The Effects of EU Formula Apportionment on Corporate Tax Revenues

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Workshop: Applying Microsimulation for Fiscal Policy Analysis
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Agenda

Introduction

The Data

Methodology

Results

Discussion

Conclusions
Motivation

- The European Commission has aimed to harmonise direct taxation for some decades.
- In the field of corporate taxation a long term goal is a fully harmonised common consolidated corporate tax base.
- As an intermediate step international loss consolidation and formulary apportionment are discussed.
- Following apportionment factors are proposed:
  - Property
  - Gross receipts
  - Payroll
Motivation (Continued)

- We analyse the revenue implications of the EU Commission proposal, ...
  - ... using a large firm-level dataset
  - ... looking at each of the apportionment factors separately
- We abstract from behavioral change of the firms
- We allow for voluntary participation, modelling the intertemporal decision how to use the losses
- Additionally we look at different scenarios, where ...
  - ... companies are forced to participate
  - ... only a subgroup of countries participate in the new system
A very short look into the literature

- There is a growing theoretical literature concerned with the response of firms and countries.
- There are few empirical studies.
- Shackelford and Slemrod (ITAX 1998):
  - Increase in tax burden of 38% for US parent firms.
- Fuest, Hemmelgarn and Ramb (2007):
  - For German inbound and outbound FDI.
  - Effect of loss consolidation: -20% corporate tax base.
  - Tendency for small countries to lose, and large countries to win.
The Data sources

- **Firm data**: ORBIS database provided by the Bureau van Dijk
  - Financial accounts (balance sheet and profit and loss accounts)
  - Information about shareholdings, shareholders, global owner
  - We use the unconsolidated data for the largest 900,000 companies for 2000-2004
- **Tax revenue data**: OECD Revenue Statistics and EU Commission Study
- **Tax data**: Own research (mainly from IBFD, Amsterdam)
  - Corporate Tax Rates
  - Information about loss carry forward, loss carry backward, group loss relief and fiscal consolidation
<table>
<thead>
<tr>
<th>Country</th>
<th>Observations</th>
<th>Not in a group</th>
<th>Part of a Group</th>
<th>OECD/Eurostat</th>
<th>∑ TAX in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>2,053</td>
<td>1,246</td>
<td>807</td>
<td>28,702</td>
<td>7,849 27%</td>
</tr>
<tr>
<td>Belgium</td>
<td>18,339</td>
<td>12,611</td>
<td>5,728</td>
<td>51,813</td>
<td>30,746 59%</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>7,576</td>
<td>6,707</td>
<td>869</td>
<td>18,692</td>
<td>8,734 47%</td>
</tr>
<tr>
<td>Germany</td>
<td>15,966</td>
<td>9,826</td>
<td>6,140</td>
<td>150,411</td>
<td>124,751 83%</td>
</tr>
<tr>
<td>Denmark</td>
<td>12,172</td>
<td>8,677</td>
<td>3,495</td>
<td>29,642</td>
<td>23,447 79%</td>
</tr>
<tr>
<td>Estonia</td>
<td>1,534</td>
<td>1,016</td>
<td>518</td>
<td>610</td>
<td>187 31%</td>
</tr>
<tr>
<td>Spain</td>
<td>83,413</td>
<td>64,476</td>
<td>18,911</td>
<td>128,663</td>
<td>76,235 59%</td>
</tr>
<tr>
<td>Finland</td>
<td>7,405</td>
<td>4,660</td>
<td>2,745</td>
<td>32,315</td>
<td>24,310 75%</td>
</tr>
<tr>
<td>France</td>
<td>75,700</td>
<td>39,849</td>
<td>35,851</td>
<td>245,609</td>
<td>151,806 62%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>40,367</td>
<td>19,957</td>
<td>20,410</td>
<td>270,834</td>
<td>132,987 49%</td>
</tr>
<tr>
<td>Greece</td>
<td>9,857</td>
<td>8,341</td>
<td>1,516</td>
<td>29,131</td>
<td>12,808 44%</td>
</tr>
<tr>
<td>Hungary</td>
<td>4,053</td>
<td>3,665</td>
<td>388</td>
<td>8,559</td>
<td>3,880 45%</td>
</tr>
<tr>
<td>Ireland</td>
<td>2,676</td>
<td>2,306</td>
<td>370</td>
<td>26,120</td>
<td>12,051 46%</td>
</tr>
<tr>
<td>Italy</td>
<td>89,468</td>
<td>79,091</td>
<td>10,377</td>
<td>213,517</td>
<td>197,612 93%</td>
</tr>
<tr>
<td>Lithuania</td>
<td>956</td>
<td>769</td>
<td>187</td>
<td>995</td>
<td>309 31%</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>449</td>
<td>338</td>
<td>111</td>
<td>9,445</td>
<td>1,533 16%</td>
</tr>
<tr>
<td>Latvia</td>
<td>841</td>
<td>646</td>
<td>195</td>
<td>929</td>
<td>657 71%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>3,771</td>
<td>1,593</td>
<td>2,178</td>
<td>84,755</td>
<td>22,404 26%</td>
</tr>
<tr>
<td>Poland</td>
<td>9,726</td>
<td>6,977</td>
<td>2,749</td>
<td>21,926</td>
<td>17,104 78%</td>
</tr>
<tr>
<td>Portugal</td>
<td>7,854</td>
<td>6,031</td>
<td>1,823</td>
<td>23,849</td>
<td>14,097 59%</td>
</tr>
<tr>
<td>Sweden</td>
<td>16,757</td>
<td>7,279</td>
<td>9,478</td>
<td>42,920</td>
<td>26,052 61%</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>1,751</td>
<td>1,610</td>
<td>141</td>
<td>3,968</td>
<td>2,054 52%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>412,658</strong></td>
<td><strong>287,671</strong></td>
<td><strong>124,987</strong></td>
<td><strong>1,423,405</strong></td>
<td><strong>891,614 63%</strong></td>
</tr>
</tbody>
</table>

