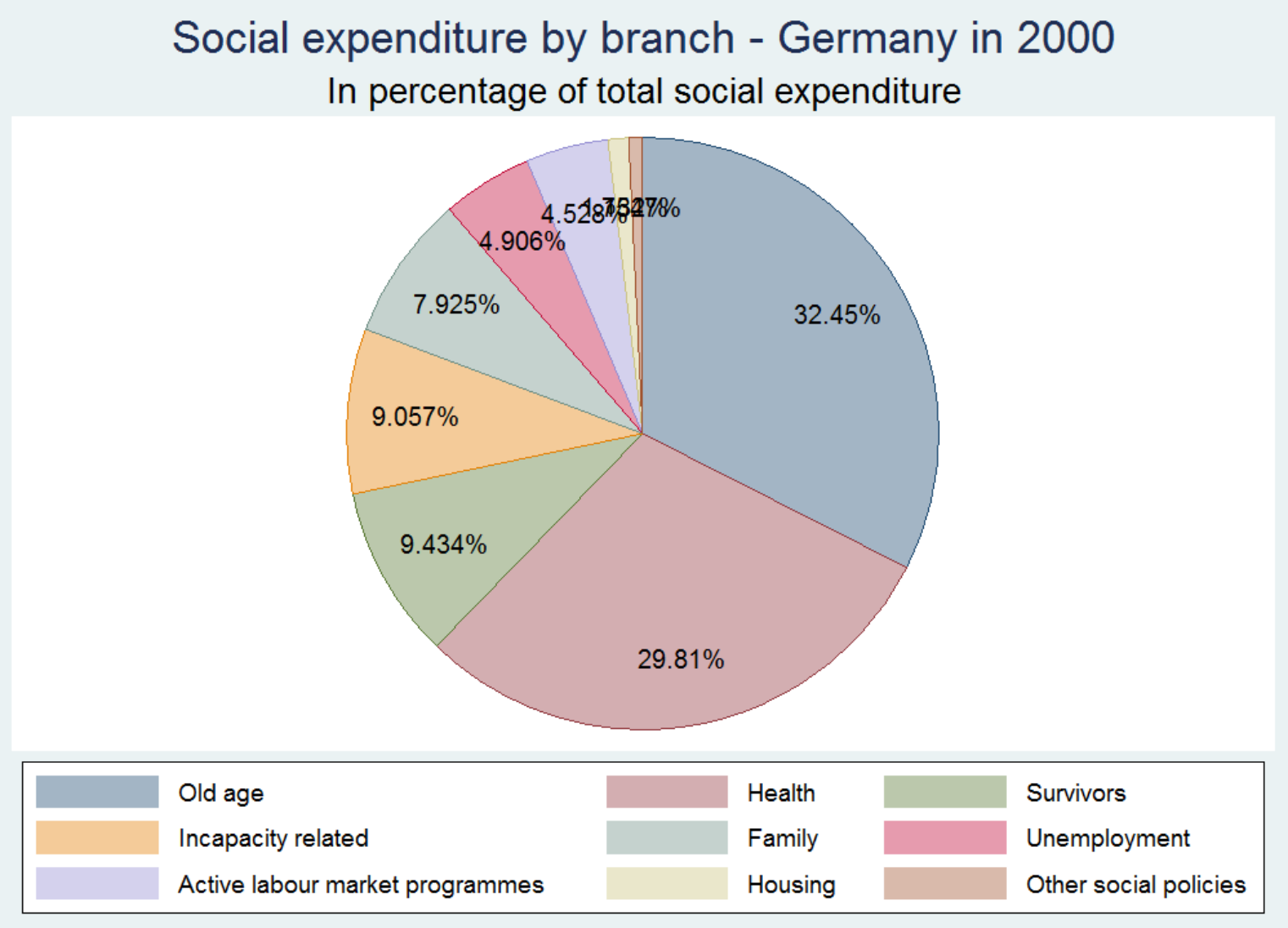
Source: OECD


Social expenditure by branch - United States in 2000
In percentage of total social expenditure
41.1%
34.93%
7.534%
5.479%
4.795%
3.425%
1.37%
Health
Old age
Incapacity related
Survivors
Family
Other social policies
Active labour market programmes
Unemployment

