Chapter 13 Taxes

1. Preview
   - How do taxes influence households’ decisions?
   - Tax on labor income vs. a tax on asset income.

2. Types of taxes:
   - Lump-sum tax,
   - Flat-rate tax,
   - Progressive tax,
   - Marginal tax rate and the average tax rate.

3. A Tax on Labor Income

   \[ C + \frac{\Delta B}{P} + \Delta K = (\frac{w}{P}) \cdot L^S + r \cdot (\frac{B}{P} + K) + V - T \]

   - Taxes \( T \), depend on \( (\frac{w}{P}) \cdot L^S \)
   - \( \tau W \) is the marginal tax rate on labor.
   - \( (1 - \tau W)(w/P) \) is the after tax real wage.
   - Substitution effect:
     - An increase in \( \tau W \), reduces the after tax real wage and leads to less labor supply.
   - Income effect is zero.
     - \( (V - T) = -G \)

   - Effect of an Increase in the Marginal Tax Rate on Labor
     - An increase in \( \tau W \) leads to a higher \( (w/P) \) and less \( L \) (Figure 13.5).

   - What about capital markets?
     - Since a decrease in \( L \) reduces MPK, the demand for capital will fall.

   - Effect of an Increase in the Marginal Tax Rate on Assets.
     - An increase in \( \tau W \) leads to a lower \( (R/P) \) and less \( xK \) (Figure 13.6).
4. A Tax on Asset Income

\[ C + \frac{\Delta B}{P} + \Delta K = \left( \frac{w}{P} \right) \cdot L^S + r \cdot \left( \frac{B}{P} + K \right) + V - T \]

- Taxes T, depend on \( r \cdot (B/P + K) \)
- \( r = (R/P) \cdot x - \delta(x) \)
- \( \tau \) is the marginal tax rate on asset income
- \( (1 - \tau) \cdot r \) is the after tax real interest rate
- How does an increase in \( \tau \) affect consumption today and tomorrow?
  - If \( C_1 \) falls by one unit, \( \Delta C_2 = 1 + r - \tau r \cdot r \)
  - \( \Delta C_2 = 1 + (1-\tau r) \cdot r \)
  - As \( \tau r \) increases, \( C_1 \) rises and \( C_2 \) falls
  - \( (1-\tau r) \cdot r = (1-\tau r) [(R/P) \cdot x - \delta(x)] \)
- How does a change in \( \tau r \) affect \( \frac{R}{P} \) and \( xK \)?
  - A change in \( \tau r \) does not affect the demand or supply of capital: \( \left( \frac{R}{P} \right)^* \) and \( xK^* \) are the same.
- How does a change in \( \tau r \) affect real GDP, \( Y \)?
  - Since \( L \) and \( xK \) remain the same, \( Y \) is not affected by a change in \( \tau r \).
- How does a change in \( \tau r \) affect investment, \( I \)?
  - Since \( C_1 \) increases and \( Y \) remains fixed, \( I \) will fall
- In the long run this leads to a smaller capital stock and lower real GDP.

Chapter 14 Public Debt

- Two types of bonds
  - \( B_t^G \) is government bonds
    * \( B_t^G > 0 \) means government borrows money from households.
  - \( B_t \) is private bonds
  - They give the identical interest rate, \( i \).
- Government’s budget constraint
  \[ r \frac{B_{t-1}^G}{P} + G_t + V_t = T_t + \left( \frac{B_t^G - B_{t-1}^G}{P} \right) \]
- Saving in the economy
  - Household’s saving : \( (K_t - K_{t-1}) + \left( \frac{B_t^G - B_{t-1}^G}{P} \right) \)
  - Government’s saving : \( \left( \frac{B_t^G - B_{t-1}^G}{P} \right) \)
  - Total saving : \( (K_t - K_{t-1}) \)
The effect of a deficit-financed tax-cut

- Government’s budget constraint

\[ G_1 = T_1 + \frac{B^G}{P} \]
\[ r \frac{B^G}{P} + G_2 = T_2 \]

1. Decrease \( T_1 \) by 1\$ keep \( G \) constant.
2. Borrow money from households by selling bonds 1\$
3. In period 2, government has to buy bonds \((1 + r)\) $
4. Government raises the tax \( T_2 \) by \((1 + r)\) $

- Household’s budget constraint

\[
\left( C_1 + \frac{C_2}{1 + r_1} + ... \right) = (1 + r_0) \left( \frac{B_0}{P} + K_0 \right) + \left( \frac{w}{P} \right) _1 \cdot L^S_1 + \frac{\left( \frac{w}{P} \right) _2 \cdot L^S_2}{1 + r_1} + ... + \left( V_1 - T_1 \right) + \frac{\left( V_2 - T_2 \right)}{(1 + r_1)} + ...
\]

1. Households receive 1\$ from the tax cut .
2. They save all money by buying bonds, 1\$
3. In period 2, they sell bonds and receive \((1 + r)\) $
4. They pay an increase of tax \( T_2 \) by \((1 + r)\) $

Ricardian Equivalence Theorem

Deficit-finance tax-cut has no real effect on the economy since it does NOT affect the lifetime income.

- Assumptions:
  1. Finite lives, not altruistic.
  2. Flat-rate taxes
  3. Imperfect capital market

Exercise : A consumption tax

Suppose that consumption is taxed in each year at the constant rate \( t_c \)

a. What is the household budget constraint?

b. What are the effects of an increase in \( t_c \)on the labor market? How do the results compare with those shown for an increase in the tax rate on labor income, \( t_w \), in Figure 13.5?

c. What are the effects of an increase in \( t_c \) on the market for capital services? How do the results compare with those shown for an increase in the tax rate on labor income, \( t_w \), in Figure 13.6?

d. Suppose now that \( t_c \) falls in year 1 but does not change in future years. How does this change affect the choice of consumption over time? How would the effects resemble those from an increase in the tax rate on asset income, \( t_r \)? In what ways do the effects differ from those from a change in the tax rate on asset income, \( t_r \)?