Introductory Macroeconomics

Pre-Tutorial #2
Week Starting 15th March 2021

The Tutorial. This week's tutorial looks at issues relating to inflation, interest rates, employment and unemployment.

Note that your tutor is under no obligation to go through the answers to the pre-tutorial work in detail. The focus in the tutorial will be on the tutorial work itself – the questions here are preparatory.

Reading Guide. You should look carefully over your lecture notes for Week 2. You may also find Chapters 3 and 5 of BOFAH useful.

Key Concepts. Inflation and interest rates. Employment and unemployment.

Problems.

1. Why do many economists believe that inflation reduces the efficiency with which prices allocate resources?

2. What do we mean by a 'real interest rate'? Can a real interest rate be negative? Why or why not?

3. Frank is going to lend Sarah \$1000 for 1 year. Frank and Sarah agree that Frank should earn a 2% real rate of interest on the loan. The CPI index is 100 at the time Frank makes the loan and is expected to be 110 in one years time. What nominal rate of interest should Frank charge Sarah? Suppose after one year that the CPI is 112 instead of 110. In this case who is better off than expected? Who is worse off than expected?

4. Deflation is a decline in the price level. Economists typically argue that deflation is costly since it discourages consumption and investment. Explain why this is the case.

5. Consider the simple model of labour market transitions with two states, employment E_t and unemployment U_t and labour force $L_t = E_t + U_t$. Let $u_t = U_t/L_t$ denote the unemployment rate. The change in unemployment from one period to the next is

$$U_{t+1} - U_t = sE_t - fU_t$$

with constant job separation rate $s = 0.03$ per month and constant job finding rate $f = 0.47$ per month.

   (a) Suppose the labour force is 10 million people. Calculate the number of employed and number of unemployed people in 'steady state' where $U_{t+1} = U_t$. Calculate the steady state unemployment rate.

   (b) Suppose the job separation rate increases to $s = 0.04$. Calculate the new steady state unemployment rate. Is this higher or lower than in (a)? Explain.

   (c) Consider again the economy in part (a). The government would like to pass some legislation that economists estimate will increase *both* the job separation rates and job finding rates by 50%. What effect would this legislation have on steady-state unemployment? Explain. What effect would it have on the composition of short- and long-term unemployment and employment? Explain.

Solutions to Pre-Tutorial Work.

1. Efficient resource allocation relies on relative price changes (e.g., if the price of Good x relative to Good y increases, resources should be shifted out of the production of y towards x). High and volatile inflation rates makes it harder to interpret price signals in real time. Suppose the price of Good x increases. Will firms be able to tell in real time that this is a relative price increase (in which case resources should be reallocated) or just part of a general economy-wide increase in prices (in which case, resources do not necessarily need to be reallocated)?

2. A real interest rate is the percentage increase in the real purchasing power of a financial asset. We can calculate the real interest rate using the *Fisher equation*

$$1 + r = \frac{1 + i}{1 + \pi}$$

where r is the real interest rate, i is the nominal interest rate and π is the expected rate of inflation. Typically, nominal interest rates must be above zero. Because holding currency (or cash) provides a nominal interest rate return of zero, it is hard to convince people to hold financial assets with a negative rate of return.[1] Despite that a real interest rate will still be negative if inflation exceeds the nominal rate of interest. In that case, the high rate of price growth relative to the nominal interest rate implies that the real purchasing power provided by a financial asset may be declining over time.

4. The Fisher equation states:

$$1 + r = \frac{1 + i}{1 + \pi}$$

Inflation is expected to be 10 percent and we want a real return of 2 percent. Plugging into the above equation implies,

$$1.02 = \frac{1 + i}{1.10} \qquad \Rightarrow \qquad 1 + i = (1.02)(1.10) = 1.122$$

hence

$$i = 0.122$$

or the nominal interest rate has to be 12.2 percent. If inflation is higher than expected, then the real interest rate associated with this trade will be lower than expected. The lender (Frank) will be worse off (receives a lower real return) while the borrower (Sarah) will be better off (pays a lower real amount for the loan).

5. Deflation is costly since it discourages consumption spending and investment spending. To see why note that the Fisher equation implies that negative inflation tends to raise the real interest rate. A higher real interest rate tends to discourage both consumption and investment. To understand why, note that individuals can use their income to save today or consume today. If

[1] In recent years, central banks have begun to use negative nominal interest rates. Small negative rates are possible since a bank account may be more convenient than holding large sums of cash.

prices are declining, then by holding on to their wealth and not consuming, they will be able to afford to purchase more goods in the future.

A similar affect applies to investment. An increase in the real interest rate is a disincentive to invest. Firms invest today in order to make future profits. The real interest rate is a measure of the opportunity cost of investing. We will see in later lectures that a decline in spending plans by consumers or firms can have a detrimental effect upon employment and output.

5. (a) In steady state $U_{t+1} = U_t$ and so

$$0 = sE - fU$$

And since $L = E + U$ we can write this

$$0 = s(L - U) - fU$$

which we can solve for

$$U = \frac{s}{s+f} L = uL$$

where $u = s/(s+f)$ is the steady state unemployment rate. With the given numbers the steady state unemployment rate $u = 0.03/(0.03 + 0.47) = 0.06$ or 6% and the number of persons unemployed in steady state is $U = uL = (0.06)(10) = 0.6$ million or 600,000 people per month. Steady state employment is then $E = L - U = (1-u)L = (0.94)(10) = 9.4$ million.

(b) If s rises to 0.04, the new steady state unemployment rate is higher at

$$u = \frac{0.04}{0.04 + 0.47} = 0.078$$

As the flow of workers out of employment increases, the unemployment rate rises.

(c) If both the separation rate and the finding rate increase by 50%, there is no effect on steady-state unemployment. That is

$$u = \frac{1.5s}{1.5s + 1.5f} = \frac{s}{s+f} = \frac{0.03}{0.03 + 0.47} = 0.06$$

just as in (a). Of course, this unchanged overall unemployment rate masks important differences. The labor market here is much more *fluid*. Individual workers experience more turnover, with shorter spells of both unemployment and employment. In other words, we would see a smaller number of long-term unemployed but also a smaller number of people with long spells of unbroken employment.