Basic notions & notations

• National income $Y = F(K,L) = Y_K + Y_L = rK + vL$
  with $r =$ average rate of return
  $v =$ average wage rate

• Individual income $y_i = y_{Ki} + y_{Li} = r_i k_i + v_i l_i$
  with $r_i =$ individual rate of return, $v_i =$ individual wage rate

• Individual capital (wealth) $k_i$ comes from past savings and/or from inheritance (or sometime from various forms of appropriations or privatization processes, e.g. for natural resources: land, oil, gold, etc.)

• In order to study capital taxation, one needs to specify where $k_i$ comes from, i.e. one needs a dynamic, multi-period model: static, one-period model are fine to study labor income taxation, but cannot be used to study capital taxation → see next lecture for explicit dynamic models; today = mostly a description of existing capital taxes
Reminder: what is capital?

• $K = \text{real-estate (housing, offices..), machinery, equipment, patents, immaterial capital,..}$
  $(\approx \text{housing assets + business assets: about 50-50})$
  $Y_K = \text{capital income = rent, dividend, interest, profits,..}$

• In rich countries, $\beta = \frac{K}{Y} = 5-6$  $(\alpha = \frac{Y_K}{Y} = 25-30\%)$
  (i.e. average rate of return $r = \frac{\alpha}{\beta} = 4-5\%$)

• Typically, in France, Germany, UK, Italy, US, Japan: $Y \approx 30 000\,\text{€} \ (\text{pretax average income, i.e. national income /population}), K \approx 150\,000-180\,000\,\text{€} \ (\text{average wealth, i.e. capital stock/po})$
  net foreign asset positions small in most countries (but rising); see this graph & inequality course for more details
Key distinction: taxes on flows versus stock

- Total tax burden EU27 ≈ 39% of GDP, incl. 9% in capital taxes (US: 28%, incl. 8% in capital taxes). See Eurostat 2013
- With a capital share $\alpha = Y_k/Y \approx 30\%$, this is equivalent to an average tax rate ≈ 30% on all capital income flows
- With a capital/income ratio $\beta = K/Y \approx 600\%$, this is equivalent to an average tax rate ≈ 1.5% on the capital stock
→ both forms of capital taxes raise ≈9% of GDP

- In practice, there is a large diversity of capital taxes: **stock-based** (one-off inheritance and transfer taxes, annual property or wealth taxes) or **flow-based** (corporate income taxes, taxes on capital income: rental income, interest, dividend, k gains etc.); why are they not all equivalent?
• In the simplest economic models, we have a general equivalence result: if the rate of return on capital is equal to \( r \) and is the same across all individuals & over all assets (=perfect capital markets), then a tax at rate \( t_k \) on the capital income flow is exactly equivalent to a tax at rate \( \tau_k \) on the capital stock, with:

\[
\tau_k = r \times t_k, \text{ or } t_k = \frac{\tau_k}{r}
\]

• If \( r = 5\% \), it is equivalent to tax capital stock at \( \tau_k = 1\% \) per year or to tax capital income flow at \( t_k = 20\% \) per year

• If \( r = 4\% \), then \( \tau_k = 1\% \) on stock \( \leftrightarrow t_k = 25\% \) on income flow
• Exemple: assume that you own an appartement worth $k=1$ million €, and that its annual rental value is equal to $y_k=40\,000€$, i.e. $r = 4\%$

• Assume you have to pay a property tax (taxe foncière) at a rate $\tau_k=1\%$: $1\%$ of $k=10\,000€$ in tax

• It is equivalent to pay a tax at rate $t_k=25\%$ on the rental income (real or imputed):
  
  $25\%$ of $y_k=40\,000€ = 10\,000€$ in tax

• Same computations with $k=100\,000€$, $y_k=4\,000€$

• Note: in France, average rate of property tax $\approx 0.5\%$; in the US or UK, it is closer to $\approx 1\%$
• In practice, the key reason why taxes on the capital stock and taxes on the capital income flow are not equivalent is the existence of capital market imperfections: the rate of return \( r_i \) varies across assets & individuals

• For individuals with \( r_i > \) average \( r \), then it is better to have stock taxes than flow taxes (& conversely for individuals with \( r_i < \) average \( r \))

• If \( r_i = 10\% \), \( \tau_k = 1\% \) on stock \( \leftrightarrow \) \( t_k = 10\% \) on income flow

• If if \( r_i = 2\% \), \( \tau_k = 1\% \) on stock \( \leftrightarrow \) \( t_k = 50\% \) on income flow