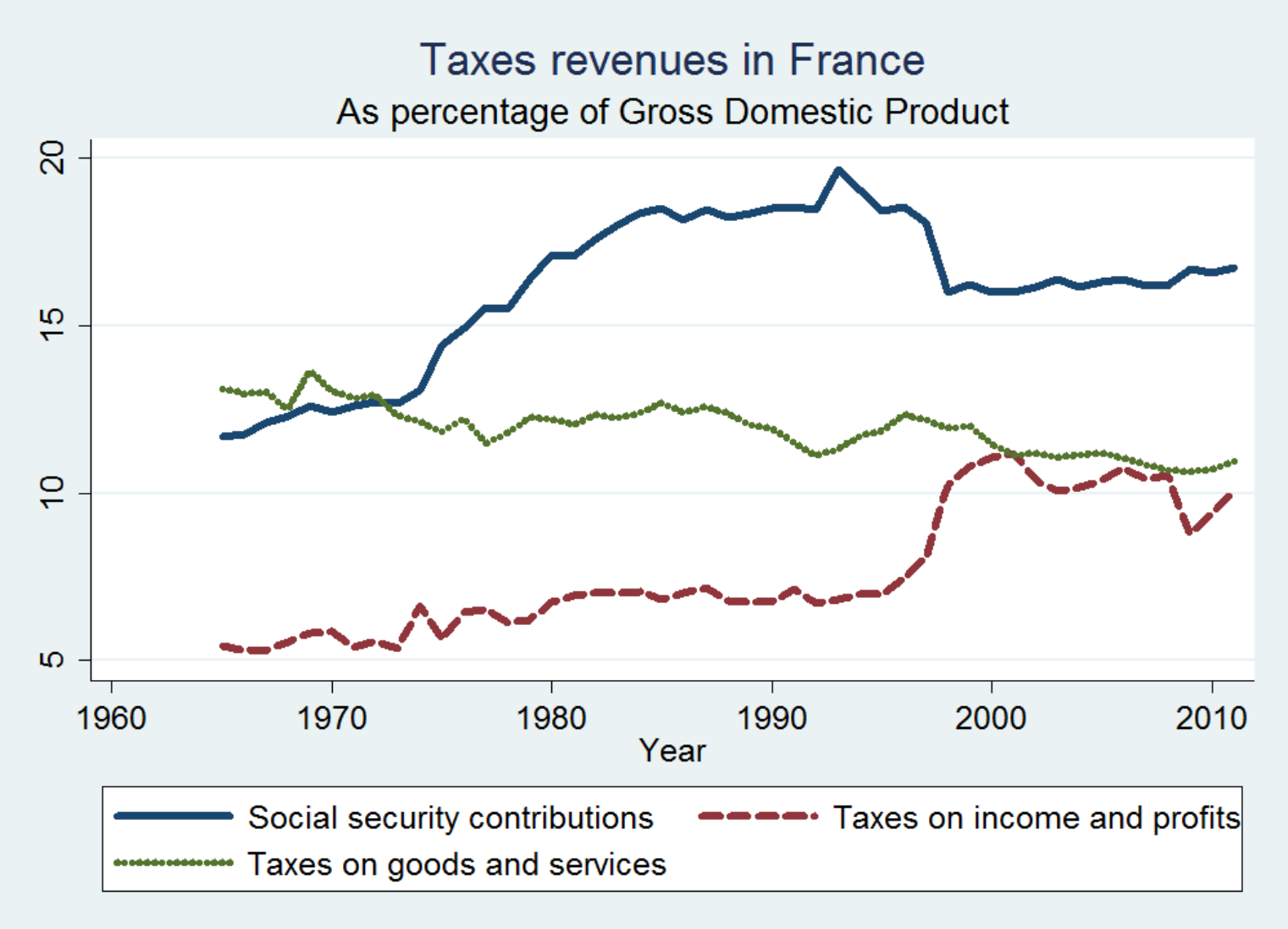
Source: OECD


Social expenditure by branch - France in 2000
In percentage of total social expenditure
36.71%
27.97%
10.49%
5.944%
5.245%
5.245%
4.196%
3.147%
2.049%
Old age
Incapacity related
Active labour market programmes
Health
Unemployment
Housing
Family
Survivors
Other social policies

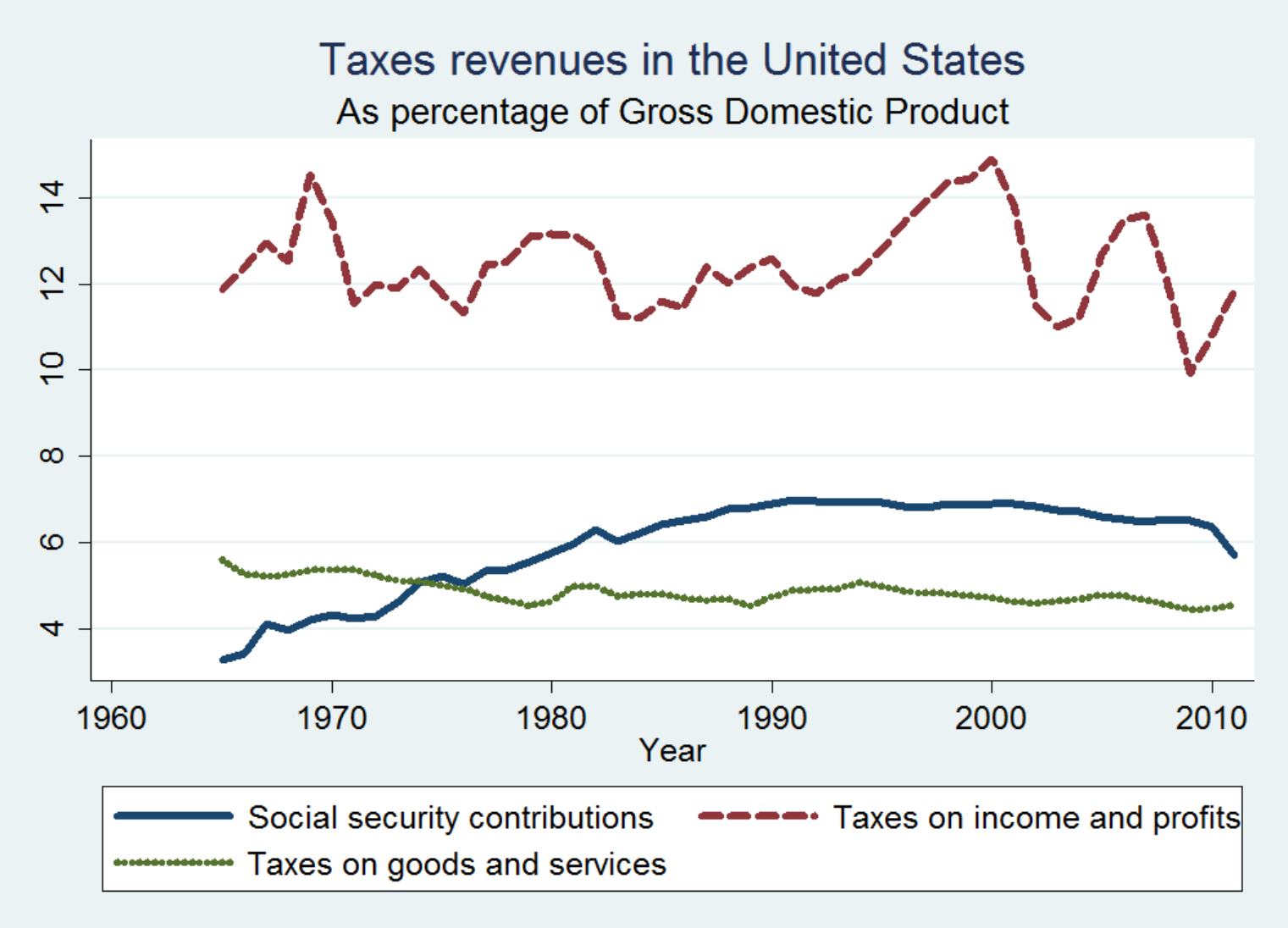
Source: OECD


Social expenditure by branch - Germany in 2000
In percentage of total social expenditure
32.45%
29.81%
9.434%
9.057%
7.925%
4.906%
4.528%
Old age
Incapacity related
Active labour market programmes
Health
Family
Housing
Survivors
Unemployment
Other social policies

