Fiscal Policy

Fiscal policy focuses on the connection between elements of government policy (spending, taxation and debt) and the overall economy.

Some big issues:

1. Proximate sources of changes in debt-output ratio?

2. Effect of spending shocks (e.g. wars)?

3. Effect of deficit finance, spending held equal?

4. Effect of starting a pay-as-you-go social security system or privatizing social security?

5. Optimal taxation for financing a war?

Government Budget Constraint

$$B_{t+1} = B_t + D_t$$

$$B_{t+1} = B_t + [G_t - T_t + r_t B_t]$$

B_t - government debt

D_t - government deficit

(G_t, T_t) - government spending and (net) taxes

Two Empirical Questions:

How does the debt-GDP ratio change over time?

What narrowly accounts for the big changes in the debt-GDP ratio?

A Decomposition:

$$B_{t+1} = B_t + D_t$$

$$\frac{B_{t+1}}{Y_{t+1}} = \frac{B_t}{Y_{t+1}} + \frac{D_t}{Y_{t+1}}$$

$$\frac{B_{t+1}}{Y_{t+1}} - \frac{B_t}{Y_t} = \frac{B_t}{Y_{t+1}} - \frac{B_t}{Y_t} + \frac{D_t}{Y_{t+1}}$$

$$\frac{B_{t+1}}{Y_{t+1}} - \frac{B_t}{Y_t} = \frac{D_t}{Y_{t+1}} - \frac{B_t}{Y_{t+1}}(\frac{Y_{t+1} - Y_t}{Y_t})$$

A Decomposition: $\frac{B_{t+1}}{Y_{t+1}} - \frac{B_t}{Y_t} = \frac{D_t}{Y_{t+1}} - \frac{B_t}{Y_{t+1}}(\frac{Y_{t+1}-Y_t}{Y_t})$

Thus, changes in the debt-output ratio can be decomposed into a deficit term and an output growth term. If the primary budget deficit is zero then the debt-output ratio depends on the magnitude of the interest rate compared to the growth rate of output.

Present-Value Budget:

It would be useful to convert the sequence of budget constraints into a single present-value budget constraint. This was done in consumer theory. One difficulty is that it is natural to view a government as living forever. Thus, there is no LAST period for such a government.

Issue: NO LAST PERIOD:

If a government faced a "last period" and was responsible, then it would be natural to require that it pay back all debt and not contract additional debt in the last period. This would then imply a present-value budget constraint. We will deal with the no last period issue by assuming a useful condition on how debt can behave far into the future.

Some Algebra (Use $R_t \equiv 1 + r_t$):

$$B_t = \frac{T_t - G_t}{R_t} + \frac{B_{t+1}}{R_t}$$

$$B_t = \frac{T_t - G_t}{R_t} + \frac{T_{t+1} - G_{t+1}}{R_t R_{t+1}} + \frac{B_{t+2}}{R_t R_{t+1}}$$

$$B_t = \frac{T_t - G_t}{R_t} + \frac{T_{t+1} - G_{t+1}}{R_t R_{t+1}} + \frac{T_{t+2} - G_{t+2}}{R_t R_{t+1} R_{t+2}} + \frac{B_{t+3}}{R_t R_{t+1} R_{t+2}}$$

Assume: the term $\frac{B_{t+n}}{R_t R_{t+1} \cdots R_{t+n-1}}$ goes to zero as n gets large.

$$B_t = \frac{T_t - G_t}{R_t} + \frac{T_{t+1} - G_{t+1}}{R_t R_{t+1}} + \frac{T_{t+2} - G_{t+2}}{R_t R_{t+1} R_{t+2}} + \frac{B_{t+3}}{R_t R_{t+1} R_{t+2}}$$

Implication is the Present-Value Budget Constraint:

$$B_t R_t + G_t + \frac{G_{t+1}}{R_{t+1}} + \frac{G_{t+2}}{R_{t+1} R_{t+2}} + \cdots = T_t + \frac{T_{t+1}}{R_{t+1}} + \frac{T_{t+2}}{R_{t+1} R_{t+2}} + \cdots$$

LHS: present value of spending + value of current debt plus interest

RHS: present value of taxes

Some Interpretations:

1. What does the Assumption mean: (i) mathematically it says that the debt must grow at a rate less than the interest rate far into the future or (ii) intuitively it rules out *rolling over* the debt forever.

2. What does the Present-Value Budget imply:

(i) it says that taxes must pay for spending and initial debt

(ii) it is based on the implicit assumption that government debt is default-free

(iii) historically most countries (but not the US!!) have defaulted on internal or external debt. See Reinhardt and Rogoff's book "This Time is Different: Eight Centuries of Financial Folly". The theory we develop focuses on governments with "responsible policies".

(iv) Argentina is not covered by this theory.

