

101562: Intermediate Macroeconomics

Problem Set 4

Shanghai University of Finance and Economics - Fall 2015

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The solutions are due *Monday November 16* before the class. Enjoy!

Exercise A (IS-LM Model: Effects of Policy)

Suggest a policy mix to achieve each of the following objectives.

1. Increase Y while keeping r constant.
2. Decrease the fiscal deficit while keeping Y constant. What happens to r and investment?
3. Raise investment but keep output constant.

Exercise B (AD-AS Model: Temporary vs. Permanent Changes)

Consider the following AD-AS model where the economy was originally at the long-run equilibrium.

$$AD : Y = Y \left(\frac{M}{P}, G, T \right)$$

$$SRAS : P = P^e H(A, z, Y)$$

1. Suppose that there is a temporary decline in G . i.e. G decreases to G' ($G > G'$) but will come back to G after some periods. Assume that the recovery of G occurs before the workers learn about the changes in the actual price. Describe the behavior of this economy both in the short-run and in the long-run.

2. Now assume instead that the recovery of G occurs after the workers start to learn about the changes in the actual price. Describe the behavior of this economy both in the short-run and in the long-run. Compare your solutions in question 1 and 2.

3. Because of the information asymmetry between the fiscal authority and the central bank, the central bank implements the expansionary monetary policy, increasing M permanently, to offset the negative effect of the decline in G . Describe the changes in this economy in the long-run.

4. Reconsider the question 3. What will happen if the decline of G was permanent?

Exercise C (AD-AS Model: Effects of Labor Market Policies)

Consider the AD-AS model where the economy was originally at the long-run equilibrium.

$$AD : Y = Y \left(\frac{M}{P}, G, T \right)$$

$$SRAS : P = P^e H(A, z, Y)$$

1. Suppose that there is an increase in z , due to the generous unemployment insurance. What happens to this economy in the short-run?
2. Suppose that there is a simultaneous change in the fiscal policy: government spending increased and hence the original natural level of output is achieved. What happens to the price level?
3. Describe what happens to this economy in the long-run (1) if G increased as in question 2 and (2) if G did not change.

Exercise D (Consumer's Problem: Linear Utility)

Suppose that a consumer solves the following static utility maximization problem:

$$\max_{c,l} u(c, l) = c + l$$

subject to

$$c = w(1 - l)$$

where w is the hourly wage rate and $\pi = T$.

1. Describe all possible solution(s) of the consumer's problem and provide economic reasonings.
2. Derive the labor supply curve and plot the labor supply curve in a diagram where w is in the vertical axis and h is in the horizontal axis.
3. (Advanced question) Assume labor demand curve is given by $w = g(h)$ where g is decreasing and continuous in h , and $g(0) > 1$. Find the condition under which the equilibrium labor is between zero and one.

Exercise E (Labor Market Equilibrium with Price Expectations)

Consider a firm's profit maximization problem:

$$\max_h \pi = pf(h) - wh$$

where f is continuous, differentiable, concave, and increasing in h . p is the price of the consumption good, which is produced by the firm, and w is the nominal hourly wage rate.

1. Derive the labor demand curve and plot it in the diagram where w is in the vertical axis and $h = 1 - l$ is in the horizontal axis.
2. Suppose that price of the good, p , increases by 10%. What happens to the nominal wage rate?

Now consider a consumer's problem:

$$\max_{c,l} u(c, l)$$

subject to

$$p^e c = wh + \pi - T \text{ and } h + l = 1$$

where $u(c, l)$ is continuous, differentiable, increasing, and concave and w is the nominal hourly wage rate.

Here, we assume that consumers should choose optimal consumption plan before they observe the price of the consumption good. Instead, they form an expectation about the price of the consumption good denoted as p^e .

3. Derive the labor supply curve (and assume $MRS_{l,c}$ is increasing in h) and plot it in the diagram where w is in the vertical axis and h is in the horizontal axis.

4. Plot the labor supply and demand curves in the same diagram and describe the labor market equilibrium.
5. Suppose that as in question 2, price of the good increases but it is not expected by the consumer hence p^e is fixed. What will happen to the labor market equilibrium? Use the diagram you draw in question 4 in your answer.
6. After a while, the consumer realizes that the price of the good changes and hence she adjusts her price expectations so that $p = p^e$. What happens to nominal wage rate, real wage rate, and equilibrium hours?
7. Connect your answers in question 5 and question 6 to the discussions on short-run and long-run effects of expansionary fiscal policy in AD-AS model.

Exercise F (Competitive Equilibrium of One-Period Economy with Specific Functions)

Suppose that a consumer solves the following static utility maximization problem:

$$\max_{c,l} u(c, l) = \ln c + Bl$$

subject to

$$c = w(1 - l) + \pi - T$$

where w is the hourly wage rate and $B > \frac{z}{z-g} > 0$ is a constant.

A firm's profit maximization problem is given by

$$\max_h \pi = y - wh$$

subject to

$$y = zh$$

where $z > 0$ is total factor productivity.

Government should satisfy the budget constraint:

$$g = T$$

where $g < z$. i.e. government spending is small enough.

1. Solve for the consumer's problem to obtain the first order conditions.
2. Solve for the firm's optimization problem.
3. If we combine the first order conditions of question 1 and 2, we can obtain the equilibrium consumption level. What is it?
4. Using the goods market clearing condition, $y = c + g$, and the solution from question 3, derive the equilibrium labor. Why do we need the condition $B > \frac{z}{z-g}$?

In summary, questions 1-4 are the steps to find the competitive equilibrium of this economy; we obtain the closed-form solution for c , h , w , and y .

5. Describe the equilibrium of this economy in a diagram where c is in the vertical axis and l is in the horizontal axis as learned in the class.

6. Suppose that the government increases government spending from g to g' where $g < g'$ (but still $g' < z$). What happens to c and h ? Please (1) use both the diagram and the closed-form solution and (2) also provide economic reasonings.

7. What is the spending multiplier (dy/dg) in this economy? Please provide your economic reasoning. (Hint: use $y = c + g$)