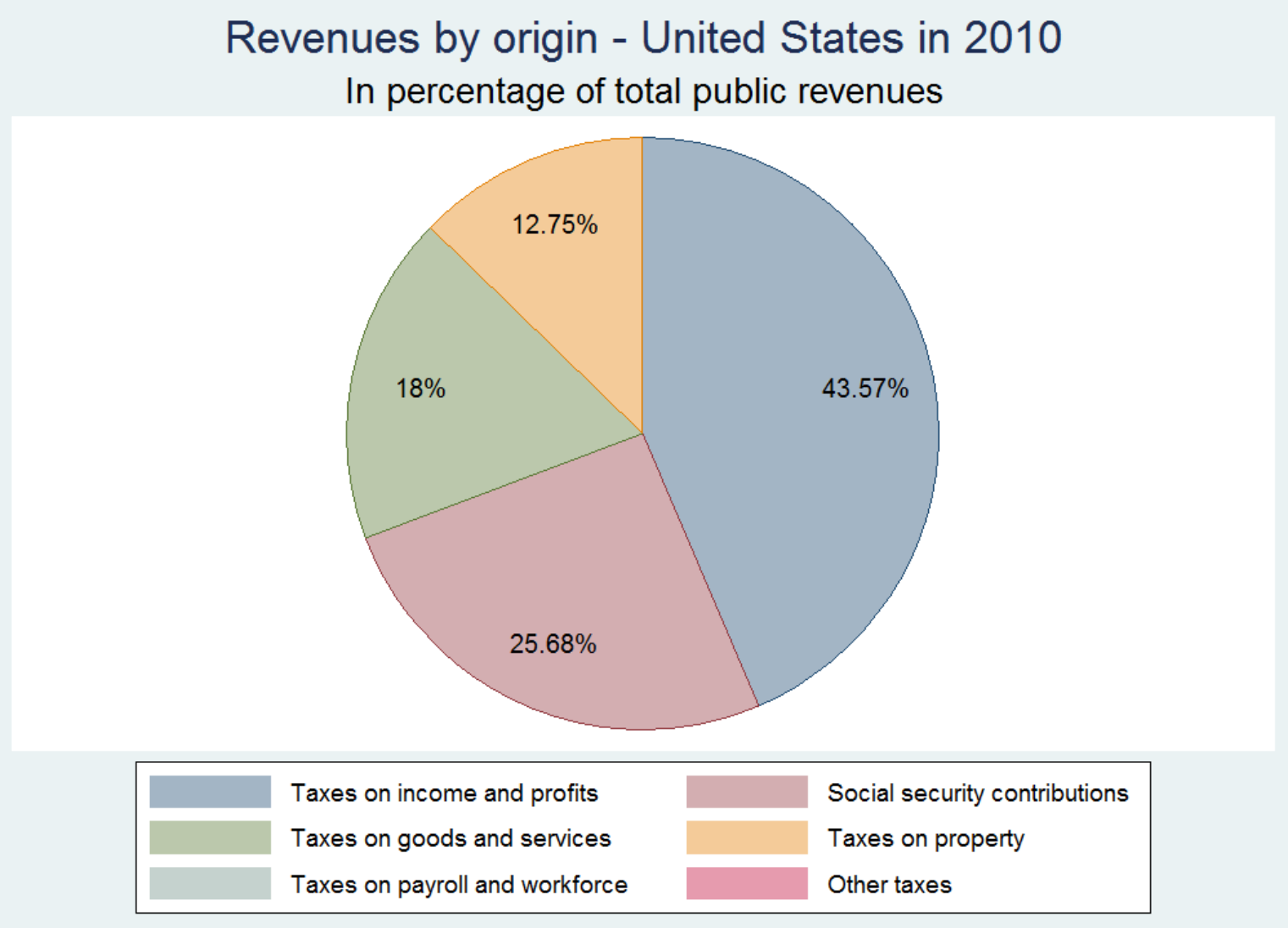
Source: OECD


Taxes revenues in France
As percentage of Gross Domestic Product
20
15
10
5
1960
1970
1980
1990
2000
2010
Year
Social security contributions
Taxes on income and profits
Taxes on goods and services

