Techit Thongprasertkul 5802641570

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Assignment 6

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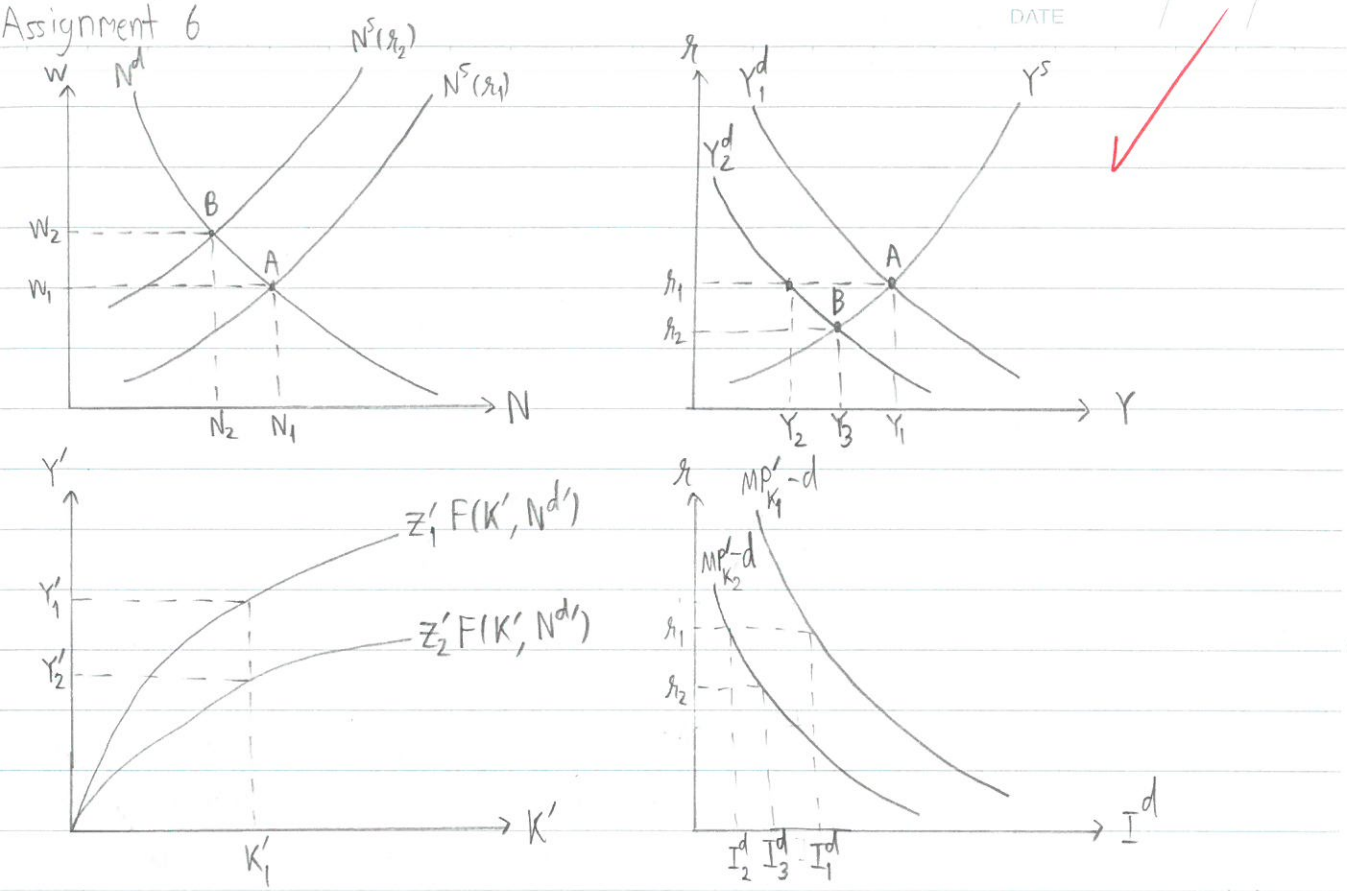

Initial equilibrium happens at point A where the representative consumer supplied for labor at N_1 and the representative firm demands for labor at N_1 given w_1, r_1, and We$_1$. At A, the consumer maximizes utility where $MRS_{L,C}$ equates to w_1, $MRS_{L,C'}$ equates to w_1', and $MRS_{C,C'}$ equates $1+r_1$. The representative firm maximizes its profits where MP_N equates to w_1, MP_N' equates to w_1', and MP_{K_1}'-d equates to r_1. At r_1, the consumer consumes C_1^d, the firm invests I_1^d, and the government spends G_1. The summation of these expenditures is equal to Y_1^d. The firm produces and supplies good at Y_1. In this analysis, we will assume S.E. dominates I.E.

