

EE312 Macroeconomics, 2/2017 (Sec. 046402-Sicha)
 Problem Set - Chapter 10
 Solution

1. Use the Closed-Economy, Real Intertemporal Model to analyze the effects of an increase in government spending on the real wage, employment, current output and the real interest rate and current consumption. (If the space provided is not enough, please attach a separate paper.)

At the initial competitive equilibrium, all markets are clear. Initial wage, initial employment, initial real interest rate, initial current output and initial price level are at w_1 , N_1 , r_1 , Y_1 and P_1 respectively.

The government increases its spending (G) and **increases the present value of tax** (T). The effect of the increase in G and the effect of the increase in T are as follows.

Step 1: $Y^d - Y^s$

• Effects on Y^s :

- The present value of the taxes rises causing a **decrease in the consumer's lifetime wealth**.
- **Current leisure decreases** and **labor supply increases**, given the real wage.
- **Supply of labour (N^s) shifts to the right** from $N^s(r_1)$ to $N'^s(r_1)$. (See Figure 1.)
- Output increases through the production function, $zF(K, N)$.
- The **output supply curve shifts rightwards** from Y^s_1 to Y^s_2 . (See Figure 2.)

• Effect on Y^d :

- Government's demand for output (G) increases.
- Current demand for goods increases by the amount of $\Delta Y^d = \Delta G$; the Y^d multiplier = 1. [Alternatively, $G \uparrow$ T remains the same and $T' \uparrow$. $\Delta Y^d = \frac{1}{1-b} \Delta G$]
- Keeping interest rate constant at the initial interest rate r_1 . $AD = \Delta G$. [Alternatively, $G \uparrow$ T remains the same and $T' \uparrow$. $\Delta Y^d = \Delta G$. Effect of $\Delta T'$ is equal to effect of ΔT]
- **Falling lifetime wealth reduces the consumer's demand for current consumption goods (C^d)**.
- A **small decrease in current consumption** while the increase in G remains large.
- Y^d **shifts to the right**. (See Figure 2.)

• Combine the two (Effects on Y^s and Effect on Y^d) : (See Figure 2.)

- The real interest rate increases as Y^d **shifts more than Y^s** because ΔG is temporary and has a **small negative effect on lifetime wealth**.
- A small negative effect on lifetime wealth $\Rightarrow$ a **small decrease in leisure**, and **small increases in labor supply** and output supply (small Y^s shift).
- A small negative effect on lifetime wealth $\Rightarrow$ a **small decrease in current consumption** while the increase in G remains large (larger Y^d shift).
- **Output increases from Y_1 to Y_2 and real interest rate increases from r_1 to r_2** .

Step 2: effect of Δr

- A higher r reduces leisure, current consumption and investment.
- **Leisure falls and labor supply increases** again.

- **Supply of labour (N^s) shifts to the right** from $N^s(r_1)$ to $N^s(r_2)$. (See Figure 1.)
- The **real wage falls** further; employment and output increase — a movement along the Y_s (From B to C).
- **Employment increases from N_1 to N_2 .**
- Investment decreases due to the higher real interest rate.
- **Current consumption falls** because of the following reasons.
 - **Falling lifetime wealth** reduces current consumption while higher income raises it — small net effect.
 - **The higher real interest rate (r)** also reduces it — dominant effect.
 - (In other words, since $C = C_0 + MPC \times (Y - T)$. C_0 (Autonomous consumption) depends on real interest rate. As real interest rate increases, C_0 decreases. Since $\frac{\Delta Y}{\Delta G} < 1$; $\Delta G = \Delta T$, the increase in Y is smaller than the increase in T ($\Delta Y < \Delta T$). Hence, $(Y - T)$ is decreased causing $MPC \times (Y - T)$ to decrease.)
- A temporary increase in G **crowds out both current consumption and investment by raising the real interest rate.**
 - The **consumer works more for a lower real wage and consumes less.**
 - Lower investment means lower future capital stock and future productive capacity.

Credit Market(1). See figure 3(1).

- Suppose the government increase its current spending and not increase the current tax.
- Then, the government increases current borrowing (bond sale).
- Demand for capital funds in the credit market increases.
- Borrowing demand increases. Borrowing + investment shifts to the right.
- As disposable income ($Y - T$) increases, Savings increases. Saving shifts to the right.
- The rightward shift in saving is lower than the rightward shift in borrowing.
- The real interest rate increases.

Credit Market(1). See figure 3(2).

- Suppose the government increase its current spending and increase the current tax by the same amount.
- Then, output will increase by less than tax increase. $\Delta Y < \Delta G$. $\Delta G = \Delta T$.
- Hence, disposable income ($Y - T$) decreases.
- Saving decreases for all levels of interest rate. [Supply of funds in the credit market decreases.]
- Private saving shifts to the left.
- The real interest rate increases.

In conclusion, an increase in government spending bring about an increase in employment, an increase in current output, an increase in interest rate, a decrease in real wage, a decrease in consumption and a decrease in investment.

figure 1. Labour Market

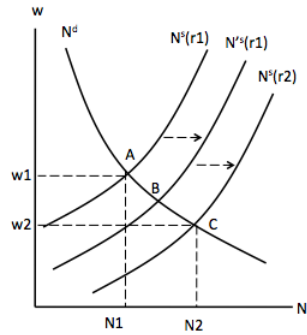


figure 3(1). Credit Market

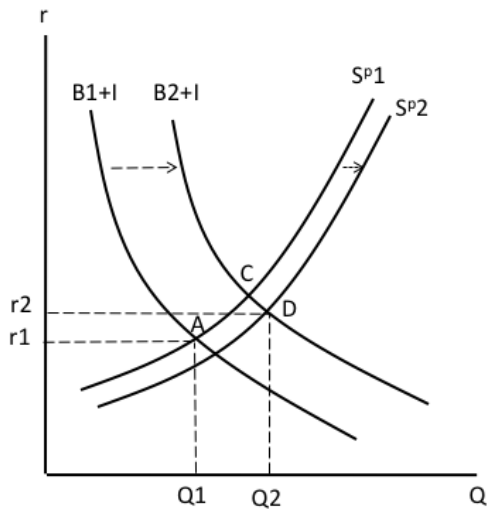


figure 2. Output Market

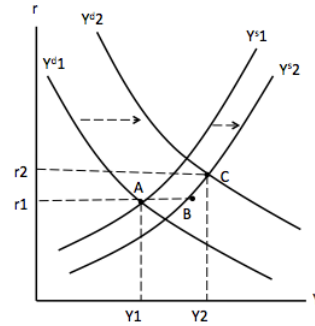


figure 3(2). Credit Market

