Guide to sample problems for exam #2

ECON 104

Spring 2008

Nominal GDP, real GDP, and inflation

Problems 1-2

If we have a price index, we can convert nominal GDP in year n to real GDP (that is, real GDP in the base year) using the following formula

$$\begin{matrix} Real\ GDP \\ (base\ year) \end{matrix} = \begin{matrix} Nominal\ GDP \\ (year\ n) \end{matrix} * \frac{\begin{matrix} Price\ Index \\ (base\ year) \end{matrix}}{\begin{matrix} Price\ Index \\ (year\ n) \end{matrix}}$$

Because of the way the price indices are created, the price index for the base year is always equal to 100. So given nominal GDP in some year, and given the price index for that year, we can always find real GDP using the above formula. For example, in problem #1 real GDP in 2003 is equal to $\$11,500 * \frac{100}{111.6}$, or about \$10,305 billon. Problem #2 is similar.

Problems 9-10

The rate of inflation is the percentage change in the average price level over a given period. Average price levels are measured by price indexes (like the CPI or GDP deflator). If we know the price level at one point in time (call it p_0) and the price level at a later point in time (p_1), we can therefore calculate inflation over the entire period of time by using the formula

$$\text{rate of inflation} = \frac{p_1 - p_0}{p_0} * 100$$

So for problem #10, the price level at the beginning of 2006 was $p_0 = 216.2$ and the price level at the end of that year was $p_1 = 225.1$. Plugging the numbers in above, we see that in 2006 the rate of inflation was about 4.1 percent. Problem #9 is similar.

The labor market

Problems 3-8

The labor force includes precisely everybody who is unemployed and employed ($LF = E + U$). The unemployment rate is the percentage of people in the labor force who are unemployed ($U_{\text{rate}} = \frac{U}{LF} * 100$). The labor force rate is the percentage of the entire population that is in the labor force ($LF_{\text{rate}} = \frac{LF}{\text{population}} * 100$).

Aggregate demand and aggregate supply

Problems 11-14

Just like shifts in individual market supply and demand curves, to understand shifts in aggregate demand and supply you need to know their components; when the components change, the curves shift. Aggregate demand is determined by household consumption, government spending, and net exports (can you think of any other determinants?). If any of these determinants increase at a given price level, aggregate demand will increase at a given price level – that is, the aggregate demand curve would shift to the right. This is what happens in problems #12 and #14. In problem #13, household wealth falls, so households are less able to consume at a given price level – hence aggregate demand falls at a given price level, or shifts to the left.

Similarly, one of the determinants of aggregate supply are costs of production (can you think of any other determinants?). In problem #11, costs of production are reduced, so at any given price level, aggregate supply is lower – that is, the aggregate supply curve shifts to the left.

MPC and the multiplier

Basics

The more disposable income people have, the more they can consume. We can therefore think of the economy's consumption C as a function of total disposable income Y_d. Let's assume (for this class and for your test) that this consumption function is just a line:

$$C = a + b \cdot Y_d$$

You can draw this line on a graph with Y_d on the horizontal axis and C on the vertical axis. What are a and b? Well, a is how much consumption we expect in the economy when disposable income is equal to zero – this is called autonomous consumption.

b is the slope of the line, which is just the "rise" in C divided by the "run" in Y_d. In other words, b is how much additional consumption we expect from an increase in disposable income – this is called the economy's marginal propensity to consume (MPC). Now we can write

$$C = a + MPC \cdot Y_d$$

We assume in this class that all disposable income is either consumed or saved. So, the marginal propensity to save (MPS) disposable income is just $MPS = 1 - MPC$.

The multiplier, which we have discussed in class, is $\frac{1}{1-MPC}$.

Problems 15-20

In these problems Dolenc gives you a table, called the **Keynesian cross table**, of consumption at given levels of disposable income. Problem #15 asks for the MPC. That's just the slope of the consumption function, or the change in C divided by the change in Y_d. From the table we therefore have $MPC = \frac{50-210}{0-200} = 0.80$. Now we can also answer problem #16: $MPS = 1 - MPC = 0.20$.

Problem #17 wants the equation for the consumption function. Above, we see that we're almost done. We just need to find a. Remember that a, autonomous consumption, is the value of C when $Y_d = 0$. Looking at the table, we see that a is \$50 billion. Therefore, $C = 50 + 0.80 \cdot Y_d$.

Probelm #18 asks for the level of income Y_d that equals C. This is just algebra. Since $C = 50 + 0.80 \cdot Y_d$,

if $Y_d = C$, then we can write

$$\begin{aligned} Y_d &= 50 + 0.80 \cdot Y_d, \text{ so} \\ 0.20 \cdot Y_d &= 50, \text{ so} \\ Y_d &= 250. \end{aligned}$$

Problem #19 asks for the multiplier. Looking at the consumption function, we see in this case $MPC = 0.75$, so the multiplier is $\frac{1}{1-0.75} = 4$. Problem #20 is similar.