6. Fiscal policy

6.1 Government budget constraint

\[ P_t G_t + V_t + R_{t-1} B_{t-1}^g = T_t + (M_t - M_{t-1}) + (B_t^g - B_{t-1}^g) \]  \hspace{1cm} (6.1)

where

\begin{align*}
P_t & \text{ – price level} \\
G_t & \text{ – government expenditures (such as public goods)} \\
V_t & \text{ – transfer payments (lump sum)} \\
R_{t-1} B_{t-1}^g & \text{ – nominal interest payments on outstanding bonds} \\
T_t & \text{ – tax revenue (lump sum)} \\
(M_t - M_{t-1}) & \text{ – money created in } t \\
(B_t^g - B_{t-1}^g) & \text{ – bonds issued in } t
\end{align*}

Government deficit will be positive if \( P_t G_t > (T_t - V_t) \)

can finance deficit in two ways:

i) ↑ in M stock, \((M_t - M_{t-1}) > 0\)

ii) ↑ in bond issues, \((B_t^g - B_{t-1}^g) > 0\)

6.2 Deficits

6.2.1 Nominal deficit:

\[ (M_t - M_{t-1}) + (B_t^g - B_{t-1}^g) \]

which can be re-written as

\[ (M_t + B_t^g) + (M_{t-1} - B_{t-1}^g) \hspace{1cm} (6.2) \]

This will be equal to the sum of government expenditures, transfers, interest payments, less tax revenues:

\[ P_t G_t + V_t + R_t B_{t-1}^g - T_t \]

6.2.2 Accounting for price changes

The real deficit can be written as:

\[ \frac{(M_t + B_t^g)}{P_t} - \frac{(M_{t-1} - B_{t-1}^g)}{P_{t-1}} \hspace{1cm} (6.3) \]

we can then re-write the nominal deficit, given price levels in the current period:
\[ \frac{P_t(M_t + B_t^e)}{P_t} - \frac{P_t(M_{t-1} - B_{t-1}^e)}{P_{t-1}}, \]

if we sub in \((1 + \pi_t) = \frac{P_t}{P_{t-1}}\), this becomes

\[ (M_t + B_t^e) - (1 + \pi_t)(M_{t-1} - B_{t-1}^e) \quad (6.4) \]

The point of this? (6.4) is much less than (6.2) when there is high inflation.

### 6.3 Public saving, private saving, national saving

Public saving is just the (-) of the budget deficit:

Real public saving = \(-\frac{(M_t + B_t^e)}{P_t} + \frac{(M_{t-1} - B_{t-1}^e)}{P_{t-1}}\) \quad (6.5)

We will consider various instruments for private saving:

- government bonds \(B_t^e\)
- foreign bonds \(B_t^f\)
- private bonds \(B_t\)
- money \(M_t\)
- capital \(K_t\)

We already know that \(B_t = 0\); there is no aggregate private savings through private bonds.

Real private saving:

\[ \frac{(M_t + B_t^f + B_t^e)}{P_t} - \frac{(M_{t-1} + B_{t-1}^f + B_{t-1}^e)}{P_{t-1}} + K_t - K_{t-1} \quad (6.6) \]

Households can save by i) accumulating money (if \(M_t \neq M_{t-1}\)) ii) accumulating foreign bonds, and iii) investing in capital.

Real national saving = real private saving + real public saving

\[ \frac{(B_t^f - B_{t-1}^f)}{P_t} + K_t - K_{t-1} \quad (6.8) \]

Money and government bond positions sum to zero when private and public sector are combined; national savings occurs only through capital accumulation (as before) and the accumulation of foreign bonds.
6.4 Public debt and the household budget constraint

How does a change in public debt affect household wealth, and through changes in wealth, household behavior?

We will consider the impact of a current period tax reduction on the PV of real taxes

Some technical assumptions to make the example more simple:

- constant P, M
- exogenous G
- Zero transfer payments
- no initial government debt, $B^g_0 = 0$

Government budget constraint:

$$G_t + \frac{R_{t-1} B^g_{t-1}}{P_t} = \frac{T_t}{P_t} + \frac{(B^g_t - B^g_{t-1})}{P_t}$$

If the government runs a balanced budget in every period, $B^g_t - B^g_{t-1} = 0$, and the constraint reduces to $G_t = \frac{T_t}{P_t}$

Now suppose the government runs a deficit of €1 in period 1.

- $T_1$ falls by €1
- hh income in period 1 rises by €1
- $B^g_1 = 1$

To repay the debt, the government must raise taxes in future periods.

In a simple two-period world, if $\Delta T_1 = -1$, $\Delta T_2 = (1+R)(1)$

Change in the PV of real taxes?

$$\frac{1}{P} [\Delta T_1 + (\frac{1}{1+R}) \Delta T_2]$$

$$\frac{1}{P} [-1 + (\frac{1}{1+R})(1 + R) 1]$$

$$\frac{1}{P} [-1 + 1] = 0$$

No aggregate wealth effects for househlds, and therefore no effect on consumption decisions

Agents know that current tax cut must be offset by future tax rises – buy bonds to hedge against future tax increases
This is an example of Ricardian Equivalence

Ricardian Equivalence holds even if the principal is never repaid.

In this case, the government just pays interest R each period, and \( B_i^g = B_2^g = \ldots = 1 \)

Change in the PV of real taxes?

\[
\frac{1}{P} \left[ -1 + \frac{R}{1 + R} + \frac{R}{(1 + R)^2} + \ldots \right]
\]

\[
\frac{1}{P} \left[ -1 + R \left( \frac{1}{1 + R} + \frac{1}{(1 + R)^2} + \ldots \right) \right]
\]

\[
\frac{1}{P} \left[ -1 + \left( \frac{R}{1 + R} \right) \left( \frac{1 + R}{R} \right) \right]
\]

\[
\frac{1}{\alpha} [ -1 + 1 ] = 0
\]

Once again, shifts between taxes and deficit do not generate aggregate wealth effects

**6.5 When does Ricardian Equivalence not hold?**

violations of "conceptual assumptions"

1. Finite horizons

Alive for tax cut, but do not expect to be for future increase – there will be a wealth effect

Or do agents make decisions in context of infinitely lived extended families?

if so, intergenerational transfers will occur to offset tax increases suffered by future generations

2. Imperfect loan markets

Some agents have higher borrowing costs (higher R) than the government

if so, deficit financed tax cut can increase the PV of wealth, as the govt can borrow at a lower rate than possible for agents
3. Non lump-sum taxes

If $T = \tau Y$, where $0 < \tau < 1$, $T \uparrow$ if $Y \uparrow$, and $T \downarrow$ if $Y \downarrow$

This reduces uncertainty over future disposable income $Y-T$, which results in a positive wealth effect.