• Key argument in favor of taxes on capital stock rather than on flow (i.e. capital tax rather than income tax): they put incentives to get a high return on \( k \) (Allais)
• In the EU & US, capital taxes = 8%-9% GDP
• Typical structure:
• inheritance taxes <1% GDP
  (say, 5%-10% of a 10% tax base)
• + annual wealth & property taxes 1%-2% GDP
  (say, 0,5% of a 200%-400% tax base)
• + corporate profits tax 2%-3% GDP
  (say, 20%-30% of a 10% tax base)
• + personal capital income tax 2%-3% GDP
  (say, 20%-30% of a 10% tax base)
Exemple of inheritance taxes

• Basic distinction:

  • **Estate taxes**: tax rates depend on the total “estate” (real estate: immobilier + personal estate: mobilier, incl. financial), i.e. the total wealth left by the decedent, irrespective of how it is split between successors

    = applied in **US & UK** (complete testamentary freedom... but egalitarian default rules if no testament)

  • **Inheritance taxes**: tax rates depend on the wealth received by each successor (part successorale) and the kin relationship (children vs strangers)

    = applied in **France & Germany** (limited testamentary freedom; rigid transmission rules)

→ in order to understand how the tax is computed, one first needs to understand how the wealth is divided
• Rigid transmission rules in France: the $1/n+1$ rule
• « Réserve héréditaire » (this has to go the children, no matters what) = $n/n+1$
• « Quotité disponible » (what you can transmit to individuals other than your children) = $1/n+1$, with $n =$ number of children
• With $n = 1$, free disposal of 50% of your wealth
• With $n = 2$, free disposal of 33% of your wealth
• With $n = 3$ or more, free disposal of 25% of your wealth; the other 75% is divided equally among children
• These basic rules were unchanged since 1804
• Default matrimonial regime: « community of acquisition » (« communauté réduite aux acquêts »)
• Married couple wealth $w = w_c + w_1 + w_2$
• with $w_c$ = community assets = assets acquired during marriage
  $w_1, w_2$ = own assets (biens propres) = inherited by each spouse (or acquired before marriage)
• Only $w_c$ is split 50-50

• Other matrimonial regimes: separate property; universal community (very rare)
Marginal vs average tax rates: illustration with French 2012-2013 Inheritance Tax

French 2012-2013 tax schedule (applied to 2012-2013 decedents):

(\textit{barème des droits de successions})

(see www.impots.gouv.fr)

This tax schedule applies "in direct line", i.e. for transmissions from parents to children, on individual estate shares ("parts successorales")

The exemption for children is equal to: 100 000

Inter vivos gift: exemption every 15 year

Spouses: tax exempt

Note: until 2011, top rate = 40% instead of 45%

Key change in 2012: in 2007-2011, children exemption = 150 000€, every 6 year

I.e. if they start giving to their children at age 50 and die at age 80, each parent could transmit 6 x 150 000€ = 900 000€ to each children with zero tax; i.e. a couple with two children could transmit 3,6 millions € with zero tax.

Since 2012, such parents can "only" transmit 4 x (3 x 100 000€) = 1,2 millions € with zero tax.

In practice, less than 5% of direct line transmissions pay inheritance taxes (but this depends a lot on tax planning)

(in 1992-2006: children exemption = 50 000€, every 10 year)
Exemple 1: married couple with wealth \( w = 1 \) million € and two kids, no inter vivos gift

Assumption: each spouse owns 500 000€, and the couple wishes to transmit 500 000€ to each kid

Assume that the first decedent transmits the full property of 500 000€ to kids; then the second decedent transmits the remaining 500 000€ to the kids

Inheritance tax at first death: 
\[
5\% \times (8\ \text{072}-0) + 10\% \times (12\ \text{109}-8\ \text{072}) + 15\% \times (15\ \text{932}-12\ \text{109}) + 20\% \times (250\ \text{000} - 15\ \text{932} - 100\ \text{000})
\]
\[
= \text{28 194€} = 11,3\% \text{ of } 250\ \text{000€}
\]

Estate tax at second death = same computation = 28 194€ = 11,3% of 250 000€

Total estate tax paid by each children = 56 389€ = 11,3% of 500 000€

Total inheritance tax paid = 112 777€ = 11,3% of 1 000 000€

Effective tax rate = 11,3% < Marginal tax rate=20%

Exemple 2: married couple with wealth \( w = 10 \) million € and two kids, no inter vivos gift

Assumption: each spouse owns 5 millions €, and the couple wishes to transmit 5 millions € to each kid

Assume that the first decedent transmits the full property of 5 millions € to kids; then the second decedent transmits the remaining 5 millions € to the kids

