Homework 3

April 7, 2016

Due date: 04-16-16 Midnight

1. Terminology (No credits for homework)

- Wage-price spiral
- Nominal interest rate
- Real interest rate
- Natural interest rate
- Fisher Hypothesis
- Discount factor
- Discount rate
- Present discounted value
- Present value
- Yield, yield to maturity, or n-year interest rate
- Default risk
- Maturity
- Shares, or stocks
- Dividends
- Ex-dividend price
- Risk neutral
- Risk averse

2.Mutations of the Phillips curve

Suppose that the Phillips curve is given by

$$\pi_t = \pi_t^e + 0.1 - 2u_t$$

a. What is the natural rate of unemployment?

Assume

$$\pi_t^e = \theta \pi_{t-1}$$

and suppose that θ is initially equal to 0. Suppose that the rate of unemployment is initially equal to the natural rate. In year t, the authorities decide to bring the unemployment rate down to 3% and hold it there forever.

b. Determine the rate of inflation in years t, t+1, t+2, and t+5.

c. Do you believe the answer given in (b)? Why or why not? (Hint: ink about how people are likely to form expectations of inflation.)

Now suppose that in year $t+5$, θ increases from 0 to 1. Suppose that the government is still determined to keep u at 3% forever.

d. Why might u increase in this way?

e. What will the inflation rate be in years t + 5, t + 6, and t+7?

f. Do you believe the answer given in (e)? Why or why not?

3. The effects of a permanent decrease in the rate of nominal money growth

Suppose that the economy can be described by the following three equations:

$$u_t - u_{t-1} = -0.4\,(g_{yt} - 3\%)$$

Okun's law

$$\pi_t - \pi_{t-1} = -\,(u_t - 5\%)$$

Phillips curve

$$g_{yt} = g_{mt} - \pi_t$$

Aggregate demand

a. Reduce the three equations to two by substituting g_{yt} from the aggregate demand equation into Okun's law. (Okun's law was presented in Chapter 2.)

Assume initially that $u_t = u_{t-1} = 5\%$, $g_{mt} = 13\%$, and $\pi_t = 10\%$

b. Explain why these values are consistent with the statement "Inflation is always and everywhere a monetary phenomenon."

Now suppose that money growth is permanently reduced from 13% to 3%, starting in year t.

c. Compute (using a calculator or a spreadsheet program) unemployment and inflation in years t, t+1, ..., t+10

d. Does inflation decline smoothly from 10% to 3%? Why or why not?

e. Compute the values of the unemployment rate and the inflation rate in the medium run.

f. Is the statement that "Inflation is always and everywhere a monetary phenomenon" a statement that refers to the medium run or the short run?

4. Regular IRAs versus Roth IRAs

You want to save $2,000 today for retirement in 40 years. You have to choose between the two plans listed in (i) and (ii).

i. Pay no taxes today, put the money in an interest-yielding account, and pay taxes equal to 25% of the total amount withdrawn at retirement. (In the United States, such an account is known as a regular individual retirement account, or IRA.)

ii. Pay taxes equivalent to 20% of the investment amount today, put the remainder in an interest-yielding account, and pay no taxes when you withdraw your funds at retirement. (In the United States, this is known as a Roth IRA.) a. What is the expected present discounted value of each of these plans if the interest rate is 1%? 10%?

b. Which plan would you choose in each case?

5. Approximating the price of long-term bonds

The present value of an infinite stream of dollar payments of $z (that starts next year) is $z/i when the nominal interest rate, i, is constant. This formula gives the price of a consol - a bond paying a fixed nominal payment each year, forever. It is also a good approximation for the present discounted value of a stream of constant payments over long but nor infinite periods, as long as i is constant. Let's examine how close the approximation is.

a. Suppose that i = 10%. Let $z = 100. What is the present value of the consol?

b. If i = 10%, what is the expected present discounted value of a bond that pays $z over the next 10 years? 20 years? 30 years? 60 years? (Hint: Use the formula from the chapter but remember to adjust for the first payment.)

c. Repeat the calculations in (a) and (b) for i = 2% and i=5%.

6. In our lecture, we derive what will happen in the stock market if there is an increase in consumer spending and the stock market. Now, suppose there is a decrease in consumer spending and the stock market, what will happen to the stock market? Please use IS-LM model to help analyze the effects.