

ECON 214: Intermediate Macroeconomics

PROBLEM SET 3: Multipliers and the IS-LM model: Algebraic and Numerical exercises.

• **Algebraic exercises:**

1) Consider the following closed-economy model:

Output Market:

$$Y=C+I+G$$

$$C=C_0+C_y(Y-T)$$

$$I=I_0-I_r r$$

$$G=G_0$$

$$T=T_0$$

Money Market:

The Fed targets the real rate. (In reality the Fed targets the nominal interest rate (FFR), but if we assume no inflation, the two interest rates are equal.)

a) Verbally explain each equation in the model. What do the C_0 and I_0 terms, the autonomous components in the consumption and investment functions, represent? What determines them (be very comprehensive)?

b) How does the (effective) LM curve look like?

c) Derive the following multipliers:

$$\frac{\partial Y}{\partial G_0}, \frac{\partial Y}{\partial T_0}, \frac{\partial Y}{\partial C_0}, \frac{\partial Y}{\partial I_0}$$

(Before you derive them, you must solve for Y such that it is a function of the exogenous variables only.)

2) Derive the multipliers in (1c) but now assume: $T=T_0+t*Y$, where t is the marginal tax rate. How do the multipliers differ from the ones derived in (1), i.e. are they larger or smaller? Explain why.

3) Derive the multipliers in (1c) but now assume: $I=I_0 -I_r r + I_y Y$, where I_y is the response of investment to changes in income.

How do the multipliers differ from the ones derived in (1), i.e. are they larger or smaller? Explain why.

- **Numerical exercises:**

4) Consider the following closed-economy model:

$$Y=C+I+G$$

$$C=100+0.8(Y-T)$$

$$I=200-20r$$

$$G=100$$

$$T=100$$

and the Fed targets the real rate at 3%

a) Compute the equilibrium output. Illustrate the equilibrium, using the IS-LM curves.

What are the levels of consumption and investment when output is in equilibrium?

b) If G increases to 120, what is the new level of equilibrium output? What are the new levels of consumption and investment? Illustrate the equilibrium.

c) If lump-sum taxes are reduced to 80, what is the new level output, consumption and investment? Illustrate the equilibrium.

d) If C_0 increases to 120, what is the new level output, consumption and investment? Illustrate the equilibrium.

e) If I_0 decreases 180, what is the new level output, consumption and investment? Illustrate the equilibrium.

5) Use the same model as in (4), but now assume $T=9 + 0.15*Y$.

Redo 4 (skip 4c).

6) Use the same model as in (4), but now assume $I=70 - 20 r + 0.1Y$

Redo 4 (skip 4e).