**Table:** Sample (2003) with ownership information and corporate tax revenues (2000-2004)
The tax payments under the current system

- We assume that firms currently optimise their tax payments
- Loss carry back and forward and domestic group consolidation is exploited where possible
- We model the current system through the reported tax payments in the balance sheet:

\[ T_{t}^{SA} = \sum_{i=1}^{n} TAX_{it} \]  

(1)

where \( i \) denotes each of \( n \) individual companies within a group.
Calculation of the taxable profits

Taxable Profits are not reported, therefore we approximate the taxable profit through the reported tax payments

\[
\pi_{it} = \begin{cases} 
\frac{TAX_{it}}{\tau_{it}} & \text{if } TAX_{it} > 0 \\
\min\left[\frac{TAX_{it}}{\tau_{it}}, EBIT_{it}\right] & \text{if } TAX_{it} \leq 0 
\end{cases}
\] (2)
Calculation of the taxable profits (Continued)

- Losses offset against a subsidiary (in a different) country can not be carried forward
- However the reported tax payments include loss carry forwards ($LCF$)

$$LCF_{it} = \begin{cases} 0 & \text{if } TAX_{it} > 0 \\ \max \left[-EBIT_{it} + \frac{TAX_{it}}{\tau_{it}} + LCF_{it-1}, 0\right] & \text{if } TAX_{it} \leq 0 \end{cases}$$ (3)

- We therefore add them back to future profits

$$\hat{\pi}_{it} = \begin{cases} \frac{TAX_{it}}{\tau_{it}} + LCF_{it-1} & \text{if } TAX_{it} > 0 \\ \min \left[\frac{TAX_{it}}{\tau_{it}}, EBIT_{it} + LCF_{it-1}\right] & \text{if } TAX_{it} \leq 0 \end{cases}$$ (4)
Tax payments under a formula apportionment system

- The taxable profits are consolidated into a group consolidated tax base.
- If the group as whole has a negative tax bases, the loss can be carried forward, therefore the group tax base is:

\[
CTB_t = \sum_{i=1}^{n} \hat{\pi}_{it} + CTB_{t-1} \quad \text{if } CTB_{t-1} < 0 \tag{5}
\]

- Denoting the apportionment factor as $\theta_j$ the tax payment under a formula apportionments system is:

\[
T_t^{FA} = \begin{cases} 
\sum_{j=1}^{m} CTB_t \theta_j \tau_{tj} & \text{if } CTB_t > 0 \\
0 & \text{if } CTB_t \leq 0 
\end{cases} \tag{6}
\]
Apportionment weights

- For the payroll factor we use cost of employees \( (CEMP_t) \), alternatively we use the number of employees \( (EMP_i) \).
- For the property factor we use total assets \( (TA_i) \).
- For the gross receipts we use turnover \( (OREV_i) \).

