Midterm 2 – ECON 3311, Fall 2024 Name:_____

Student ID: _____

Show your work. Make sure to provide explanations to your answers for full credit.

---

1. **Suppose the economy is in the midst of a recession, similar to the situation that the US found itself in during the Great Recession.**

    a. **If the government wants to increase spending to try and get the economy out of the recession, why is it important to know what the multiplier is? (8 points)**

    The multiplier will cause an increase in one of the components of spending to have a larger effect on short-run output. For instance, if government spending increases by 1%, the effect on short-run output will be larger. So if the goal is to have output increase by 2%, the multiplier will allow the country to increase spending by less than 2% to achieve this goal.

    b. **If an increase in 2% in government spending ($\bar{a}_g$ increased by 2%) caused an increase in short term output of 6%, what is the value of $\bar{x}$? (6 points)**

    If the increase in government spending caused short-run output to increase by thrice as much, then this means that the multiplier is equal to 3:

$$\frac{1}{1-\bar{x}} = 3 \rightarrow 1 = 3 - 3\bar{x} \rightarrow 2 = 3\bar{x} \rightarrow \bar{x} = 2/3$$

2. **The Federal Reserve (central bank in the US) sets nominal interest rates in an economy.**

    a. **If the Federal Reserve sets nominal interest rates, how is it able to affect real interest rates? What assumption is needed to argue that the Fed can influence real interest rates? Briefly explain. (8 points)**

    The key assumption is "sticky inflation", meaning that inflation does not adjust instantaneously to changes in money supply (and therefore in nominal rates). We can see this in the Fisher equation. If inflation does not adjust, any changes in the nominal rate will translate into changes in the real interest rate as well.

b. How does the relationship between the real interest rate and the marginal product of capital affect investment spending? Briefly explain. (8 points)

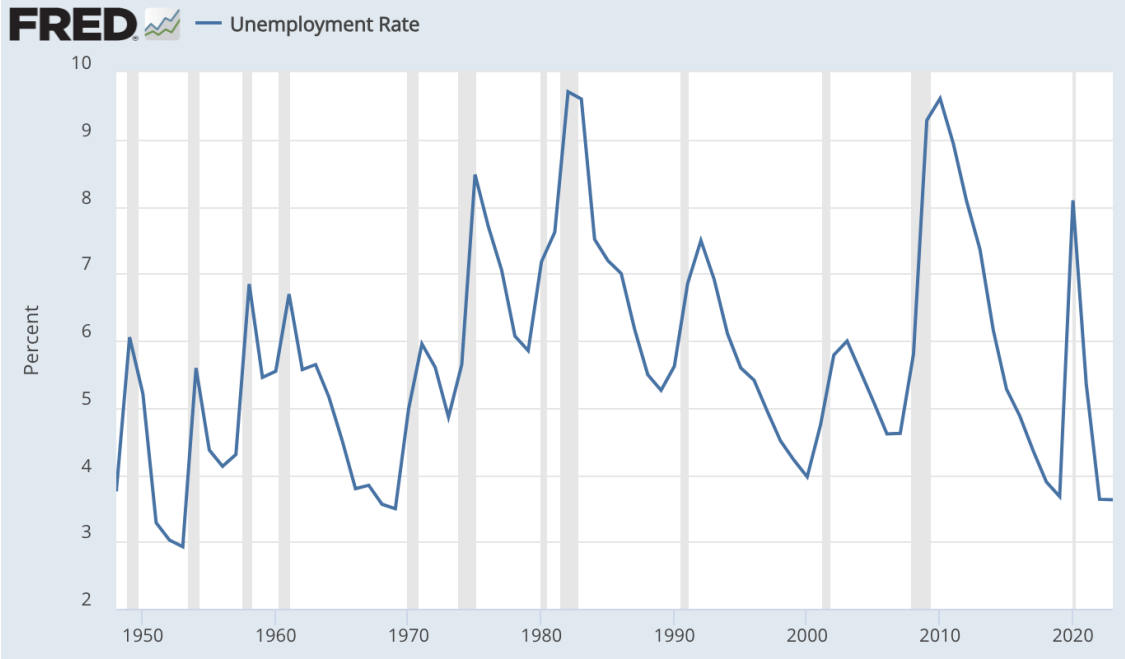
When the real interest rate is above the marginal product of capital then it costs more to borrow (real interest rate) than what is obtained from borrowing to invest and increase production (marginal product of capital). Since the cost of debt outweighs its benefits the firms will choose to decrease investment spending. The reverse occurs when the interest rate is below the marginal product of capital.