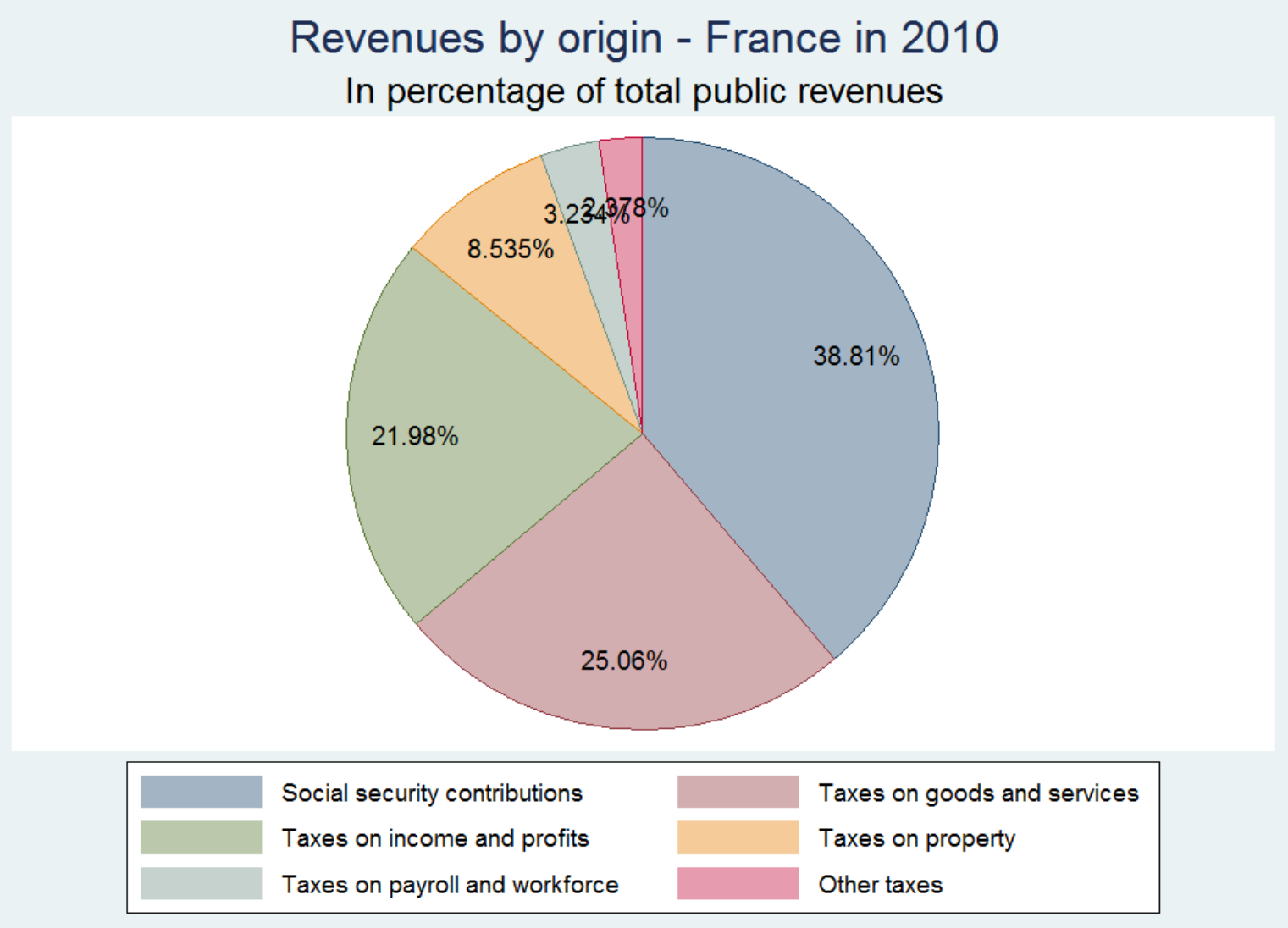
Source: OECD


Taxes revenues in the United States
As percentage of Gross Domestic Product
4
6
8
10
12
14
1960
1970
1980
1990
2000
2010
Year
Social security contributions
Taxes on income and profits
Taxes on goods and services

