1 A brief repetition

Governments that compete independently will provide an optimal level of public goods but there may not be enough revenues from the externality tax to cover the cost of providing the public goods.

We have discussed what can be done to make fiscal competition efficient.

The first mechanism, tax harmonization, leads to an excessive amount of public goods.

The other mechanism, a self-financing constraint, does however work.

Under this system, only capital is taxed.

When a government increases the tax rate two things happen.

First, capital is deterred.

Second, it also generates more revenues which are used to provide public goods.

This in turn attracts capital.

When the government selects the optimal tax rate, these two effects are identical.

In other words, starting from a low level, increasing the tax rate will attract capital (in the region where $\rho < -c_W(K,W)K$ and $\frac{dR}{d\tau} > 0$).

In this region the attraction effect dominates the deterrent effect of the tax.

At some point, where $\rho = -c_W(K,W)K$ and $\frac{dR}{d\tau} = 0$, these two effects cancel.

For larger τ (when $\rho > -c_W(K,W)K$ and $\frac{dR}{d\tau} < 0$) the deterrence effects dominates.

Hence, the public good provision will be optimal.

In addition, since the global capital stock is fixed, the amount of capital in each country is the same as without a self-financing constraint so the situation is first best.

2 Regional tax competition

So far, we have analyzed incentives to compete for capital in a model in which capital mobility is the only link between regions.

In reality, tax competition does not only arise between nation states, but also between regions of the same state.

We here augment the public sector model of Zodrow and Mieskowski by an equalization system and a revenue sharing program (based on Köthenbürger 2002, *ITAX*).

These types of programs exist in Germany and Canada for example.

- Suppose the economy consists of n regions.

- Each region $i, i = 1...n$, is endowed with a capital stock $\overline{k}^i$

- Per capita endowment is equalized across regions and is denoted $\overline{k}$.

- Households derive utility from private consumption c and public consumption g.

- Preferences are given by $u(c^i, g^i)$.

- Each household inelastically supplies one unit of labor.

- Total income is therefore given by w^i and the interest rate income r$\overline{k}$.

- Capital is perfectly mobile.

- Firms solve

$$\max_{k^i} f(k^i)k^i - rk^i - t^i k^i - w^i L$$

The first-order condition with respect to capital is

$$f_{k^i}(k^i) = r + t^i$$

Let's first study how an increase in the local tax rate affects the local capital stock.

Total differentiate the first-order condition with respect to k^i and t^i.

$$f_{k^i k^i}(k^i)dk^i = \frac{dr}{dt^i} + 1 * dt^i$$

Last time, we derived how an increase in the tax rate affects the market interest rate:

$$\frac{dr}{dt^i} = -\frac{1}{n}$$

We then get

$$\frac{dk^i}{dt^i} = \frac{1 - \frac{1}{n}}{f_{k^i k^i}(k^i)}$$

or

$$\frac{dk^i}{dt^i} = \frac{\frac{n-1}{n}}{f_{k^i k^i}(k^i)} < 0$$

as before.

A higher tax rate drives capital out of the region.

The higher the second derivative of the production function, the larger is the effect.

The more regions, the stronger is the effect.

Now, in the case of regional tax competition, the budget constraint reads

$$g^i = t^i k^i - \alpha \bar{t} k^i + \beta \bar{t}(N - k^i)$$

Lower level governments collect capital tax revenues $t^i k^i$ from its citizens.

They share a fraction $0 < \alpha < 1$ of standardized tax revenues with the federal level.

$\bar{t}$ denotes the standardized tax rate.

The last term reflects fiscal equalization.

N is the region's fiscal needs

k is the region's tax capacity.

When β is high, the region gets much revenues if in need.

Let's differentiate the budget constraint to get

$$dg^i = k^i dt^i + t^i \frac{dk^i}{dt^i} dt^i - \alpha \bar{t} \frac{dk^i}{dt^i} dt^i - \beta \bar{t} \frac{dk^i}{dt^i} dt^i$$

or

$$\frac{dg^i}{dt^i} = k^i + (t - \alpha \bar{t} - \beta \bar{t}) \frac{dk^i}{dt^i}$$

Remember that $\frac{dk^i}{dt^i} < 0$.

Increasing the local tax drives out capital and therefore reduces the tax base in the region.

This entitles the region to additional equalizing transfers at an amount of $-\beta \bar{t} \frac{dk^i}{dt^i}$.

It also reduces the region's transfer obligations towards the federal government by $-\alpha \bar{t} \frac{dk^i}{dt^i}$.

In other words, both fiscal arrangements at least partly insulate the local budget from capital mobility!

2.1 Equilibrium tax policy

The government solves

$$\max_{t^i} u(c^i, g^i)$$

u is concave in both consumption and public good provision.

In our case it is equal to

$$\max_{t^i} u(f(k^i) - f_{k^i}k^i + r\overline{k}, t^i k^i - \alpha\bar{t}k^i + \beta\bar{t}(N^i - k^i))$$

Differentiating with respect to t yields

$$u_{c^i}((f_{k^i}(k^i) - f_{k^i k^i}k^i - f_{k^i}(k^i))\frac{dk^i}{dt^i} + \frac{dr}{dt}\overline{k})+$$

$$+u_{g^i}(k^i + (t - \alpha\bar{t} - \beta\bar{t})\frac{dk^i}{dt^i}) = 0$$

Since all regions are identical we look for the symmetrical equilibrium $(t^i = t^j = \overline{t})$.

