

14.02 Principles of Macroeconomics

Problem Set #4, Questions and Answers

Posted: Thursday, March 21, 2002

Due Date: Thursday, April 4, 2002

You have 4 points bonus.

Please remember to write your TA's name and section time on the front page of your problem set.

Part I: True, False Questions. Decide whether each statement is true or false and justify your answer with a short argument. (5 points each, 50 points total)

- 1.) The Fed policy is more effective in a close economy than in an open economy with a flexible exchange rate policy.

False: In an open economy, the changes in the interest rate not only affecting investment and consumption but also export and import (through its negative effect on the exchange rate). Therefore, the IS curve will be steeper (more sensitive to interest rate). Note, in open economy the multiplier is smaller (due to the leakage), therefore, the fiscal policy is less effective (The IS shifts less).

- 2.) If the annual yield on the T-Bill is higher than the one-year German-government interest rate, then the dollar is expected to appreciate.

True: See the interest rate parity condition page 355 in Blanchard.

- 3.) If the autonomous consumption " $\equiv c_0$ " is small enough, then the long-run elasticity is approximately equals to one.

True: The LR Elasticity ($\eta_{C,Y}$): Percentage change in spending / Percentage change in disposal income ($\equiv [\Delta C/\Delta Y] / [C/Y] = MPC / APC$). So, if the autonomous consumption " $\equiv c_0$ " is small enough, then the long-run $MPC=APC$, and therefore, the LR elasticity is approximately 1. In the "Long-Run", both APC and MPC appear to be close to 95% for the US in the postwar period. (see the slides)

- 4.) When the US GDP grows by 5%, then we expect the capital to grow by 5% as well.

False: The variations in GDP get amplified in variations in investment.

- 5.) The decrease of interest rates by the Fed will certainly lead to a rise in investment, consumption and net real export within a few months.

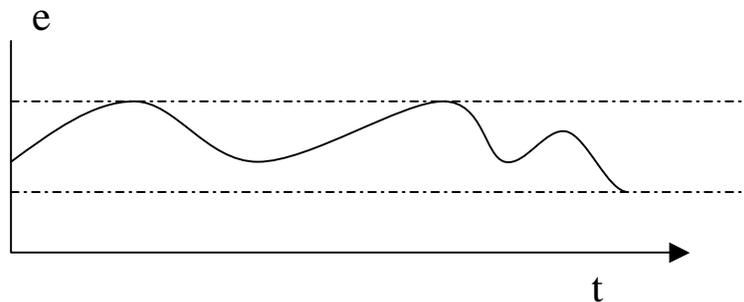
False: Interest rate negatively affects investment, consumption and exchange rate. The increase in the exchange rate (depreciation) will have a positive real effect on the net export after about 4-6 months only if the Marshall-Lerner condition holds (the J-curve).

6.) The Marshall-Lerner condition is inconsistent with the J-curve.

False: While the J-curve states that the real net export could improve or deteriorate in the medium term due to a depreciation of the currency, the Marshall-Lerner condition states the condition that assures the improvement.

7.) The PPP theory implies that, the real exchange rate is bounded in the long run.

True: In the long run, our GDP purchasing power should be equal to the foreigners' GDP purchasing power. This is what is called the Purchasing Power Parity (PPP) condition ("The Big Mac Index"). This means that, the real exchange rate is bounded in the long run. There could be some deviations (up and down) from its mid level in the short run.



8.) We expect the short-run MPC for durables to be smaller than short-run MPC for services.

True: See lecture slides (graphs and regression results).

9.) If the GB£ depreciates rapidly w.r.t. the US\$, then the British trade balance will worsen before it improves.

True: The J-curve effect.

10.) If the economy starts with a balanced trade, then an expansionary fiscal policy will lead to the twin-deficit.

True: See Blanchard 389.