When people expect that the future productivity will decrease, future production function will rotate downward due to lower future output at every level of K'. At K_1', MP_K' decrease from MP_{K_1}' to MP_{K_2}'. In order to maximize firm's profits, the firm will choose I^d to adjust K' that MP_K'-d equates to r_1. Since current MP_K'-d is lower than r_1 and subject to law of diminishing maginal productivity in capital, the firm has to invest less to reduce K' and then MP_K'-d will be equal to r_1 again. Investment schedule will shift to the left to MP_{K_2}'-d because of lower I^d at every interest rate. At r_1, I^d will decrease from I_1^d to I_2^d. Since Y' decrease from Y_1' to Y_2', the consumer will lower current consumption in relative small amount. From decreasing C^d and I^d, Y^d shift to the left from Y_1^d to Y_2^d. At r_1, there will be excess supply for goods; therefore, interest rate is expected to decrease to r_2. Lower interest rate cause current consumption relatively cheap. With a dominant S.E., C^d will increase partially. Lower interest rate also cause I^d to rise from I_2^d to I_3^d to lower MP_K'-d. From increasing C^d and I^d, Y will increase from Y_2 to Y_3.

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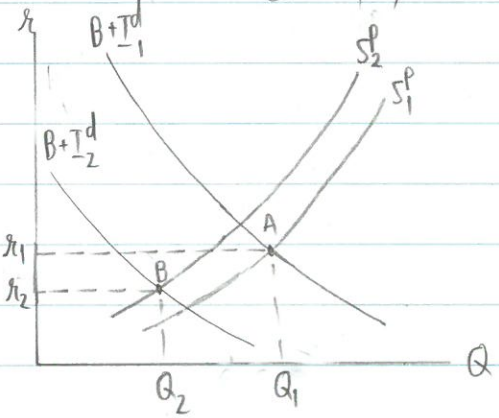
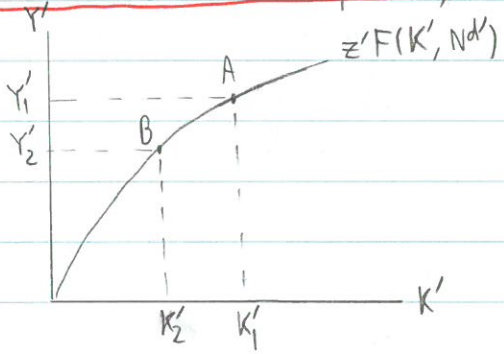
DATE / /

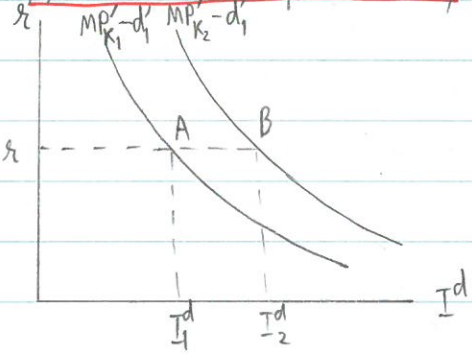
Lower interest rate cause current leisure to become cheaper and then the consumer chooses more current leisure and less current labor supply. Labor supply will shift to the left from $N^s(r_1)$ to $N^s(r_2)$ due to a dominant S.E., At w_1, there will be excess demand for labor. Therefore, real wage has to rise from w_1 to w_2. The new equilibrium will happen at point B in both labor market and good market. C^d and I^d drops and thus output drops to Y_3 with lower interest rate at r_2. Employment decrease to N_2 with higher wage at w_2.