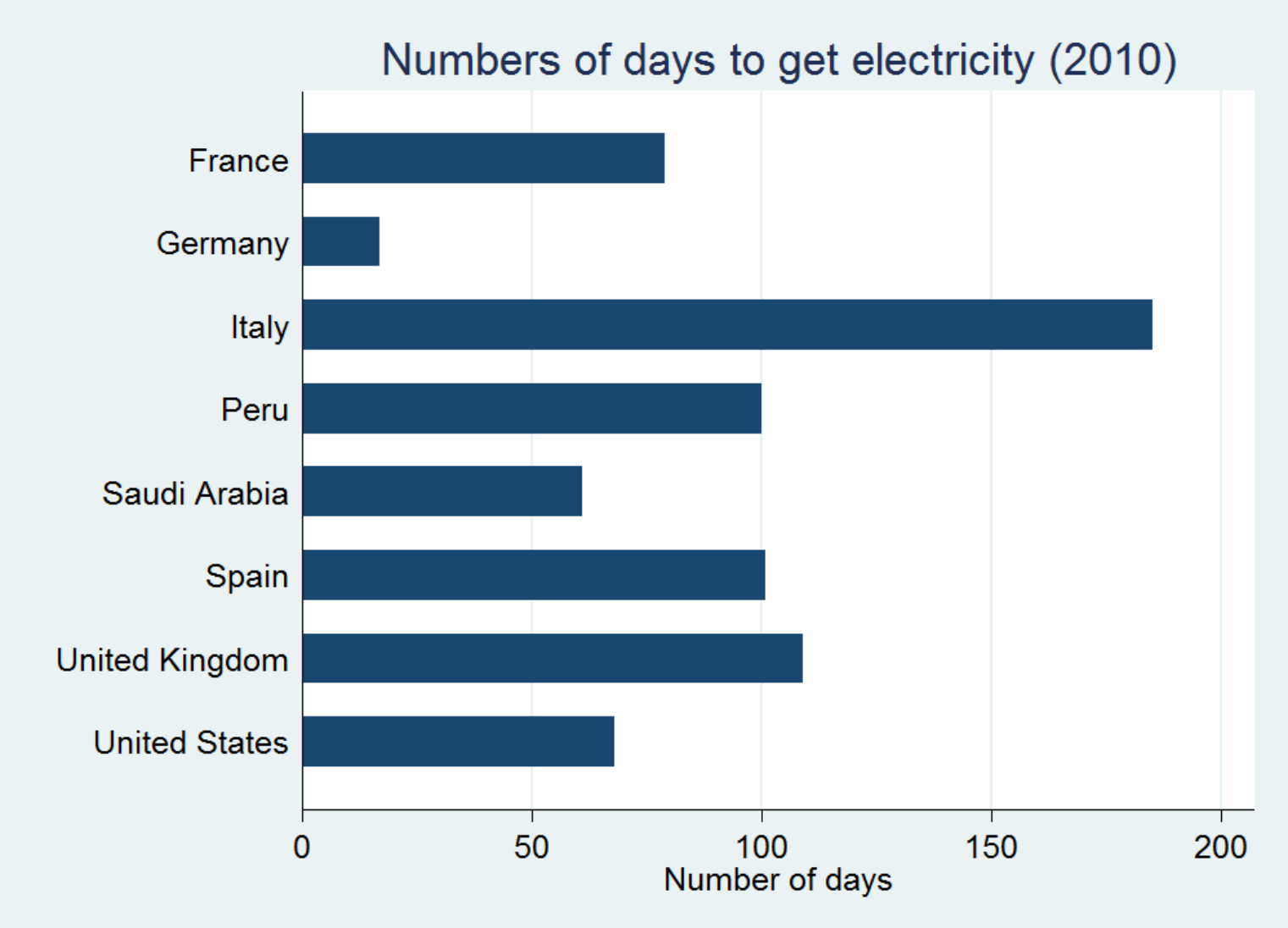
Source: OECD


Revenues by origin - United States in 2010
In percentage of total public revenues
12.75%
18%
43.57%
25.68%
Taxes on income and profits
Social security contributions
Taxes on goods and services
Taxes on property
Taxes on payroll and workforce
Other taxes

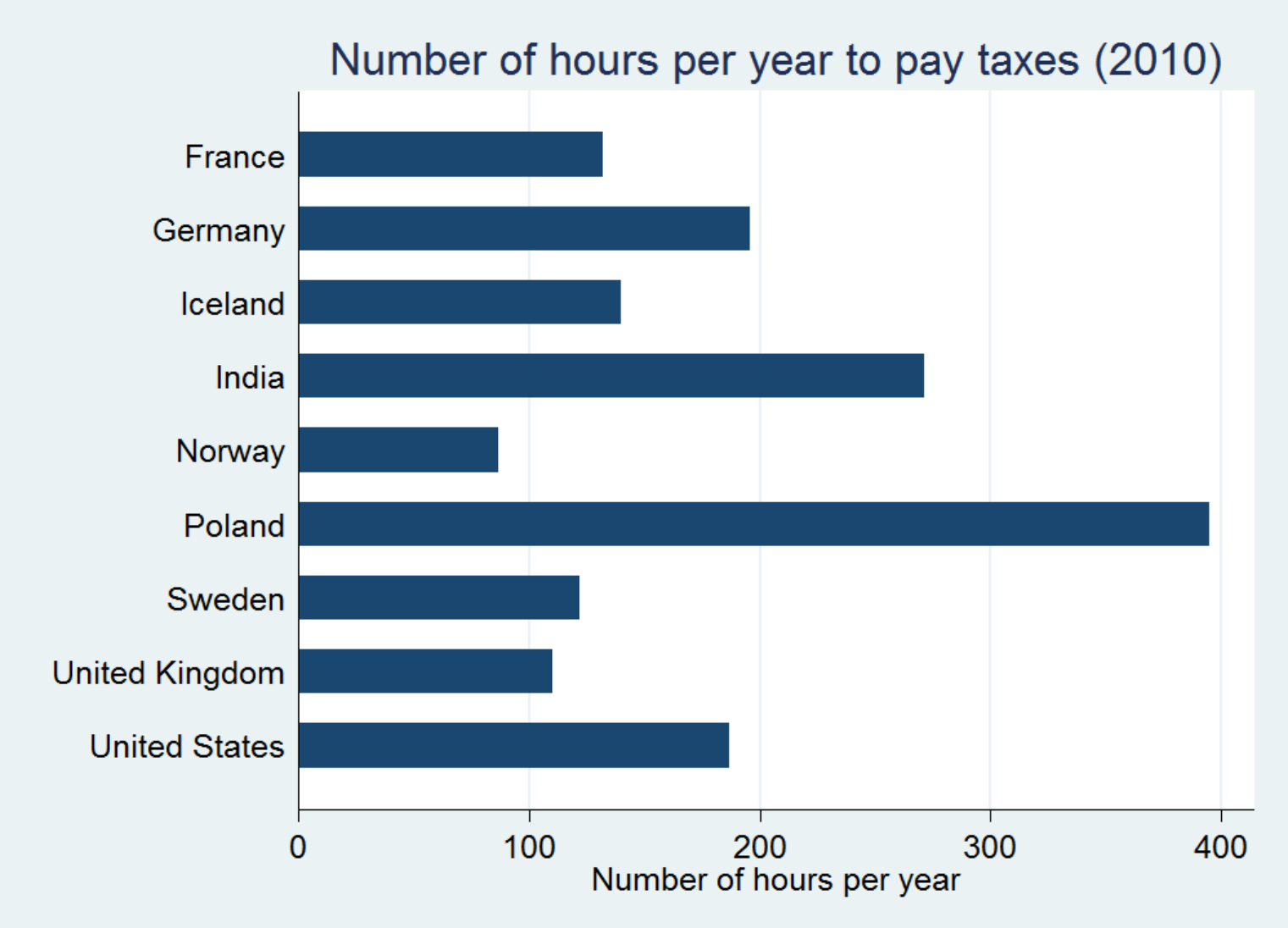
Source: OECD


Revenues by origin - France in 2010
In percentage of total public revenues
38.81%
25.06%
21.98%
8.535%
3.234%
2.378%
Social security contributions
Taxes on goods and services
Taxes on income and profits
Taxes on property
Taxes on payroll and workforce
Other taxes