The same argument also follows for firms that are looking to use already available funds (i.e., that don't need to borrow). For these, if the real rate —that represents alternative investment opportunities— is higher than the return from investing in their own business (marginal product of capital) then they decrease their investment (to opt for those alternative assets).

3. High rates of inflation can be extremely costly for countries. Why is it the case that in countries where governments have a harder time borrowing money and raising taxes, it is more likely that we will see higher rates of inflation? Briefly explain. (Hint: Think about the ways in which governments can finance their spending) (8 points)

The fiscal deficit (budget) of a government is financed with their income (taxes), their borrowing (debt), and with money supplied by the central bank (printing money to give the the government). The latter source of funding has a substantial effect on inflation but may be the only choice if firms cannot increase their taxes or borrow money.

4. The following graph depicts the unemployment rate over time.



Source: U.S. Bureau of Labor Statistics

One of the relationships we talked in class was between the unemployment rate and short-run fluctuations in GDP.

a. What 'law' is used to depict this relationship and what does it predict regarding the correlation between unemployment and GDP? (6 points)

The relationship is depicted by the Okun's law that indicates a negative relationship between (cyclical) unemployment and short-run GDP.

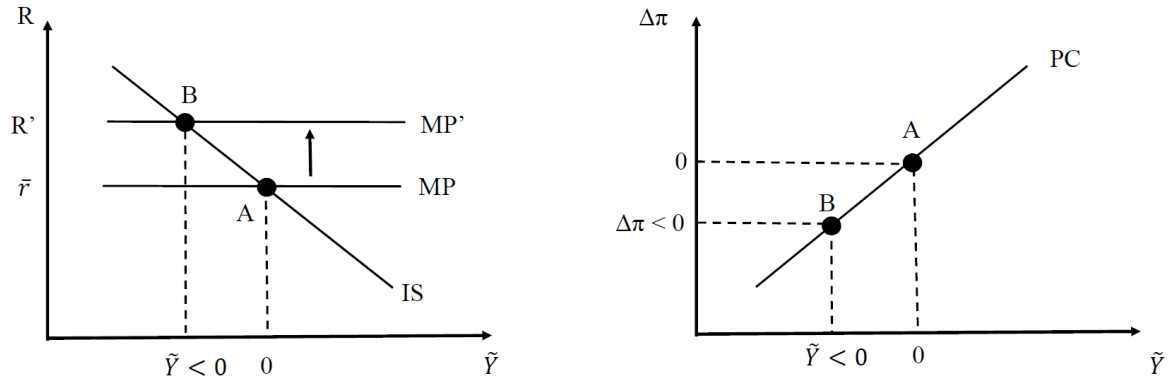
b. How would we have to change the unemployment measure depicted in this graph to relate it to changes in short-run output using your response from part 'a'? Briefly explain. (6 points)

The law considers cyclical unemployment which is the difference between the unemployment rate (plotted above) and the natural unemployment. Therefore, to use this data to depict a relationship with short-run output we would have to subtract from it estimates of the natural rate of unemployment —defined in several ways, including the unemployment rate in the long run, the unemployment rate associated to the potential output, or the steady-state value of the unemployment rate.

5. **Suppose that the inflation rate in a country decreased from 2015 to 2018, and suppose that the original cause of this was a change in interest rates initiated by the central bank.**

   Explain how a change in interest rates could have caused a decrease in the inflation rate using the IS-MP graph and the Phillips curve graph. Make sure to label all relevant points, axes, curves, etc. and explain in words what change in happening in each graph. (24 points)

   An increase in the nominal interest rate by the central bank will cause an increase in the real interest rate because inflation is sticky. This is not visible in the plot so either the increase in nominal rate or in real can be the departing point. This causes a decrease in short-run output (the graph on the left). The decrease in short-run output causes a decrease in the inflation rate as depicted in the Phillips cufrve (graph on the right).

