Due: 11/5, at 11:59pm (via eLearning)

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1. **What is the permanent-income hypothesis? How is diminishing marginal utility related to the theory behind the permanent-income hypothesis? Briefly explain.**
    Diminishing marginal utility helps understand that people smooth consumption. The argument is that we prefer some level of consumption all of the time than volatility in consumption. Then, if I have seven pieces of cake, utility will be greater if I have one piece of cake each day of the week, than if I have 7 in a single day and nothing later. In this context, after a sudden income increase that will not occur later in the future, and therefore won't affect its average or permanent income, consumption will not increase drastically, instead, people will smooth consumption with small increases in it given the extra income. With this, the permanent-income hypothesis follows: Consumption depends on permanent income rather than on short-run income, partly due to its tendency to be smooth and not jump drastically even if there's a sudden (but short lived) income increase.

2. **In Chapter 8 on inflation, one of the conclusions was that the marginal product of capital is equal to the real interest rate. When looking at the IS model, we talk about how <u>differences</u> between the real interest rate and the marginal product of capital lead to changes in short-run output. What is the reason for this discrepancy? Briefly explain.**

    The marginal product of capital is equal to the real interest rate <u>in the long-run, when prices have been able to adjust. In the short-run</u>, however, prices are sticky (take time to adjust), and therefore the real interest rate deviates from the marginal product of capital. This is what allows the central bank (Federal Reserve) to influence the real interest rate.

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

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

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

    3) If the current output is equal to potential output, then the inflation rate is equal to 0

    1) $\bar{a}$ is equal to 0 (and not 1) and any deviation from 0 is a macroeconomic shock.

    2) The statement should include <u>real</u> interest rate and not <u>nominal</u> interest rate.

    3) According to the Phillips curve, the <u>change</u> in inflation is 0 when current output is equal to potential output, but the inflation rate is most likely above 0.

4. **What is the equation representing the IS curve (including the multiplier)? What does the term $\bar{b}$ represent and how is it related to the slope of the IS curve? Briefly explain.**

The equation representing the IS curve is given by:

$$\tilde{Y}_t = \frac{1}{1-\bar{x}}(\bar{a} - \bar{b}(R_t - \bar{r}))$$

The term $\bar{b}$ represents the <u>degree</u> to which investment responds to changes in the real interest rate. The higher $\bar{b}$ the more the investment (and therefore short-run output) reacts to changes in the real interest rate. Because short-run output ($\tilde{Y}_t$) is graphed on the horizontal axis, a higher $\bar{b}$ corresponds to a <u>flatter</u> IS curve.

5. **What role did changes in interest rates by the Federal Reserve, first the decrease from 2000 to 2004, and then the increase from 2004 to 2007, play in the Great Recession? Briefly explain the impact of the decrease and then the impact of the increase.**

As a response to the 2001 recession, the Fed (central bank) decreased interest rates. The <u>decreased interest rates</u>, combined with lenient lending practices, are part of the reason for the <u>sharp increase in housing prices</u> at the start of the 2000s. When the Fed then <u>increased interest rates, this led to higher mortgage payments</u> for those individuals who had adjustable rate mortgages, and many people defaulted on their mortgages, thus deepening the crisis. The changing interest rates —decreasing at first and later increasing— played a role in both the increase in housing prices and the decrease in housing prices.

6. **Suppose that we initially have the following values for the variables that make up the IS curve:**

$$\bar{b} = 0.5, \bar{a} = 0, R_t = \bar{r} = 5\%, \bar{x} = 0$$

If $\bar{a}_{im}$ increases by 2% and the real interest rate falls by 4%, what will be the change in short-run output? Show your work.

The two changes offset each other so that short-run output does not change. Recall that an increase in $\bar{a}_{im}$ leads to a shift to the left (decrease) of the IS curve.

Initially:

$$\tilde{Y}_t = \frac{1}{1-\bar{x}}\left(\bar{a} - \bar{b}(R_t - \bar{r})\right) \rightarrow \tilde{Y}_t = \frac{1}{1-\bar{0}}\left(\bar{0} - 0.5(5 - 5)\right) = 0$$

After the change in $\bar{a}_{im}$ and R_t:

$$\tilde{Y}_t = \frac{1}{1-\bar{0}}\left(-2 - 0.5(1 - 5)\right) = -2 + 2 = \mathbf{0\%}$$

7. What is the difference between the 'ex ante' real interest rate and the 'ex post' real interest rate? Which one is used for investment decisions? Briefly explain.

The real interest rate is equal to the nominal interest rate minus the inflation rate.
However, the inflation rate is not known ahead of time —when deciding what interest rate to charge for a future period— and has to be predicted by those making decisions that involve future returns.

To do this, we can define the ex-ante real interest rate as:

$$R_t^{ex\ ante} = i - \pi_t^e$$

The real interest rate (ex ante) is equal to the nominal interest rate minus the <u>expected</u> rate of inflation.

The ex post real interest rate is:

$$R_t^{ex\ post} = i - \pi_t$$

The real interest rate (ex post) is equal to the nominal interest rate minus the <u>actual</u> rate of inflation. This rate can be determined once the inflation becomes known.

Because investments cannot be made in hindsight, the real interest rate used is the ex ante real interest rate. Investments need to be made on what people expect inflation to be.