Source: OECD



Source: World Bank



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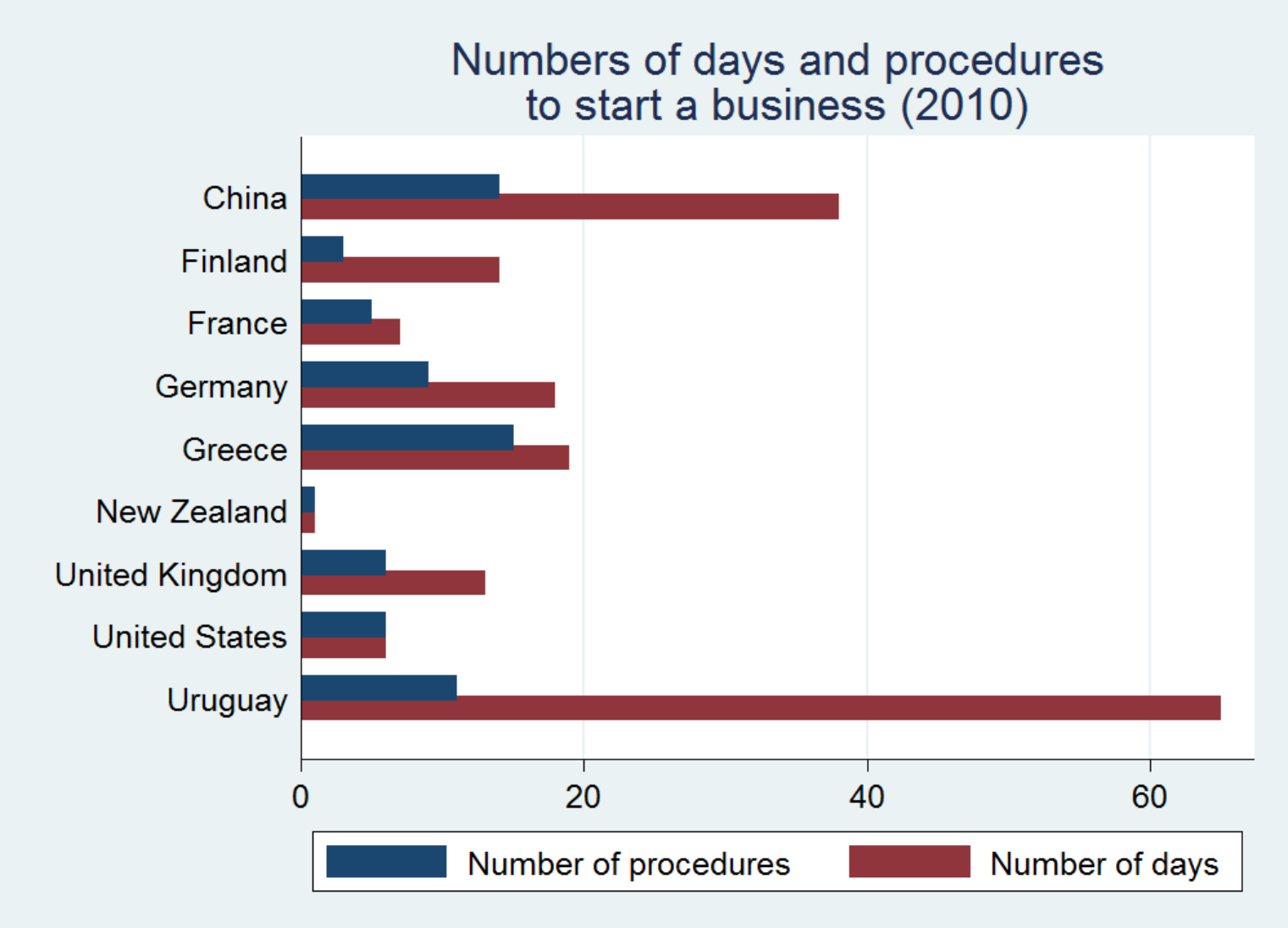
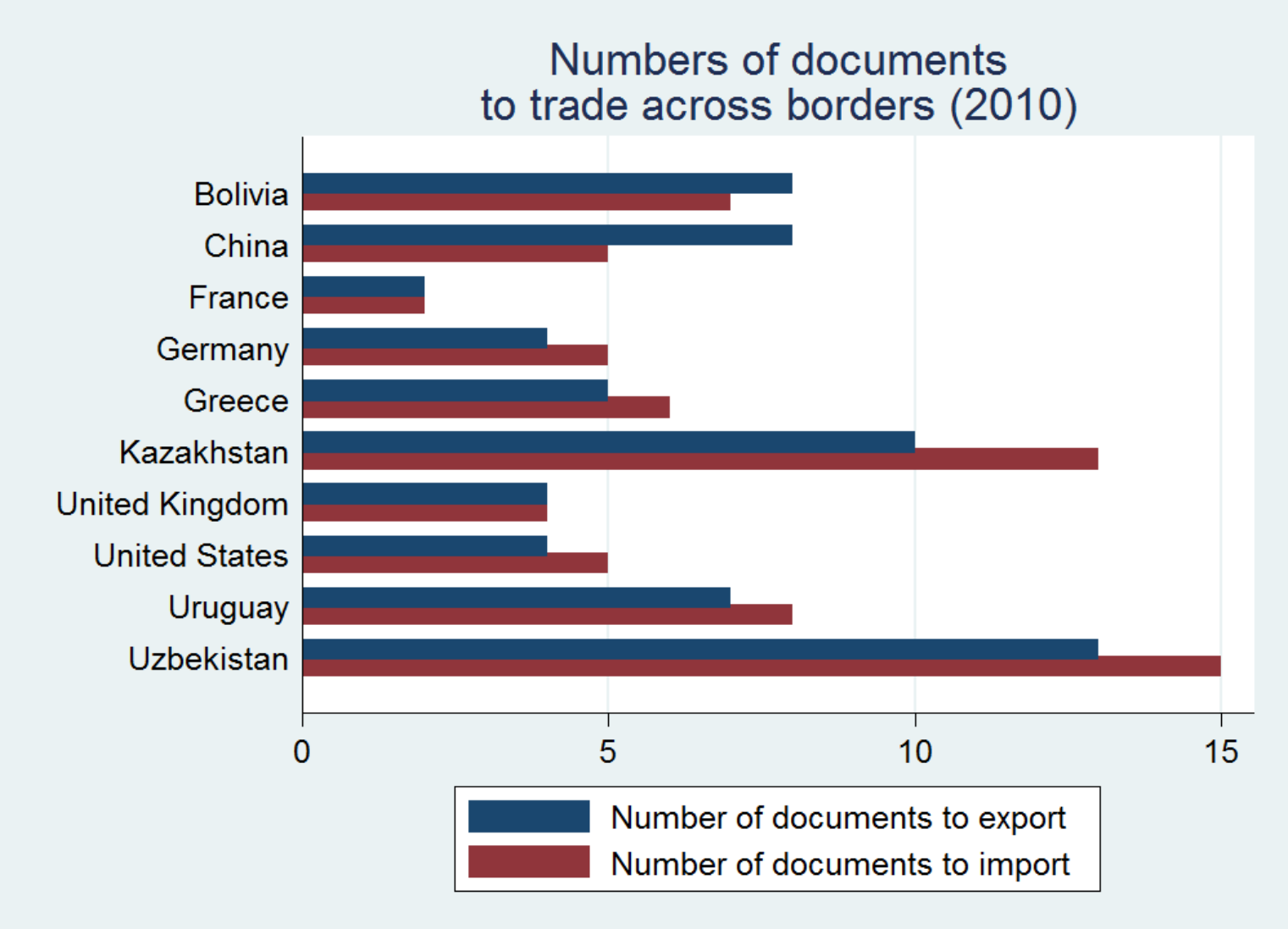