Rearrange to get

$$\frac{u_g}{u_c} = -\frac{(-f_{kk}k\frac{dk}{dt} + \frac{dr}{dt}\overline{k})}{(k + t(1-\alpha-\beta)\frac{dk}{dt})}$$

Now, we know $\frac{dk}{dt} = \frac{\frac{n-1}{n}}{f_{kk}(k)}$ and $\frac{dr}{dt} = -\frac{1}{n}$ so we get

$$\frac{u_g}{u_c} = \frac{k}{(k + t(1-\alpha-\beta)\frac{\frac{n-1}{n}}{f_{kk}})}$$

or

$$\frac{u_g}{u_c} = \frac{1}{(1 + (1-\alpha-\beta)\frac{\frac{n-1}{n}}{f_{kk}}\frac{t}{k})}.$$

We will now do the following:

As the benchmark case we will first study the situation completely without capital mobility ($n = 1$).

We will show that this situation is efficient.

We then introduce the possibility for capital to leave the region ($n > 1$) but still assume that there are no equalizing schemes ($\alpha = \beta = 0$).

We finally add these schemes to the model ($\alpha > 0$, $\beta > 0$) to study what happens to tax competition.

When there is only one region, or if it is assumed that capital is completely immobile then we get the condition

$$\frac{u_g}{u_c} = 1.$$

If capital cannot be moved abroad in response to domestic tax rate increase, taxation of capital resembles a lump sum tax.

In this case, the cost of increasing public good spending by one unit in terms of lost private spending is one to one.

The government will hence increase the tax rate as long as the marginal utility of public spending is higher than that of private spending (the alternative cost), but no more than that.

In equilibrium, the marginal benefit of public funds, $\frac{u_g}{u_c}$, equals the marginal cost, 1.

Now what happens when $n > 1$ and $\alpha = \beta = 0$.

That is, there exists capital mobility but no equalizing transfers.

We then get

$$\frac{u_g}{u_C} = \frac{1}{(1 + \frac{\frac{n-1}{n}}{f_{kk}}\frac{t}{k})} > 1.$$

When the government increases the tax rate, each unit of additional tax revenue costs not only one unit of private income as before but the additional costs that arise because capital is able to escape taxation.

These are actually two costs from this.

First, the tax base erodes.

Second, the outflow of capital lowers the return to the fixed factor of production, which reduces private spending.

One additional unit of public expenditures therefore costs more than one unit of private expenditure for the country as a whole.

Said with the terminology of public finance, the marginal cost of public funds is greater than one.

Since the price of increasing public spending in terms of lost private consumption is larger than one, the marginal utility of public spending must be larger than the marginal utility of private consumption in equilibrium.

So raising the tax rate increases the outflow of capital which raises the marginal costs of public funds above resource costs.

Hence, regions have incentives to set tax rates lower than the efficient ones, which could lead to a so called "race to the bottom".

Let's now go back to the equalizing transfer scheme, $\alpha > 0$ $\beta > 0$.

We had

$$\frac{u_g}{u_c} = \frac{1}{(1 + (1 - \alpha - \beta)\frac{\frac{n-1}{n}}{f_{kk}}\frac{t}{k})}$$

We note first that if $\alpha + \beta = 1$, then

$$\frac{u_g}{u_c} = 1.$$

In this case, region is completely insulated from capital mobility.

And this is the point of the schemes.

The regional government has no incentive to engage in tax competition because they gain nothing by reducing taxes since they are "insured" against capital movement.

When $\alpha + \beta < 1$, then local public funds are still negatively affected by the tax base response.

So taxes are inefficiently low and public goods are therefore underprovided.

But the situation is better than without any schemes.

3 Welfare states and their sustainability

This chapter analyses the question: are welfare states sustainable?

Let's first discuss reasons for having a welfare state in the first place.

- Tibout early (1961) pointed out that if citizens are faced with an array of communities that offer different types or levels of public goods and services, then each citizen will choose the community that best satisfies his or her own particular demands.

- Individuals effectively reveal their preferences by "voting with their feet."

- Citizens with high demands for public goods will concentrate themselves in communities with high levels of public services and high taxes.

- Those with low demands will choose other communities with low levels of public services and low taxes.

- Competition among jurisdictions results in homogeneous communities, with residents that all value public services similarly.

- In equilibrium, no individual can be made better off by moving, and the market is efficient.

- It does not require a political solution to provide the optimal level of public goods.

- Eli Hechscher and Bertil Ohlin took that stand that trade equalizes factor prices.

- Labor in developed countries will lose in this process.

- This is one argument for having a welfare state.

- Sinn gives an efficiency argument in defense of the welfare state.

- Ex post, every insurance contract implies redistribution, but ex ante most of the redistribution activities of the state can be interpreted as insurances.

- As such it must be included in the set of state activities which are legitimated by the goal of increasing allocative efficiency.

- The problem with private insurance is that it comes too late.

- So welfare states may be justified for efficiency reason, in addition the obvious redistributional reasons.

- Next time we will study show the efficiency argument within a model.

- We will also see that there is a risk that systems competition leads to an erosion of the welfare states.