

EE312 Macroeconomics, 1/2014 (Sec. 046402)
 Problem Sets 5
 Solution

1. In the Real Business Cycle Model, analyze the effects of the increases in current total factor productivity and future total factor productivity 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.)

Real business cycle theory (RBC theory) are a class of macroeconomic models in which short-run fluctuations are mainly results of random productivity (i.e., real) shocks. 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. A higher current z tends to be followed by a higher future z' . The effects of the increase in current total factor productivity and future total factor productivity are as follows.

Step 1.

- Effects of the increase in z on Y^s :
 - An increase in current total factor productivity (z) **raises MPN.**
 - **Labour demand and output supply shift right.**
 - Labour demand shifts to the right from N_1^d to N_2^d . (See figure 1)
 - Output supply shifts to the right from Y^s_1 to Y^s_2 . (See figure 2)
- Effects of the increase in z' on Y^d
 - Future z' is expected to rise; **future marginal product of capital (MP'_K) increases.**
 - **Investment Demand (I^d) increases causing output demand to shift to the right** (from Y^{d1} to Y^{d2} , see figure 2).
- Overall effects.
 - The effect of the increase in current z (on Y^s) occurs in the current period.
 - **The effect of the expected increase in future z' on current investment (on Y^d) is weaker than the effect of the increase in current z (on Y^s).**
 - * The increase in future real income is smaller than the increase in current real income.
 - * Consumption smoothing results in a small increase in current consumption (and Y^d).
 - The **real interest rate decreases** from r_1 to r_2 .

Step 2. effect of falling r

- The lower real interest rate reduces labor supply.
- N^s **shifts left** (from $N^s(r_1)$ to $N^s(r_2)$) and partially offsets w and N . (See figure 1)
- Effect of r is small, so N^d dominates.
- **Employment increases** (from N_1 to N_2) **and real wage increases** (from w_1 to w_2). (See figure 1)

Step 3. effect on money market

- **Higher Y and lower r cause nominal M^d to shift right** (increase).
- Money demand shifts from $PL(Y_1, r_1)$ to $PL(Y_2, r_2)$. (See figure 3.)

- The price level drops.

Step 4 : effect on average productivity *

- With rising z , higher Y and N , average labor productivity ($\frac{Y}{N}$) also increases (slope $OB >$ slope OA). See figure 4.

Figure 1. Labour Market

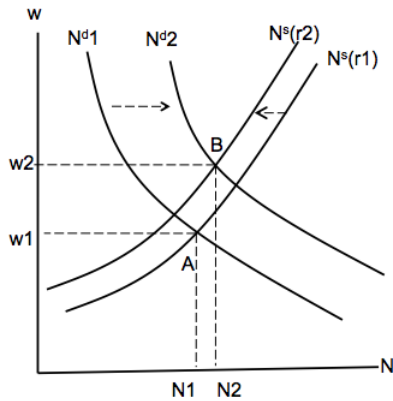


Figure 2. Good Market

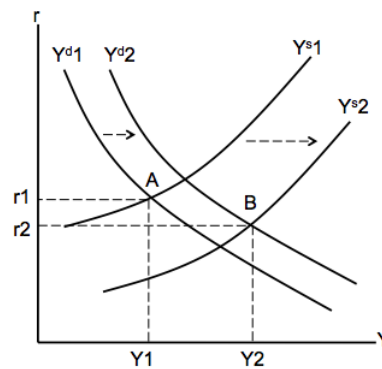


Figure 3. Money Market

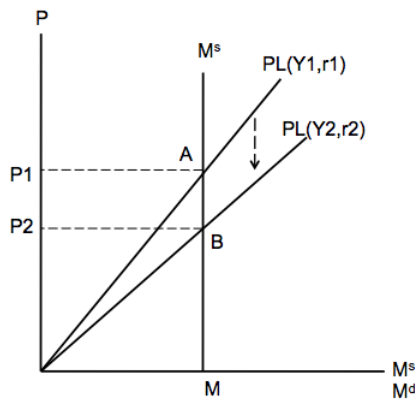
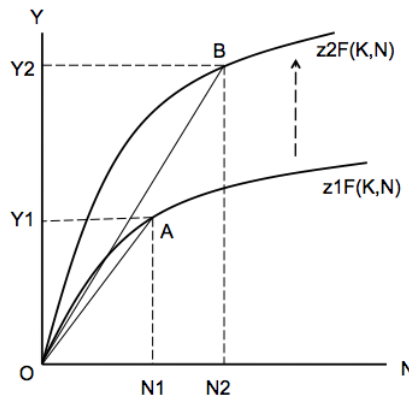


Figure 4. Production function (not required)



Comparison between the theoretical predictions and the data.**

“The real business cycle model qualitatively explains essentially all of the key business cycle regularities. Consumption, investment, employment, the real wage and average labour productivity are procyclical, and the price level is counter procyclical. ...” “One feature of the data that the model in this form cannot replicate is the procyclicality of money supply...” “In the real business cycle model, the procyclicality of nominal money supply can be explained by way of ‘endogenous money’...”

Note:

- You must clearly explain your graphs and your steps in the exam.
- The question did not ask you to state the main thought of RBC theory (short-run fluctuations are mainly results of random productivity (i.e., real) shocks). It is better to state it to add more economic meaning to the analysis.