

Solutions to EC2102 Macroeconomic Analysis I
Tutorial 5, Week 8, March 8-12, 2010

Scenario 1

$\Delta G_1 = -\Phi < 0 \Rightarrow \searrow$ in PV of govt expenditures $\Rightarrow \searrow$ in PV of taxes as well, because from government's LBC:

$$\underbrace{G_1 + \frac{G_2}{1+r_1} + \dots}_{PV \text{ of expenditures}} = \underbrace{T_1 + \frac{T_2}{1+r_1} + \dots}_{PV \text{ of taxes, } \tau}$$

Hence,

$$-\Phi = \Delta\tau < 0$$

$\Rightarrow \Delta\omega^d = -\Delta\tau > 0$. This implies:

In the labor market, $N_1^s(r_1^*)$ curve shifts to the left to $\tilde{N}_1^s(r_1^*)$ (ω^d rises and consume more leisure which is a normal good, that is, work less), and

In the goods market, goods supply Y_1^s curve shifts to the left to \tilde{Y}_1^s because $N_1^s(r_1^*)$ shifted to the left. There are two effects on goods demanded. First, the government spends less today:

$$\Delta G_1 = -\Phi < 0.$$

Second, as the consumer's lifetime disposable wealth has increased, Y_1^d is affected by a change in consumption: there is a direct increase in C_1 , whose magnitude of increase, ΔC_1 , is, since $\Delta\omega^d = -\Delta\tau = \Phi > 0$,

$$\Delta C_1 = MPC\Delta\omega^d = MPC\Phi > 0.$$

As there are two effects on goods demanded, the overall change in Y_1^d , ΔY_1^d , is:

$$\begin{aligned} \Delta Y_1^d &= \left(\frac{1}{1-MPC} \right) (\Delta G_1 + \Delta C_1) \\ &= \left(\frac{1}{1-MPC} \right) (-\Phi + \Delta C_1) \\ &= \left(\frac{1}{1-MPC} \right) (-\Phi + MPC\Phi) \\ &= \left(\frac{1}{1-MPC} \right) (-\Phi)(1-MPC) \\ &= -\Phi. \end{aligned}$$

This means that Y_1^d changes by $\Delta G_1 = -\Phi$, i.e., Y_1^d shifts out to the left to \tilde{Y}_1^d .

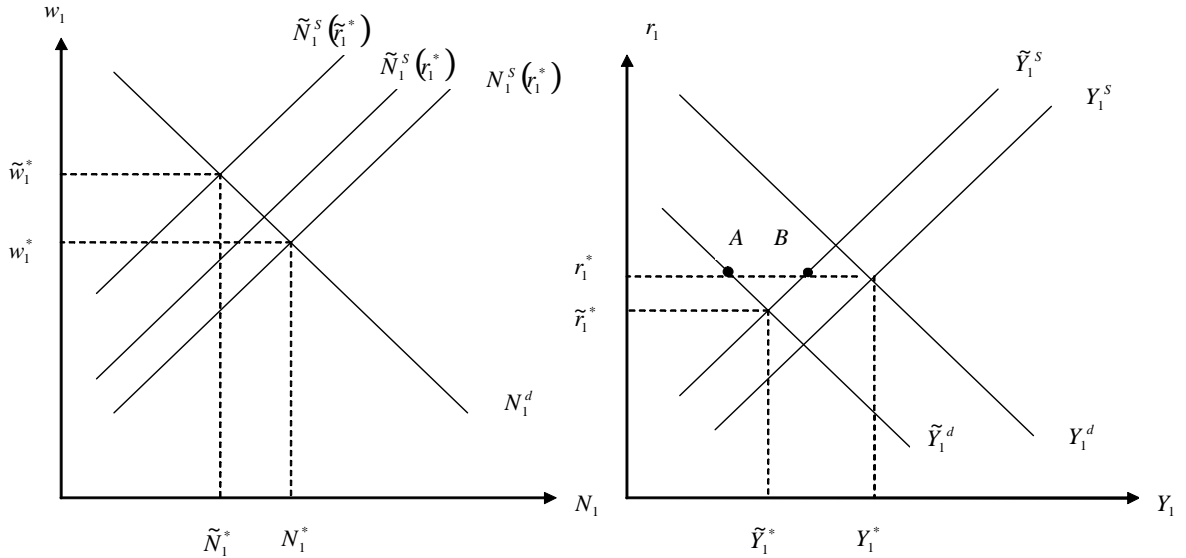
Unambiguously, equilibrium Y_1 falls. But it looks like equilibrium r_1 could increase or decrease. As this is a temporary change in G_1 , the effect on lifetime wealth is small, so N_1^S and hence Y_1^S do not change by much. And Y_1^d changes by the magnitude of Φ . Since the change in lifetime wealth small, the effect on Y_1^d is relatively large.