Source: World Bank



Source: World Bank

1. Facts about governments and public intervention

2. Empirical methods for public economics
   - Why evaluating?
   - Canonical problem
   - Non-experimental approaches
   - Experimental approaches

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.

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:

$$h_i = \alpha w_i (1 - t_i) + \beta X_i + \varepsilon_i.$$

- Problem: Net of tax wages are endogenous.
  Here, marginal tax rate is a function of earnings. There is an explicit relationship between earnings and the tax rate faced by individuals.

For example, suppose that the tax system is made of two tax brackets:

$$\begin{array}{ll} \tau_1 & \text{if earnings} < \bar{E}, \\ \tau_2 & \text{if earnings} \geq \bar{E}, \end{array}$$

with $\tau_1 < \tau_2$. The (binding) budget constraint is:

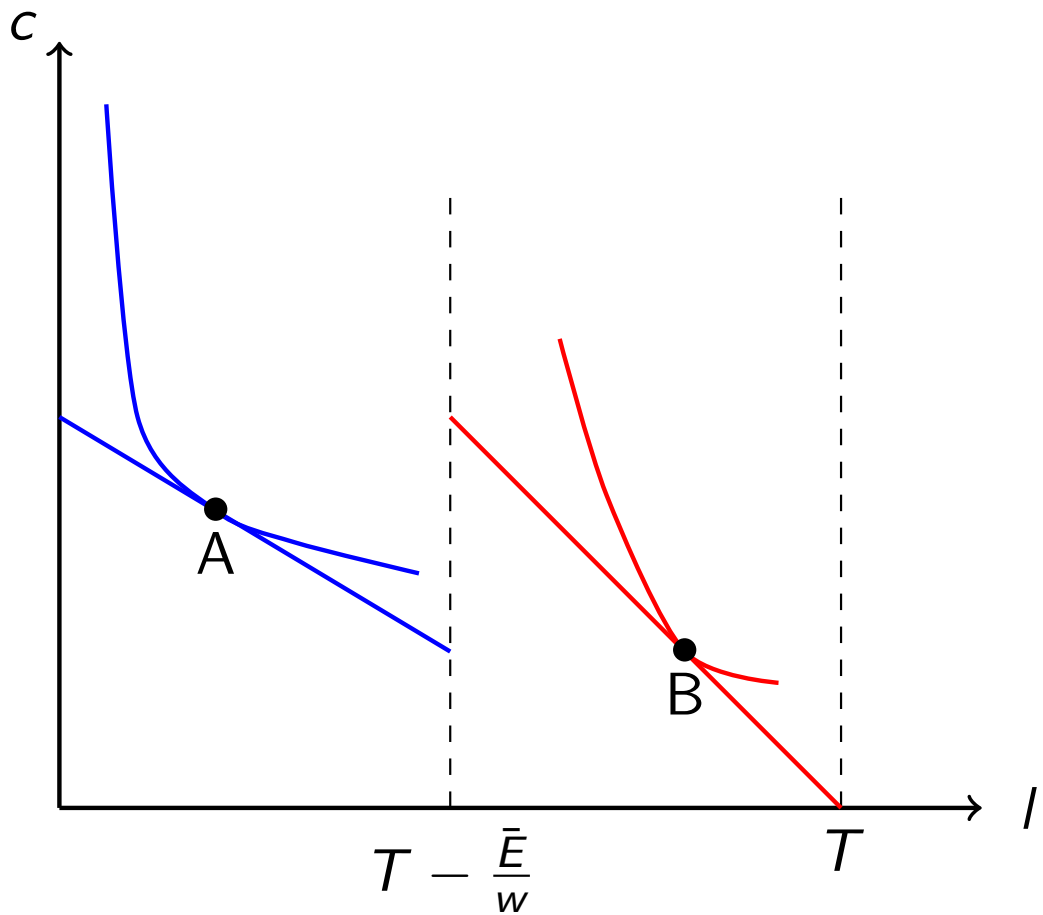
$$\begin{array}{ll} & hw(1-t) = pc \\ \Leftrightarrow & (T-l)w(1-t) = pc, \end{array}$$

where l is leisure time, T is total available time, c is quantity of good purchased at price p.

$$\text{If } (T-l)w < \bar{E} \Leftrightarrow l \geq T - \frac{\bar{E}}{w},$$
$$\text{then } c = \frac{w}{p}(1-\tau_1)T - \frac{w}{p}(1-\tau_1)l,$$

and,

$$\text{if } l < T - \frac{\bar{E}}{w},$$
$$\text{then } c = \frac{w}{p}(1-\tau_2)T - \frac{w}{p}(1-\tau_2)l,$$



People with high hours have higher unobservable taste for work. So, when ε 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.