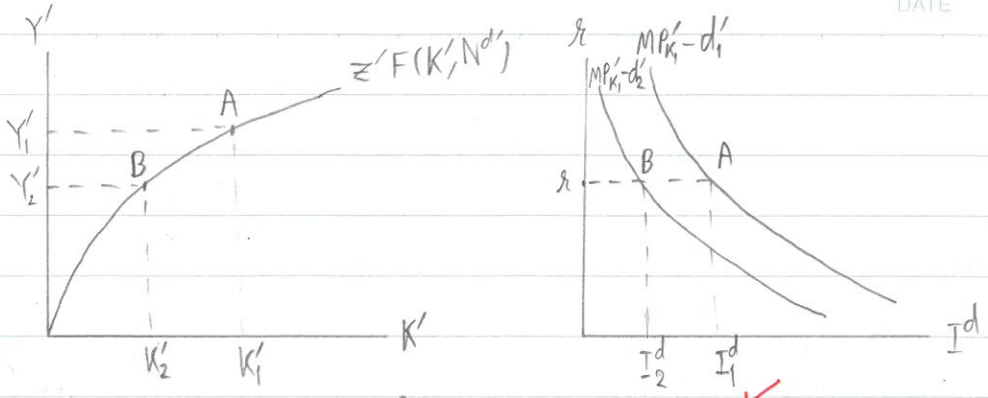
In the credit market, decrease in I^d causes $B+I^d$ to shift to the left from $B+I^d_1$ to $B+I^d_2$. Since Y decreases, C^d will decrease as well, But drop in C^d is less than drop in Y due to consumption smoothing. Private saving will drop and shift to the left from S^p_1 to S^p_2. Interest rate and quantity will drop.

(2.1) When depreciate rate increase, people expect to adjust their investment since machines can produce less and are sold at lower price. Initial situation happens at A where the firm has future capital stock at K'_1. The firm maximizes its profits by choosing investment I^d_1 where $MP'_{K_1} - d'_1$ equates to r. To analyze the effect, we divide the impact into three cases. Firstly, current period d increases temporarily. Secondly, future period d increases temporarily. Lastly, d increases permanently.

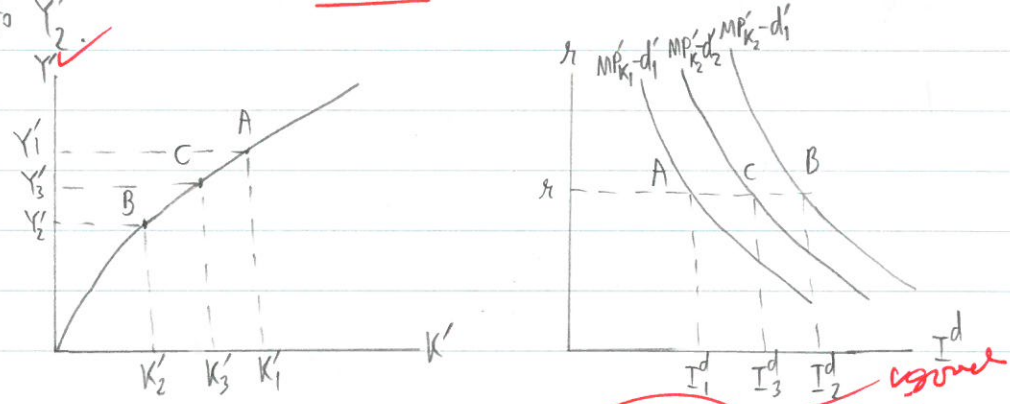




Considering the first case where current period d increases temporarily, current capital stock will depreciate more and thus future capital stock will be reduced from K'_1 to K'_2 given that investment remains unchanged. At point B, lower K' causes MP'_K to rise; therefore, investment schedule will increase and shift to the right to $MP'_{K_2} - d'_1$. At interest rate r, investment will rise to I^d_2. As r is constant, K' will increase to K'_1 and Y' also rises to Y'_1.



For the second case where future period d increases, quantity of capital for liquidation will be lower. That makes net future marginal product of capital decrease to $MP'_{K_1} - d'_2$. In order to maximize profits, the firm need to reduce investment to increase $MP' - d'$ until $MP' - d'$ is equal to r. Investment schedule will shift to the left and at r investment reduce to I_2^d. Lower I^d cause K' to decrease and then future output decrease to Y_2'.



When d increases permanently, we combine the effect of first two cases. Higher current period d reduce K_1' to K_2' causing investment schedule to shift to the right from $MP'_{K_1} - d_1'$ to $MP'_{K_2} - d_1'$. I_1^d will rise to I_2^d resulting that K' increases back to K_1' and Y_2' are adjusted back to Y_1'. Higher future period d reduce $MP'_K - d'$ causing investment schedule shift to the left from $MP'_{K_2} - d_1'$ to $MP'_{K_2} - d_2'$. At r, I_2^d decrease to I_3^d and K_1' decrease to K_3' causing Y_1' drops to Y_3'. Overall, I^d will depend on increase in current d and future d, while Y' will drop.