So Y_1^d shifts to the left by more than Y_1^S .

At the original equilibrium interest rate of r_1^* , output demand (point A on \tilde{Y}_1^d) is less than output supply (point B on \tilde{Y}_1^s). Hence, goods market cannot be in equilibrium. To restore equilibrium, interest rate needs to fall because a fall in interest rate means that consumers want to save less, so they consume more today, C_1 rises (substitution effect of interest rate change dominates), and a fall in interest rate means that the rate of return on alternative asset to firms (bonds) decreases, so I_1 rises. Hence, there is a movement along the \tilde{Y}_1^d curve down from point A.

At the same time, as interest rate falls, the representative consumer works less, since the price of leisure today is less expensive relative to the price of leisure tomorrow and this substitution effect dominates, so $\tilde{N}_1^S(r_1^*)$ starts to shift to the left, and thus causes a movement down along the \tilde{Y}_1^s curve from point B.

Equilibrium in the goods market is restored when equilibrium r_1 has fallen sufficiently so that goods demanded equals good supplied at point C, where the equilibrium r_1 has fallen from r_1^* to \tilde{r}_1^* , and equilibrium output decreased from Y_1^* to \tilde{Y}_1^* ; and in the labour market, $\tilde{N}_1^S(r_1^*)$ has shifted to the left to $\tilde{N}_1^S(\tilde{r}_1^*)$, where labour supplied equals labour demanded at the new wage rate which has rises from w_1^* to \tilde{w}_1^* , and N_1 has fallen from N_1^* to \tilde{N}_1^* .



Scenario 2

In the labour market, N_1^d shifts to the left from N_1^d to \tilde{N}_1^d because $MPN_1 \downarrow$ and firm decreases demand for labour. In the goods market, Y_1^S shifts to the left to \tilde{Y}_1^S due to N_1^d shifting to the left from N_1^d to \tilde{N}_1^d .

At the original equilibrium interest rate of r_1^* , output demand (point A on Y_1^d) is more than output supply (point B on \tilde{Y}_1^s). Hence, goods market cannot be in equilibrium. To restore equilibrium, interest rate needs to rise, because a rise in interest rate means that the price of consumption today relative to tomorrow, $1 + r$, has risen, and consumers want to save more, so they consume more today, C_1 increases (substitution effect of interest rate change dominates), and a rise in interest rate means that the rate of return on alternative asset to firms (bonds) increases, so I_1 decreases. Hence, there is a movement along the Y_1^d curve upwards from point A.

At the same time, as interest rate rises, the representative consumer works more, since the price of leisure today is more expensive relative to the price of leisure tomorrow, which is $w_1(1 + r_1)/w_2$, and this substitution effect dominates, so $N_1^S(r_1^*)$ starts to shift to the right, and thus causes a movement up along the \tilde{Y}_1^s curve from point B.

Equilibrium in the goods market is restored when equilibrium r_1 has risen sufficiently so that goods demanded equals good supplied at point C, where the equilibrium r_1 has risen from r_1^* to \tilde{r}_1^* , and equilibrium output decreases from Y_1^* to \tilde{Y}_1^* .

But in the labour market, as interest rate rises, labour supplied increases from $N_1^S(r_1^*)$ to $\tilde{N}_1^S(\tilde{r}_1^*)$. Equilibrium wage rate falls unambiguously from w_1^* to \tilde{w}_1^* , but the net effect on current employment is ambiguous

But data tells us that real interest rate effect on labour supply is small, so overall, employment will fall from N_1^* to \tilde{N}_1^* .