Solutions

- Non-experimental approaches;
- Experimental approaches.

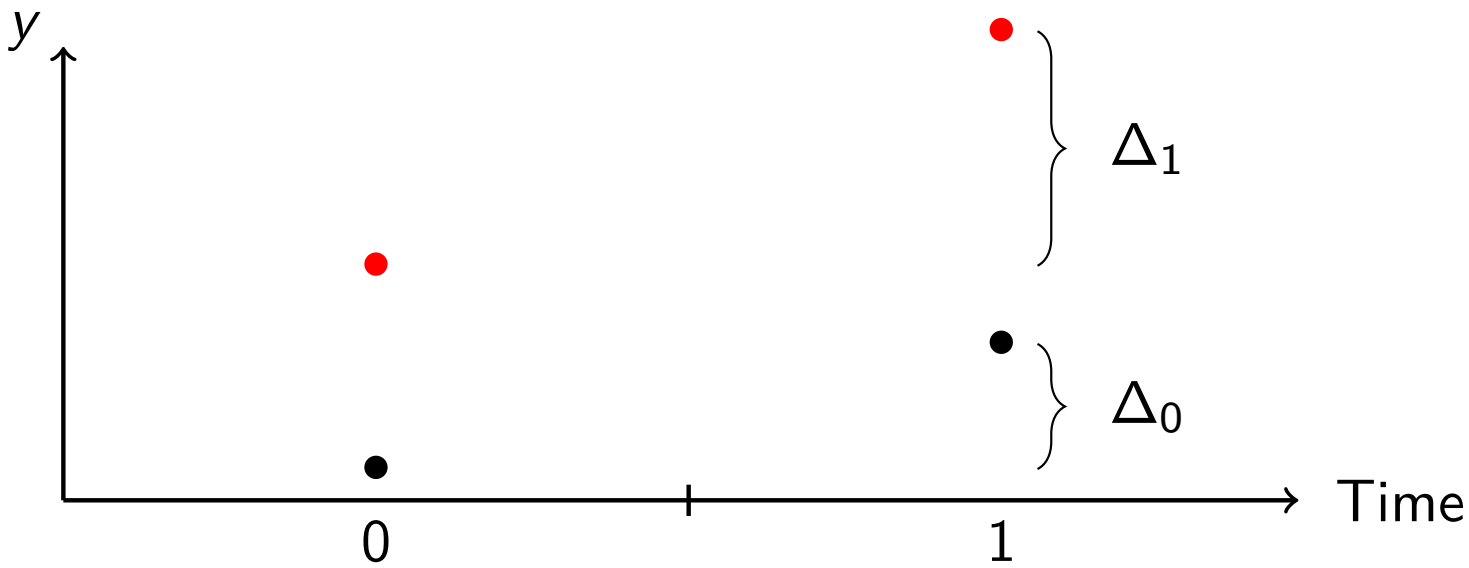
Difference in differences

Before-after estimator:

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

Difference in differences estimator:

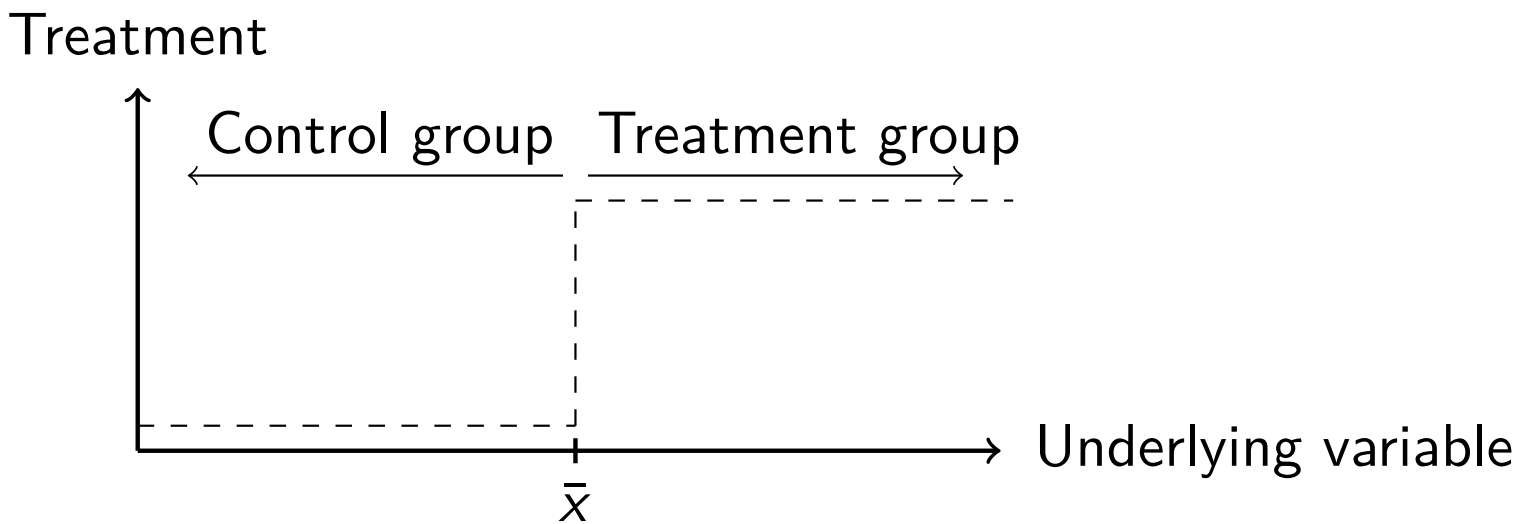
- Compare the change in outcome between a treated group and an untreated group.
- Control group captures what would have happened to the treated individuals if they were not treated.
- Assumption: there are no contemporaneous shocks specific to each group and/or there are no group-specific trends that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