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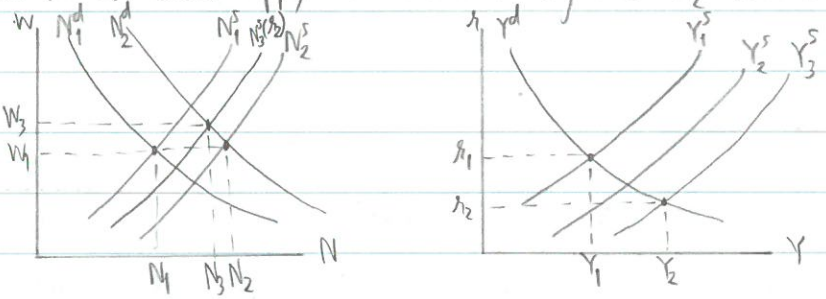
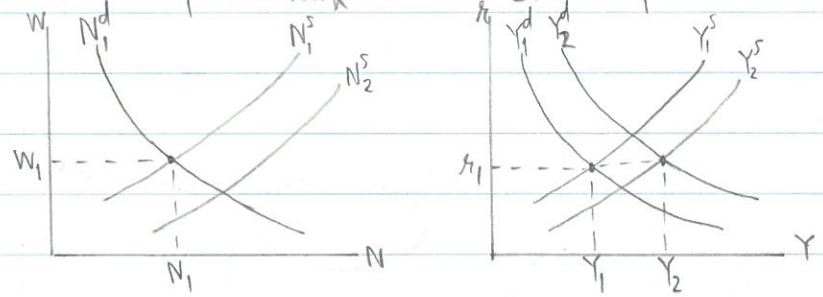
(2.2) To provide tax subsidy, the government has to increase taxes either in current period or future period if we assume it remains government expenditure unchanged. The present value of taxes rises causing lifetime disposable income to drop. Lifetime wealth will decrease. With income effect, the consumer has less purchasing power, so he reduce current leisure and supply for labor more. Labor supply will shift to the right to N_2^s and thus output supply shift to Y_2^s.



Considering the output subsidy, new PV of profit will be $[(1+t)Y - wN - I] + \left[\frac{Y' - w'N' + (1-d)K'}{1+r}\right]$. The firm will hire more labor until $(1+t)MP_N$ equates to wage. Labor demand shift to the right to N_2^d. We assume that it shifts in the same amount of shift in labor supply. At w_1, higher labor cause output supply to shift to the right to Y_3^s. Interest rate will drop to r_2; therefore, the firm will increase investment to equate $MP_K' - d$ and r_2. Consumption also increase and thus output increase to Y_2.



Considering the investment subsidy, marginal benefit of investment will be $\frac{MP_K' + 1 - d}{1+r} + S$. The firm will increase investment until $\frac{MP_K' + 1 - d}{1+r} + S$ equates to 1. Output demand shift to the right to Y_2^d. Given r_1, output will increase to Y_2. In this case, most of increase in Y come from increase in I^d because PV of lifetime wealth remain unchanged and then current consumption will not increase. While the output subsidy, increase in Y is shared by investment and consumption from the effect of lower interest rate.
Since investment subsidy tend to increase I^d more, the investment subsidy is more effective.

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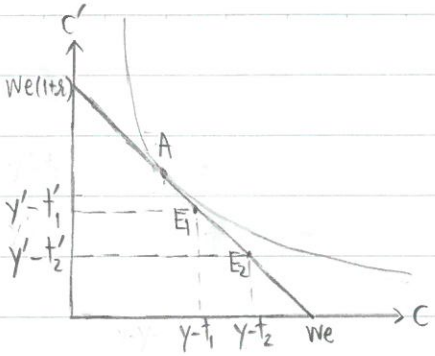
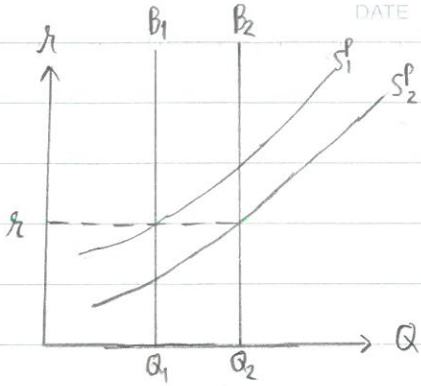
(2.3)





When the government decreases current taxes and holds spending unchanged, intertemporal budget constraint implies that the government will increase future taxes in amount of future value of decrease in current taxes. In the initial situation, the consumer has an endowment point at E_1 where he has disposable income $(y-t_1, y'-t_1')$. After current taxes decreases, the endowment point will move to E_2 where he has higher current disposable income $y-t_2$ and lower future disposable income $y'-t_2'$. Since present value of change in future taxes offsets change in current taxes, total lifetime wealth will remain constant given r. Therefore, consumption bundle are the same at point A and other economic variables remain unchanged as well. However, the government need to borrow more to finance decreare in current taxes and the consumer save more due to high current disposable income. Borrowing and saving shift to the right in the same magnitute, hence real interest rate is the same. This is consistant with the Ricardian equivalence. Tax multiplier in this case is zero. While government expenditure multiplier is more than zero but less than one because increase in government expenditure cause demand for output to rise and there is "crowding-out effect causing equilibrium output to drop.