Part II: (6 points each, 24 points total)

For an economy that its equilibrium is characterized by the following function:

$$Y = C(Y^D, r) + I(Y, r) + G + Ex(Y^W, e) - eQ(Y, e)$$

1. By analyzing the above equation, explain what is the short-term and medium-term effect of real depreciation on GDP, real and nominal export, real and nominal import, real and nominal net export.
2. How the equation above should be modified in order to reflect the recent tariffs imposed by the US on import ($z\%$ per goods imported)?
3. By analyzing the modified equation that accounts for the tariffs, explain what is the short-term effect of increase in tariffs on GDP, real and nominal export, real and nominal import, real and nominal net export.
4. By analyzing the modified equation that account for the tariffs, explain what is the medium-term effect of increase in tariffs on GDP, real and nominal export, real and nominal import, real and nominal net export.

*In the short- and medium-term, we assume real exchange rate does not change.

Answers:

1. The answer for 1 is in Blanchard, page 375 and the J-curve (also in the slides).
2. $Y = C(Y^D, r) + I(Y, r) + G + Ex(Y^W, e) - eQ(Y, e(1+z))$.
- 3&4. $z \uparrow \rightarrow e(1+z) \uparrow \rightarrow Q(Y, e(1+z)) \downarrow \rightarrow eQ(Y, e(1+z)) \downarrow \rightarrow Y \uparrow, = Ex(Y^W, e)$

Note there is no J-curve effect because the effects in the short- and medium-term are the same.

Since the quantity of goods and its value (Q and eQ) decrease, while the quantity and value of export (Ex) does not change, the real and nominal net export increase as well as the real output. The effect of higher GDP on import only mitigates the first effect of the higher tariffs.

Part III: (6 points each, 30 points total)

The production function for an economy is:

$$Y = A K^\delta L^{(1-\delta)}$$

1. Draw a graph of the production function in the (K/L, Y/L) space.
2. What is the elasticity of Y w.r.t capital?
3. What is the marginal production of capital?
4. What is the optimal K*? K/L? Is K*=Y?
5. How an increase in the technology will likely affect the optimal capital? Do you expect capital to adjust immediately?

Answer:

2.

$$Y = A K^\delta L^{(1-\delta)}$$

$$Y/L = A (K/L)^\delta$$

$$\ln Y = \ln A + \delta \ln K + (1-\delta) \ln L$$

Therefore, the elasticity of Y w.r.t capital is $= \delta$.

3.

$$MPK \equiv \partial Y / \partial K$$

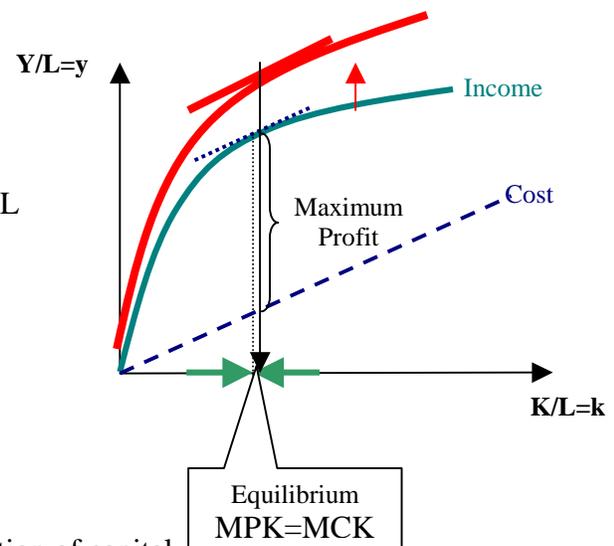
$$= \delta A K^{(\delta-1)} L^{(1-\delta)}$$

$$= (\delta/K) A K^\delta L^{(1-\delta)}$$

$$= \delta * Y/K$$

$$= \delta * y/k$$

$$= \delta * \text{average production of capital}$$



4. In equilibrium:

$$MPK = MCK$$

$$\delta * Y/K^* = R$$

$$K^* = (\delta/R) * Y$$

$$k^* = (\delta/R) * y$$

In order to have $K^*=Y$, elasticity has to be equal to the cost of capital. (R =cost of capital= interest rate, depreciation and capital loss).

5. Note that optimal capital in the Cobb-Douglas production function is not a function of A (technology, unless the technology changes the elasticity of capital).