Tax competition and governmental efficiency: Theory and evidence

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Picture instead of words

Note: CIT - corporate income tax; EU-Core - France, Germany, Belgium, Netherlands; CEEC - Poland, Czech Republic, Slovakia, Slovenia, Hungary; EU-Periphery - Spain, Portugal, Greece
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- no restrictions on capital movement;

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- **2005**: CIT (EATR) ranged from 11% Latvia and Ireland to 34% in Belgium
Main contribution

• Explanation for asymmetric outcome of fiscal competition
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- **Result:** More efficient government sets higher tax if
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- Empirical evidence in OECD countries supports the theory
• IEF - efficiency proxy

• IEF and CIT - negative correlation: more efficient governments do set higher taxes
Place in literature

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• **However:** 2005: Belgium - 34% $\Rightarrow$ Greece - 32% $\Rightarrow$ Poland - 19%
Modeling innovation

- Common feature of the models above: the production function of the government is

\[ g = x \]

\( g \) - public good, \( x \) - revenue
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  \[ g_A = bx_A, g_B = x_B, b > 1 \]

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- main assumption driving the results
Main features of the model

- 2 countries, \( A \) and \( B \), continuum of absentee owned firms
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- Firms:
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  - profit function of firm \( s \):

\[
\Pi_i = p - c - \tau_i + sg_i^\theta, \ i \in \{A, B\}
\]

\( p \) - price of the good, \( c \) - cost of production - both **exogenous**
\( \tau_i \) - tax rate in country \( i \), \( g_i \) - amount of public goods,
\( s \sim U[0, 1] \) measures the need for public input,
smaller \( \theta \) means more concavity
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– invest where after-tax profits are higher
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- **Governments:**
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- **Governments:**
  - maximize tax revenues less public spending
  - objective function of gov’t $A$, given $\tau_B$ and $g_B$:

$$
\max_{\tau_A, g_A} \tau_A \times (1 - \hat{s}_B) - g_A/b, \ b > 1
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    $$\max_{\tau_A, g_A} \tau_A * (1 - \hat{s}_B) - g_A/b, \ b > 1$$

  - objective function of gov't $B$, given $\tau_A$ and $g_A$:

    $$\max_{\tau_B, g_B} \tau_B * \hat{s}_B - g_B$$

  \(\hat{s}_B\) - share of firms investing in country $B$
Objectives of the governments

... are consistent with 2 views on their nature:

- Governments are malevolent:

  revenues less spending = rents to the office
Objectives of the governments

... are consistent with 2 views on their nature:

- Governments are benevolent:

  revenues less spending = funds, which can be distributed to the population in an optimal way
Solution

2 steps:
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• Solve the game assuming that in equilibrium

\[ \tau_A > \tau_B \text{ and } g_A > g_B \]
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• Prove it is indeed the only equilibrium in pure strategies.
Solution: Step 1 - fast forward

• $\tau_A > \tau_B$ and $g_A > g_B$. Then in equilibrium:

$$\begin{align*}
\tau_A &= \frac{2}{3} \Delta, \quad g_A = \left(\frac{2\theta b}{9}\right)^{\frac{1}{1-\theta}}, \\
\tau_B &= \frac{1}{3} \Delta, \quad g_B = \left(\frac{\theta}{9}\right)^{\frac{1}{1-\theta}},
\end{align*}$$

(1) (2)

where $\Delta = g_A^\theta - g_B^\theta$, $b$ - efficiency parameter, $\theta$ - concavity parameter
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(3)

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(4)

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- $\tau_A, \tau_B, g_A, g_B$ - all increase with $\theta$
Solution: Step 2 - even faster

- This is the only equilibrium in pure strategies if:
  - Responses of each government are indeed optimal under our general assumptions;
  - There are no other equilibria in pure strategies.
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- This is the case if $\theta$ and $b$ satisfy:

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![Graph](image)

Note: $b$ - efficiency parameter, $\theta$ - concavity parameter

- $b$ should be sufficiently big - difference between governments;

- $\theta$ should be sufficiently small - firms are more elastic.
Empirics

- Sample: 28 (mostly) OECD countries, years 1996-2005
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- Then

\[ \tau_1 > \tau_2 \iff \beta (b_1 - b_2) > 0 \iff \beta > 0 \]
Empirics

• Data:
  – proxy for tax rate - EATR
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  - proxy for gov't efficiency - IEF, (also GDP per capita). Why?
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    * Simplicity, availability of data;
    * IEF’s criteria for an ”efficient governance” should in general coincide with firm’s preferences;
    * sample is homogeneous in terms of governance institutions:

<table>
<thead>
<tr>
<th></th>
<th>DB</th>
<th>WGI</th>
<th>GQI</th>
<th>CPI</th>
<th>HDI</th>
<th>Cereal</th>
<th>GDP</th>
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<tr>
<td>2005</td>
<td></td>
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<td></td>
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<tr>
<td>IEF</td>
<td>-0.61</td>
<td>-0.72</td>
<td>-0.78</td>
<td>-0.65</td>
<td>-0.55</td>
<td>-0.38</td>
<td>-0.51</td>
</tr>
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Note The correlations of IEF with the corresponding indices and indicators are reported. Here: DB - Ease of Doing Business inverse ranking; WGI - Worldwide Governance Indicators aggregate index; GQI - Governance Quality Index; CPI - Transparency International’s Corruption Perception Index; HDI - United Nation’s Human Development Index; Cereal - average cereal yield (kg per hectare); GDP - GDP per capita in international dollars.
Empirics

• Relation between EATR and IEF:
Empirics

- Relation between EATR and IEF:

- I use OLS
Empirics

• Results:

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>EU-15</th>
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<tbody>
<tr>
<td>dependent</td>
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<tr>
<td>variable</td>
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<tr>
<td>ief</td>
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<td>0.001</td>
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<tr>
<td></td>
<td>(0.015)</td>
<td>(0.019)</td>
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<tr>
<td>gdp_cap</td>
<td>0.008***</td>
<td>0.007***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.002)</td>
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<tr>
<td>$R^2$</td>
<td>0.64</td>
<td>0.86</td>
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<tr>
<td>$N$ obs.</td>
<td>300</td>
<td>140</td>
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<tr>
<td></td>
<td>308</td>
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    increase in EATR on 0.36 p.p. (mean - 22, sd.var. - 0.8)
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• Results:
  – theoretical predictions are supported
  – decrease in IEF on 0.1 (sample mean - 2.25, st.variation - 0.54) ⇒ increase in EATR on 0.5 p.p. (mean - 22, sd.var. - 0.8)
  – increase in GDP per capita on 1000 int.dollars (app. 4.3% GDP growth, av. GDP per capita growth in 2004-05 - 670 int.dollars) ⇒ increase in EATR on 0.8 p.p.
Conclusions

- **Main result of the paper** - more efficient government sets the higher corporate income tax rate (if countries are sufficiently different and production function is concave enough)
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