Fischer article – overview:

1. A model with lump sum taxes – this will be our base line model.

2. A model with distortionary taxes on capital and labor where the government can precommit to its policy.

3. A model with no commitment mechanism. This is harder to analyze and involves several steps.

In all economies, we have two agents: households and government.

Household budget constraints:

$$c_1 + k = y$$

$$c_2 = Rk + an - g$$

Government budget constraint:

$$g = taxes$$

In the economy with lump sum taxes, we have

$$taxes = T$$

And we combine the government and households' problems as a ***social planner problem*** with the constraint as:

$$c_1 + \ k = y$$

$$c_2 = Rk + \ an - g$$

Or, combining to get the intertemporal budget constraint:

$$Ry + \ an = Rc_1 + c_2 + g$$

Maximizing agents' utility given by:

$$\ln c_1 + \delta \left[\ln c_2 + \alpha \ln (1-n) + \beta \ln g\right]$$

Subject to:

$$Ry + \ an = Rc_1 + c_2 + g$$

Yields demand functions:

$$c_1 = \frac{Ry+a}{R(1+\delta(1+\alpha+\beta))} \qquad c_2 = \frac{\delta(Ry+a)}{(1+\delta(1+\alpha+\beta))}$$

$$g = \frac{\delta\beta(Ry+a)}{(1+\delta(1+\alpha+\beta))} \qquad 1-n = \frac{\alpha\delta(Ry+a)}{a(1+\delta(1+\alpha+\beta))}$$

When the government can not use lump-sum taxes, things get a bit more complicated.

First, we can not write the household’s and government’s problems down as a single social planner problem.

Second, the choice variables for the government are tax **rates** and the level of government expenditures.

Let’s look at the budget constraints:

For the households, the budget constraints are:

$$c_1 + \ k = y$$

$$c_2 = Rk - \tau_k^e Rk + an - \tau_n^e an$$

Again, combining these to write the intertemporal budget constraint:

$$R\left(1 - \tau_k^e\right) c_1 + c_2 = R\left(1 - \tau_k^e\right) y + na\left(1 - \tau_n^e\right)$$

Define the after tax return on capital and marginal product of labor as (the “2” denotes Economy 2, “e” implies expected)

$$R2^e = R\left(1 - \tau_k^e\right) \qquad \mathrm{a}2^e = a(1 - t_n^e)$$

The household budget constraint is

$$R2^e c_1 + c_2 = R2^e y + a2^e n$$

Note that, with this definition, tax income to the govt is:

$$(R - R2)\,k = \tau_k R k \;;\; (a - a2)\,n = \tau_n \alpha n$$

So the government budget constraint in Economy 2 is:

$$g = \tau_k R k + \tau_n a n = (R - R2)\,k + (a - a2)\,n$$

Solving the economy with no commitment mechanism

We solve the model by working backwards:

1. In period 2, the government takes the household's decision of capital made in period 1 as given and then chooses optimal taxes on capital and labor. We will show that the tax on labor = 0 while the tax on capital is a function of the capital stock chosen in period 1.
2. Households make choices in period 1 – in particular, they choose capital. This is a function of the expected tax rate.
3. We require that the tax rate that household's expect in period 1 is equal to the tax rate chosen by the govt. in period 2 (this is the rational expectations assumption).

There are a lot of steps… and we use indirect utility repeatedly, so pay attention!

Now – on to Mathematica file.