Lecture Notes: Systems Competition
II.1: "Race to the bottom" view

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1 Fiscal Competition and Economic Geography

So far, we assumed that capital "chooses" its location purely based on a comparison of tax policy in different countries.

In reality, capital however chooes its locations based on a variety of factors. Besides tax issues, labor market conditions, regulatory issues (e.g. environmental regulation), market size and agglomeration effects plausibly influence the location decision as well.

The latter two issues are at the core of the "economic geography" approach to business location, most notably inspired by the new trade theory (see e.g. Krugman, 1980).*

In recent years, the approach has been applied to study tax setting in fiscal competition.

*P. Krugman, Scale economies, product differentiation, and the pattern of trade. American Economic Review 70 (1980), 1950-1959.

Questions:

1. How should we expect economic geography aspects to alter the findings which are familiar from the standard tax competition model à la Zodrow-Mieszkowski?

- Impact of trade costs?

- Differences in market size?

- External economies of scale?

2. Is the standard approach able to explain the pattern of capital taxes in the European Union (core members have higher taxes than accession countries)? Is it only a matter of time until they converge or can it be interpreted as a steady state configuration?

In what follows we will first study a model of tax competition with trade costs and asymmetric market size (based on Haufler and Wooton, 1999) and in a second step will sketch the formal apparatus used in Baldwin and Krugman (2004).

1.1 Model by Haufler and Wooton (1999)[†]

1.1.1 Basic set-up

one-period model

2 regions, A and B

one household in B and $n > 1$ households in region A

each household supplies one unit of labor domestically

budget constraint: $w + T_i = q_i x_i + z_i$

w is the wage rate and T_i are transfers (and taxes if negative)

[†]A. Haufler and I. Wooton, Country size and tax competition for foreign direct investment, Journal of Public Economics, 71 (1999) 121-139.

z_i and x_i are consumption quantities (good Z is the numéraire good)

preferences are $u(z_i, x_i) = \alpha x_i - 0.5\beta x_i^2 + z_i$

$\Rightarrow$ maximizing $u(z_i, x_i)$ s.t. the budget constraint gives demand for good x_i: $X_A = nx_A = n\frac{\alpha - q_A}{\beta}$ and $X_B = x_B = \frac{\alpha - q_B}{\beta}$

Good Z is produced under conditions of perfect competition

Good X is produced by a foreign-owned monopolist using labor as input (in the region where it resides): $y = l$ ($\Rightarrow$ wage rate is constant)

Location options: The monopolist can reside either in region A, region B, in both regions or it can serve both markets from its home base (in a third country)

When setting up production in a region it incurs a fixed cost F.

The monopolist can serve demand in a region at no transportation cost when it resides in that region. Otherwise, it incurs a cost of τ per unit "shipped".

Assuming that price discrimination is not feasible, consumer prices are:

$q_A^A = p_A$ and $q_B^A = p_A + \tau$ if the monopolist invests in region A

$q_A^B = p_B + \tau$ and $q_B^B = p_B$ if the monopolist invests in region B

(q_j^i: consumer price in region j if the monopolist produces in region i)

1.1.2 Location choice of the monopolist

In what follows we will only consider the location options of either residing in region A or in region B.

Motivation?

The monopolist chooses its location based on a comparison of profits.

If investing in A

$$\pi_A = (p_A - w)\left(X_A(q_A^A) + X_B(q_B^A)\right) - F - t_A.$$

If investing in B

$$\pi_B = (p_B - w)\left(X_A(q_B^A) + X_B(q_B^B)\right) - F - t_B.$$

Inserting the demand functions and the definitions of consumer prices and differentiating w.r.t. the producer price

gives the profit-maximizing producer prices contingent on the location decision:

$$\begin{aligned} \widehat{p}_A &= 0.5\left(\alpha + w - \frac{\tau}{n+1}\right) \quad \text{if investing in A} \\ \widehat{p}_B &= 0.5\left(\alpha + w - \frac{n\tau}{n+1}\right) \quad \text{if investing in B.} \end{aligned}$$

Thus, $\widehat{p}_A > \widehat{p}_B$. Locating in region A allows the monopolist to realize a higher producer price. Motivation?

Evaluating profits at the optimal prices and comparing the maximum profit levels allows us to derive the tax differential $\Gamma \equiv t_A - t_B$ which leaves the firm indifferent between investing in one of both regions:

$$\Gamma = (n-1)\left(2\left(\alpha - w\right) - \tau\right)\frac{\tau}{4\beta}$$

$\Gamma > 0$ as $\alpha - w - \frac{\tau}{2}$ is the average profit from selling the first unit in both markets.

Interpretation of Γ:

- As $n > 1$ in A (larger market) the monopolist is willing to pay higher taxes in A than in B (ceteris paribus).

- For $\tau = 0$ the size advantage of A disappears.

1.1.3 Equilibrium tax policy

We first compute the minimum tax (or subsidy in negative) each region is willing to offer. In a second step we determine the equilibrium tax in the tax setting game between both regions.

The minimum tax rates are derived by comparing utility when hosting the monopolist and when importing good X.

These are:

$$\begin{aligned}\widetilde{t}_A &= \frac{-n\left(n+3\right)\tau\left(2\left(\alpha-w\right)-\tau\right)}{8\left(n+1\right)\beta} < 0 \\ \widetilde{t}_B &= \frac{-\left(3n+1\right)\tau\left(2\left(\alpha-w\right)-\tau\right)}{8\left(n+1\right)\beta} < 0\end{aligned}$$

We find $\widetilde{t}_A < \widetilde{t}_B$. Region A is willing to undercut the lowest bid of region B.

Motivation: Region A has stronger incentives to attract the monopolist as the number of beneficiaries (i.e. households) is larger in that region.

Which subsidy will region A offer in equilibrium?

Region A can charge a higher tax rate ($\Gamma > 0$) than region B, but it is constrained by the "exit" decision of

the monopolist. Thus, region A's equilibrium tax rate $\widehat{t}_A$ is

$$\begin{aligned}\widehat{t}_A &\equiv \widetilde{t}_B + \Gamma \\ &= \frac{\left(2n^2 - 3n - 3\right)\tau\left(2\left(\alpha - w\right) - \tau\right)}{8\left(n+1\right)\beta}.\end{aligned}$$

which gives the monopolist an incentive to invest in region A.

Mutual best-responses?

- Region B has no incentive to undercut the tax rate $\widetilde{t}_B$.

- Given region B's minimum tax rate, region A has no incentive to choose a lower tax rate (as it involves a fiscal cost) or a higher tax rate (as the monopoly would choose region B as its home base).

- Given the tax differential $\widehat{t}_A - \widetilde{t}_B$ the firm's best response is to locate in region A.

$\Rightarrow$ We have characterized a subgame-perfect Nash equilibrium.