Therefore the apportionment factor can be written as

\[
\theta_{tj} = \frac{X_{jt}}{\sum_{m=1}^{m} X_{jt}} \tag{7}
\]

where \( X_{jt} \) is the sum of the particular weight.
The decision to participate

- A corporate group participates if the present value of the total tax payments are lower under the new system.
- Define $\eta$ equal to one if a company participates and zero otherwise.

$$
\eta = \begin{cases} 
0 & \text{if } \sum_{t=0}^{T} \frac{T_{t}^{SA}}{(1+\rho)^t} < \sum_{t=0}^{T} \frac{T_{t}^{FA}}{(1+\rho)^t} \\
1 & \text{if } \sum_{t=0}^{T} \frac{T_{t}^{SA}}{(1+\rho)^t} > \sum_{t=0}^{T} \frac{T_{t}^{FA}}{(1+\rho)^t}
\end{cases}
$$

(8)
Our 'base case' results

- Participation is voluntarily
- All 25 European countries participate
- The overall reduction is only about 2.5%
- Generally likely to be 'loser': Germany, Finland, Luxembourg
- Generally likely to be 'winner': Czech Republic, Hungary, Sweden, United Kingdom
- However the 'winners' and 'losers' are widely differing under the different apportionment rules
Apportioning according to property factor

AT  BE  CZ  DE  DK  ES  FI  FR  GB  GR  HU  IE  IT  LT  LU  LV  NL  PL  PT  SE  SK

50%  60%  70%  80%  90%  100%  110%  120%  130%  140%  150%
Apportioning according to gross receipts factor
About the use of Payroll

- Using Payroll as an apportionment factor does implicitly include the wage differences
- In the European Union wage disparities do matter
- Hence using the Number of Employees changes the picture substantially
- The Slovak Republic, Hungary, and the Czech Republic would gain if the Number of Employees would be used
Discussion

- The results will change if companies are forced to participate or if only a subgroup of countries participates

**Obligatory participation**
- Winners: Spain, Sweden, Slovak Republic, United Kingdom
- Losers: Finland, the Netherlands, Portugal
- Overall effect: up to 2% increase in tax revenues

**The Ireland mystery**
- Why Ireland is not losing tax revenue, or is it?

**Only 8 countries participating**
- Winners: France, Germany
- Losers: The Netherlands, Luxembourg
- Overall effect: 1.5% decrease (voluntary) or 0.4% increase (obligatory)
Obligatory participation

The Ireland mystery solved
Only eight participating countries

Apportioning according to property factor (original sample)
The Ireland mystery solved

Only eight participating countries
The Ireland mystery solved Only eight participating countries

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Apportioning according to payroll factors

| Percentage | AT   | BE   | CZ   | DE   | DK   | ES   | FI   | FR   | GB   | GR   | HU   | IE   | IT   | LT   | LU   | LV   | NL   | PL   | PT   | SE   | SK   |
|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 50%        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 60%        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 70%        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 80%        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 90%        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 100%       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 110%       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 120%       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 130%       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 140%       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 150%       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

No. of Employees
Cost of Employees
Why Ireland is not losing tax revenue, ...

- So far Ireland is not really losing tax revenues.
- Everybody expects Ireland to lose.
- First check:
  Share of apportionment factors relative to taxable profit
Obligatory participation

The Ireland mystery solved

Only eight participating countries
Why Ireland is not losing tax revenue, ... 
... or is it?

- Everything indicates that Ireland should lose tax revenues
- In fact, Ireland is losing revenues under the obligatory system
- But, this so far not observed, because of missing employment data
- Therefore we rerun the calculation without the apportionment according to employment criteria
The Ireland mystery solved

Only eight participating countries

Obligatory participation

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EU Formula Apportionment and Tax Revenues
The Ireland mystery solved

Obligatory participation

Apportioning according to property factor (larger sample)
Obligatory participation The Ireland mystery solved
Only eight participating countries
Obligatory Participation

- property
- gross receipts
- No. Employees
- Cost Employees
- weighted

AT BE DE DK FR IT LU NL

property gross receipts No. Employees Cost Employees weighted

Obligatory Participation

60% 70% 80% 90% 100% 110% 120%

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EU Formula Apportionment and Tax Revenues
Conclusions

- We look at a recent proposal of the EU Commission (2006)
- Using a large panel of firm data we quantify the implied changes in tax revenues
- In total the loss in tax revenues could be up to 2% of the total tax revenues
- If participation is voluntary, high tax countries (Germany, Italy) might lose
- New member states tend to win
- The design of the apportionment factor does matter
- If participation in mandatory, tax revenues increase up to 2%
- Countries like Spain or the United Kingdom would win at the expense of countries like Finland or the Netherlands