Life-Cycle Model w/ Government:

1. Consider the Life-Cycle Model ... but with

2. Government: $(G_t, T_{yt}, T_{ot}, B_t)$

3. Government obeys the present-value budget

4. Assume: $U(c_y, c_o) = \log(c_0)$ ... thus $\alpha = 0$

Life-Cycle Model: Mechanics

No Govt: $K_{t+1} = Na_{t+1} = N(1-\beta)Ak_t^{\beta}$

Govt which spends, taxes and borrows:

$$Na_{t+1} = K_{t+1} + B_{t+1}$$

$$K_{t+1} = Na_{t+1} - B_{t+1} = N[(1-\beta)Ak_t^{\beta} - T_{yt}] - B_{t+1}$$

$$k_{t+1} = a_{t+1} - b_{t+1} = [(1-\beta)Ak_t^{\beta} - T_{yt}] - b_{t+1}$$

Example: A “Temporary” War

1. start at steady state w/ $G_0 = B_0 = 0$

2. war lasts one period: $G_1 > 0$

3. Finance: $NT_{y1} = NT_{o1} = G_1/2$

4. Future: $G_t = B_t = T_{yt} = T_{ot} = 0$ for $t = 2, 3, ...$

Example: A “Temporary” War

We can analyze this example using the assumption that agents only care about consumption in old age (i.e. $\alpha = 0$) or for any value of α. In fact, this example was analyzed in homework 5! Other examples will lead to “complications” unless we focus on $\alpha = 0$.

Example: A "Temporary" War

$$k_{t+1} = a_{t+1} - b_{t+1} = [(1-\beta)Ak_t^{\beta} - T_{yt}] - b_{t+1}$$

At t=1 the law of motion shifts down as young agents are poorer. At t=2,3,... the law of motion shifts back up to its original position. Thus, we have a one period fall in k and then a slow return to the original steady state. [same result as for $\alpha \neq 0$]

The Cold War: Three Plans

start at steady state w/ $G_0 = B_0 = 0$

war lasts forever: $G_t = G = Ng > 0$ for all $t \geq 1$

Plan 1 (Tax Old): $(T_{yt}, T_{ot}) = (0, g)$ all $t \geq 1$

Plan 2 (Tax Young): $(T_{yt}, T_{ot}) = (g, 0)$ all $t \geq 1$

Plan 3 (Deficit Finance):

$(T_{y1}, T_{o1}) = (0, 0)$ and $(T_{yt}, T_{ot}) = (0, g(1 + r_t))$ for $t \geq 2$

Plan 1: Analysis

$$k_{t+1} = a_{t+1} - b_{t+1} = [(1-\beta)Ak_t^{\beta} - T_{yt}] - b_{t+1}$$

$k_{t+1} = [(1-\beta)Ak_t^{\beta} - 0] - 0$ - law of motion

Because the law of motion does not move, then GDP and investment do not move. Since government spending increases some other component of GDP must decrease. Consumption of the old falls by the full amount of the war expenditure in each period.

Plan 2: Analysis

$$k_{t+1} = a_{t+1} - b_{t+1} = [(1-\beta)Ak_t^{\beta} - T_{yt}] - b_{t+1}$$

$k_{t+1} = [(1-\beta)Ak_t^{\beta} - g] - 0$ - law of motion

Law of motion shifts down. Thus, over time the capital-labor ratio and the GDP-labor ratio fall. Consumption of agents born in the future in Plan 2 must be lower than under Plan 1. This holds if the economy was initially below the Golden Rule steady state.

Plan 3: Analysis

$$k_{t+1} = a_{t+1} - b_{t+1} = [(1-\beta)Ak_t^\beta - T_{yt}] - b_{t+1}$$

$k_{t+1} = [(1-\beta)Ak_t^\beta - 0] - g$ - law of motion

Law of motion shifts down. It shifts down by EXACTLY the amount of the downward shift in Plan 2. Thus, the aggregate consequences (for GDP, investment ,consumption, factor prices) are exactly the same as in Plan 2. Welfare for each agent is also exactly the same as in Plan 2.

To intuitively understand why Plan 2 and Plan 3 are equivalent in essentially all important ways, it is helpful to graph budget constraints.

Ricardian Equivalence

The equivalence between Plan 2 and Plan 3 is an illustration of a more general principle called Ricardian Equivalence. Within an economic model with lump-sum taxation, two plans that finance the same government expenditure will be equivalent provided the present value of taxation on each household is the same across the two plans. This result is INDEPENDENT of utility functions!

Social Security: Theory

Most governments run a mandatory tax-transfer system whereby working-age individuals are taxed to fund transfer payments to older individuals. Such systems are often labeled social security systems. We will analyze within the Life-Cycle model a pure pay-as-you-go social security system:

$$(T_{yt}, T_{ot}) = (s, -s) \text{ all } t \geq 1$$

Social Security: Analysis

$$k_{t+1} = a_{t+1} - b_{t+1} = [(1-\beta)Ak_t^{\beta} - T_{yt}] - b_{t+1}$$

$k_{t+1} = [(1-\beta)Ak_t^{\beta} - s] - 0$ - law of motion

Thus, starting a pay-as-you-go system in the model results in a downward shift of the law of motion. If the economy is initially in a steady state below the Golden Rule, then neither social security nor anything else produces a Pareto improvement in this model.