Inheritance tax at first death: 
\[
5\% \times (8\ \text{072}-0) + 10\% \times (12\ \text{109}-8\ \text{072}) + 15\% \times (15\ \text{932}-12\ \text{109}) + 20\% \times (552\ \text{324} - 15\ \text{932}) + 30\% \times (902\ \text{838} - 552\ \text{324}) + 40\% \times (1\ \text{805\ 677} - 902\ \text{838}) + 45\% \times (2\ \text{500\ 000} - 1\ \text{805\ 677} - 100\ \text{000})
\]
\[
= \text{842 394€} = 33,7\% \text{ of } 2\ \text{500 000€}
\]

Estate tax at second death = same computation = 842 394€ = 33,7% of 2 500 000€

Total inheritance tax paid by each children = 1 684 789€ = 33,7% of 5 000 000€

Total inheritance tax paid = 3 369 577 € = 33,7% of 10 000 000€

Effective tax rate = 33,7% < Marginal tax rate = 45%
• Other examples of computations using tax schedules from France and the US: see excel file

• Chaotic evolution of top inheritance tax rates over time and across countries: see graph

• On the historical evolution of inheritance taxes:
The top marginal tax rate of the inheritance tax (applying to the highest inheritances) in the U.S. dropped from 70% in 1980 to 35% in 2013. Sources and series: see piketty.pse.ens.fr/capital21c.
Progressive wealth taxes

• Exemple with French ISF: see excel file

• On the evolution of the French wealth tax (ISF) :
### Marginal vs average tax rates: illustration with French 2008-11 Wealth Tax

French 2008 wealth tax schedule (applied to 1/1/2008 wealth):  
*barème de l’impôt sur la fortune (ISF)*  
(see www.impots.gouv.fr)  

<table>
<thead>
<tr>
<th>Threshold (€)</th>
<th>Marg. Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>770 000</td>
<td>0,55%</td>
</tr>
<tr>
<td>1 240 000</td>
<td>0,75%</td>
</tr>
<tr>
<td>2 450 000</td>
<td>1,00%</td>
</tr>
<tr>
<td>3 850 000</td>
<td>1,30%</td>
</tr>
<tr>
<td>7 360 000</td>
<td>1,65%</td>
</tr>
<tr>
<td>16 020 000</td>
<td>1,80%</td>
</tr>
</tbody>
</table>

*(no major reform in 2008-2011, except small adjustment for inflation)*

**Exemple with wealth \( w = 1 \text{ million €} \)**

\[
0,55\% \times (1 000 000 - 770 000) = 1 265€ = 0,13\% \text{ of } 1 000 000 €
\]

>>> **marginal wealth tax rate = 0,55%, average wealth tax rate = 0,13%**

Implicit wealth income tax rate:
- If \( r = 2\% \), i.e. \( rw = 20 000€ \), then average wealth income tax rate = 6,32%
- If \( r = 10\% \), i.e. \( rw = 100 000€ \), then average wealth income tax rate = 1,26%

**Exemple with wealth \( w = 10 \text{ million €} \)**

\[
0,55\% \times (1 240 000 - 770 000) + 0,75\% \times (2 450 000 - 1 240 000) + 1\% \times (3 850 000 - 2 450 000) \\
+ 1,30\% \times (7 360 000 - 3 850 000) + 1,65\% \times (10 000 000 - 7 360 000) = 114 850€ = 1,15\% \text{ of } 10 000 000 €
\]

>>> **marginal wealth tax rate = 1,65%, average wealth tax rate = 1,15%**

Implicit wealth income tax rate:
- If \( r = 2\% \), i.e. \( rw = 200 000€ \), then average wealth income tax rate = 57,43%
- If \( r = 5\% \), i.e. \( rw = 500 000€ \), then average wealth income tax rate = 22,96%
- If \( r = 10\% \), i.e. \( rw = 1 000 000€ \), then average wealth income tax rate = 11,48%
**Marginal vs average tax rates: illustration with French 2012 Wealth Tax**

<table>
<thead>
<tr>
<th>Threshold (€)</th>
<th>Marg. Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>800 000</td>
<td>0.50%</td>
</tr>
<tr>
<td>1 310 000</td>
<td>0.70%</td>
</tr>
<tr>
<td>2 570 000</td>
<td>1.00%</td>
</tr>
<tr>
<td>5 000 000</td>
<td>1.25%</td>
</tr>
<tr>
<td>10 000 000</td>
<td>1.50%</td>
</tr>
</tbody>
</table>

French 2013 wealth tax schedule (applied to 1/1/2013 wealth):

(barème de l’impôt sur la fortune (ISF))

(see www.impots.gouv.fr)