EE312 Macroeconomics, 2/2014 (Sec. 046402)
Problem Sets 5
Solution

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

At the initial competitive equilibrium, all markets are clear. Intitial wage, initial employment, intitial real interest rate, initial current output and initial price level are at w_1, $N1$, $r1$, $Y1$ and $P1$ 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^s1 to Y^s2**.** (See Figure 2**.**)
- Effect on Y^d :
  - Government's demand for output (G) increases.
  - Falling lifetime wealth (effect of the tax) reduces the consumer's demand for current consumption goods (C^d)**.**
  - A small decrease in current consumption while the increase in G remains large.
  - Tax multiplier $= \dfrac{-MPC}{1-MPC}$, Government spending multiplier $= \dfrac{1}{1-MPC}$
  - Current demand for goods increases by the amount of $\Delta Y^d = \Delta G$; the Y^d multiplier $= 1$. [In other words, the balance budget multiplier is equal to 1.]
  - Keeping interest rate contant at the initial interest rate r_1. $AD = \Delta G$.
  - Y^d **shifts to the right.** (See Figure 2.)
- Combine the two (Effects on Y^s andEffect 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 ⇒a s**mall decrease in leisure**, and **small increases in labor supply** and output supply (small Y^s shift).
  - A small negative effect on lifetime wealth ⇒a **small decrease in current consumption** while the increase in G remains large (larger Y^d shift)**.**
  - **Output increases from Y1 to Y2 and real interest rate increases from r1 to r2**.

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 Ys (From B to C).
- **Employment increases from N1 to N2**.

- 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**.**

Step 3: Money Market (See Figure 3.)

- **Higher Y raises money demand but rising r decreases i**t.
- **If the latter is strong, M^d shifts left** (from M^d1 to M^d2 **) and P rises** from P1 to P2.

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

figure 1. Labour Market

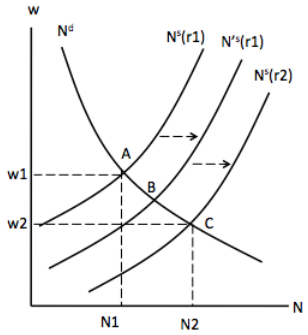


figure 2. Output Market

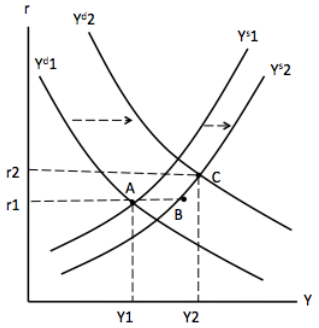
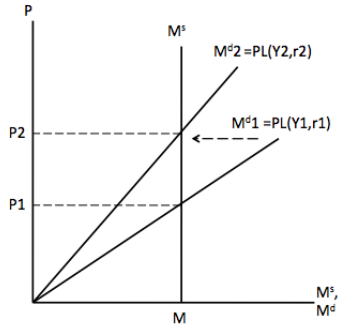


figure 3. Money Market



Note that the question asks us to analyze the effects of an increase in government spending on the real wage, employment, current output and the real interest rate, current consumption and price level. There are six variables we need to do the analysis. Make sure you do all. Attack the question. Crowding out effect should be discussed because it is an important economic intuition to the analysis. Though the question in this homework did not ask you to analyze such the impact on investment, this solution to the homework provides the analysis for you to review.