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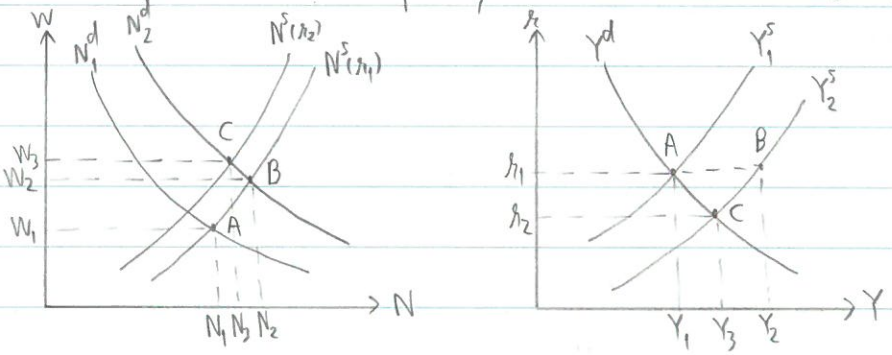
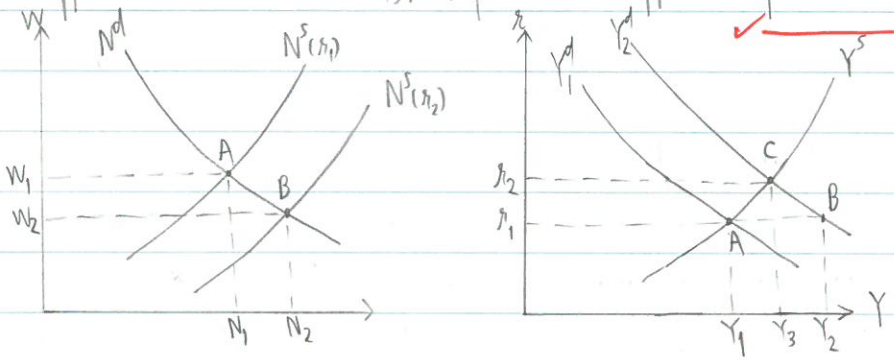
(2.4) Before we analyze the effect of permanent increase in total factor productivity Z, we have to see the outcome of temporary increase in z and z' first.



Temporary increase in z causes MP_N to rise and then the firm will demand for labor more. Labor demand shift to the right to N_2^d and wage is expected to rise to w_2 given r_1. When the firm hire more labor, output supply shift to the right to Y_2^s. Interest rate will drop to r_2. Lower interest rate make current consumption to become cheaper, so the consumer will choose C^d more. I^d also rise to lower MP_K'-d to equate to r_2. For demand side, output will move from Y_1 to Y_3. Lower r cause current leisure to become cheaper, then the consumer supplies for labor less. Labor supply shift to the left to $N^s(r_2)$ and wage increase to w_3. For supply side, lower labor cause output supplied to decrease to Y_3. Equilibrium happens at point C in both markets.



Temporary increase in z' cause MP_K' to rise and then the firm raise I^d to lower MP_K'-d to equate to r_1. Now the consumer expects to have higher future income; therefore, current consumption will increase. Output demand shift to the right to Y_2^d. Interest rate is expected to rise. Higher r cause current consumption relatively expensive, then he lowers C^d partially. I^d also drop to raise MP_K'-d to equate to r_2. For demand side, output decrease from Y_2 to Y_3. Higher r also cause current leisure to become more expensive, then he supplies for labor more. Labor supply shift to the right to $N^s(r_2)$ and wage decrease to w_2. Higher labor supplied cause output to rise from Y_1 to Y_3. Equilibrium happen at B in labor market and at C in goods market.

For permanent increase in Z, we combine the effect of temporary increase in z and z'. Consumption and Investment will increase. Therefore, output rises. Employment also rises while wage and interest rate will depend on magnitute of shifting in demand and supply for labor and goods.

good! ✱ clearly written!