

EPA143A – Week Five

Questions

THE IS-LM Model

Required readings of Week 5:

P. Krugman. 2011. IS-LMentary. (A short note).

EPA143A LECTURE NOTE W-5 (including exercises and answers).

Supportive videos:

- <https://www.youtube.com/watch?v=pAX7mR4ii5Y>
- <https://www.youtube.com/watch?v=19w5dcGhCo>
- <https://www.youtube.com/watch?v=vx6w5JFljzw>

Lecture Note W-5 and the exercises of Week 5 are part of the exam materials.

On Brightspace you will find a file “Numerical exercises with IS-LM” which contains 10 numerical applications of the IS-LM model (with solutions). The EXERCISES W-5.1, W-5.2, W-5.3 and W-5.4 for Week 5 are given below.

EXERCISE W-5.1

Consider the following IS-LM model:

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|-----|---|-----------------------------|
| (1) | $c = 200 + 0.25(y - t)$ | real consumption function |
| (2) | $i = 150 + 0.25y - 1000 \times r$ | real investment function |
| (3) | $g = 250$ | real public spending |
| (4) | $t = 200$ | real income taxation |
| (5) | $\left(\frac{M^D}{p}\right) = 2 \times y - 8000 \times r$ | real money demand function |
| (6) | $\left(\frac{M^S}{p}\right) = 1600$ | exogenous real money supply |

1. Derive the IS-curve.

2. Derive the LM-curve.
3. Solve for equilibrium real GDP y^* and the equilibrium real interest rate r^* . Calculate c^* and i^* .
4. Let $\left(\frac{M^S}{p}\right) = 1840$. Repeat questions (1)-(3). Explain the direction of change in y^* and r^* .
5. Let $\left(\frac{M^S}{p}\right) = 1600$ and let $g = 400$. Repeat questions (1)-(3). Explain the direction of change in y^* and r^* . Explain why there is crowding out of private expenditure by public expenditure.

EXERCISE W-5.2

In this exercise we expand the IS-LM model and include the balance-of-trade (BT) in the model. The economy is assumed to be open to trade of goods and services; cross-border capital mobility is zero. This variant of the IS-LM model is called the IS-LM-BT model.

- (1) $c = 2000 + 0.6(y - t)$ real consumption function
- (2) $i = 300 - 3000 \times r$ real investment function
- (3) $g = 300$ real public spending
- (4) $t = 300$ real income taxation
- (5) $ne = e - m = 400 - 200 \times er$ real net exports; er = the real exchange rate (expressed in terms of foreign currency/domestic currency).
- (6) $\left(\frac{M^D}{p}\right) = 0.2 \times y - 1000 \times r$ real money demand function
- (7) $\left(\frac{M^S}{p}\right) = 500$ exogenous real money supply

1. Derive the IS-curve.
2. Derive the LM-curve.
3. Derive the BT-curve. Hint: the BT-curve can be derived from the trade balance equation that $ne = 0$ (the trade balance = zero, or exports = imports).
4. What are the equilibrium levels of real GDP y^* and real interest rate r^* ? Hint: first calculate the equilibrium real exchange rate (from the equation in question 3); use that value in determining y^* and r^* .
5. Suppose the real export function changes to $ne = 500 - 200 \times er$. Determine er^* , y^* and r^* .

EXERCISE **W-5.3**

Consider the following IS-LM model:

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|-----|--|-----------------------------|
| (1) | $c = c_0 + (1 - \sigma) \times (y - t)$ | real consumption function |
| (2) | $i = i_0 - \alpha \times r$ | real investment function |
| (3) | $g = g_0$ | real public spending |
| (4) | $t = t_0$ | real income taxation |
| (5) | $\left(\frac{M^D}{p}\right) = v \times y - \beta \times r$ | real money demand function |
| (6) | $\left(\frac{M^S}{p}\right) = \left[\frac{\overline{M^S}}{p}\right]$ | exogenous real money supply |

1. Will the IS-curve shift to the RIGHT or to the LEFT in response to (a) a decline in the average propensity to save; (b) an increase in autonomous private investment; (c) an increase in income taxation; and (d) good news about the economy?
2. Will the LM-curve shift to the RIGHT or to the LEFT in response to (a) a decline in nominal money supply M^S ; and (b) a decline in the general price level p ?

EXERCISE W-5.4

Consider the following IS-LM model:

- (1) $c = 100 + 0.8 \times y$
- (2) $i = 120 - 3 \times r$
- (3) $\left(\frac{M^D}{p}\right) = 0.2 \times y - 5 \times r$
- (4) $\left(\frac{M^S}{p}\right) = 120$
- (5) $p = 1$
- (6) $y = c + i$

1. Derive the IS-curve and the LM-curve.
2. Solve for equilibrium real GDP y^* and the equilibrium real interest rate r^* .
3. Suppose the investment function changes to: $i = 160 - 3 \times r$, because of an increase in public investment by 40 (units). Solve for new equilibrium real GDP y^* and the new equilibrium real interest rate r^* .
4. By how much did public investment crowd out private investment in question 3?
5. The central bank can support the fiscal stimulus by the government by means of an accommodating monetary policy. The aim of accommodating monetary policy is to keep the (real) interest rate constant in order to avoid any crowding out. By how should the central bank increase money supply in order to avoid crowding out?