Social Security: Would this analysis change if we allow population growth?

$(T_{yt}, T_{ot}) = (s, -s(1+n))$ all $t \geq 1$

$k_{t+1} = a_{t+1} - b_{t+1} = [(1-\beta)Ak_t^{\beta} - T_{yt}] - b_{t+1}$

$k_{t+1} = [(1-\beta)Ak_t^{\beta} - s] - 0$ - law of motion

Why do Social Security systems exist when the model says they do not lead to Pareto improvements?

Two possibilities:

1. Model is missing something - valuable insurance for earnings, mortality or macro shocks

2. Model is ok, but we need to think about politics.

Social Security Facts:

1. SS Act signed in 1935.

2. Benefit, Tax Rate and Year:

OASI 10.6 1935 and 1939

DI 1.8 1956

HI 2.9 1965

3. Earnings Cap 106,000 in 2009

4. Old Age Benefit

- based on 35 highest indexed earnings years

- progressive formula

- real annuity linked to CPI

- spousal benefit: own old age benefit or half of spouses benefit

Temporary Tax Cut: Analysis

A few years back the US government sent $500 checks to many families. One might view this episode as coming close to the theoretical ideal of a temporary tax cut. The reason is that there was no clear discussion of how this action was related to corresponding spending cuts. Thus, one might think that nearly equal tax increases might come within a few years.

Regardless of whether or not one views this episode in this way, there is the theoretical issue of how an idealized temporary tax cut, without any change in govt spending, might impact the economy.

Temporary Tax Cut: Assumptions

1. Consider the Life-Cycle Model in steady state.

2. Government: $G_0 = Ng = NT_{y0} + NT_{o0}$ and $T_{y0} = T_{o0} = g/2$

3. At $t = 1$ the govt collects no taxes.

4. At $t = 2, 3, ...$ then $T_{yt} = T_{ot} = g/2 + gr_t/2$

Thus, the government collects enough tax to pay for spending and to pay the interest on the debt.

Temporary Tax Cut: Conclusions

$$k_{t+1} = a_{t+1} - b_{t+1} = [(1-\beta)Ak_t^{\beta} - T_{yt}] - b_{t+1}$$

$$k_{t+1} = [(1-\beta)Ak_t^{\beta} - g/2] - 0 \text{ - at } t = 0$$

$$k_{t+1} = [(1-\beta)Ak_t^{\beta} - 0] - g \text{ - at } t = 1$$

$$k_{t+1} = [(1-\beta)Ak_t^{\beta} - g/2 - gr_t/2] - g \text{ - at } t = 2, 3, ...$$

Law of motion keeps shifting downward. Tax cut is not expansionary. It is a trick to shift the burden of paying for spending onto future generations within this simple model.

If some believe that tax cuts can be expansionary, then what is the mechanism for this? Do proponents base their analysis on the fact that many real world taxes are not lump-sum or on a labor response to a tax cut?

Ricardian Equivalence:

We have an article written by Robert Barro on Ricardian Equivalence. He is a strong proponent both of the idea that Ricardian Equivalence is a useful polar theoretical result and of the claim that many government policies that finance the same spending stream may display a near equivalence.

We will try to follow his argument.

Ricardian Equivalence: Definition

Two government tax policies that finance the same government expenditures will be said to display Ricardian Equivalence (RE) provided that the consumption allocation to all agents in the model is the same for the two policies.

Deviations from Ricardian Equivalence: Theory

1. Non-lump-sum taxes

2. Borrowing limits

3. Uninsured risks and taxation as insurance provision

Barro highlights altruism as an important mechanism undelying Ricardian Equivalence.

A Shred of Evidence

Barro mentions the case of Israel in the 1980's. In 1984 Israel experienced a large increase in the budget deficit. This was associated with a fall in real taxes collected due to a sharp rise in inflation. Barro highlights the behavior of public and private savings rates over time.

Definitions

$$Y = C + I + G$$

$$I = [Y - C - Tax] + [Tax - G]$$

$[Y - C - Tax]$ = Private Savings

$[Tax - G]$ = Public Savings

National Savings = Private Savings + Public Savings

Israel: 1983- 87

1983 Nat Savings 13 Private Savings 17 Public Savings -4

1984 Nat Savings 15 Public Savings 26 Public Savings -11

1985 Nat Savings 18 Private Savings 19 Public Savings 0

1986 Nat Savings 14 Private Savings 14 Public Savings 0

1987 Nat Savings 12 Private Savings 14 Public Savings -2