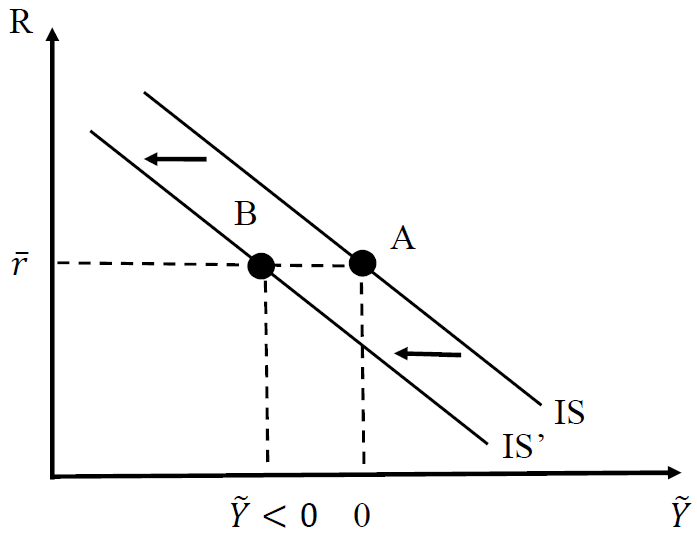


   The new equilibrium of the economy is given by the point B in each plot.

6. Suppose the government decreases defense spending. Suppose the economy starts out where $\tilde{Y} = 0$ and the real interest rate is equal to the marginal product of capital.

a. Graphically depict what would happen to the IS curve in this situation. Make sure to label all of the relevant points (axes, curves, etc.) on your graph. (6 points)

The IS curve would shift to the left with a decrease in government spending.



In this case, although we don't draw an MP line we know the economy starts in point A due to the assumption of starting at potential output. With no further changes the economy would go to point B.

b. Why did you draw the IS curve with the slope (negative, positive, horizontal, vertical) that you did in part 'a'? Briefly explain. (6 points)

The IS curve is downward sloping because of the negative relationship between investment spending and the real interest rate. Short-run output changes in the same direction as investment spending.

c. **How would the change in the IS curve in part 'a' be different if consumers (consumption spending) reacted more strongly to changes in $\tilde{Y}$? Explain your answer and focus only on the change in the IS curve. (8 points)**

Consumers reacting to short-term GDP will imply a multiplier of the effects of aggregate demand shocks into the short-term output larger than one. The effects of the shocks are now given by $1/(1-\bar{x})$ times the usual effect. Despite this, however, the IS curve plot will be similar as the one above. The slope may be a bit flatter and the intercept lower but the overall shape and signs implied by the curves are the same.

Good answers would be: No change but slight adjustments to intercept and slope, or the IS changes because the intercept and slope changes. On the other hand "No change" without mention to the adjustments would give partial credit only.

d. Ignore part 'c'. How would the graph look different if $\bar{b}$ in the IS equation were lower? What is the significance of a lower value for $\bar{b}$ in terms of the relationship between interest rates and short-run output? Explain your answer in words. (6 points)

$\bar{b}$ measures the degree by which investment spending is reacting to deviations of the real interest rate from the marginal product of capital. A lower value for $\bar{b}$ means that investment is changing by less in response to changes in the real interest rate. This leads to a steeper IS curve.

As in part 'c' the shape will the the same. However, a wrong answer would be to say that a lower $\bar{b}$ leads to a flatter slope since the slope is actually $1/\bar{b}$.

Bonus

The following four statements are false. Briefly explain what needs to change in each statement in order to make it correct.

I. $\bar{a}$ is equal to 1 and if it drops below 1 then this is considered a macroeconomic shock.

Answer: It should be "is **equal to 0** and if it drops below **0.**"

II. When the nominal interest rate is less than the marginal product of capital, then firms will increase their investment spending.

Answer: It should be the **"real interest rate"** not the nominal.

III. If the current output is equal to potential output, then the inflation rate is equal to 0.

Answer: It should be the "inflation rate is equal to: it's **past value**", or to "the **expected** inflation", or the "**change in inflation** is equal to 0."

IV. If the current output is lower to potential output, then the prices (of goods and services) are decreasing.

Answer: It should be "**inflation is decreasing**" or "prices are **increasing less than before**".