# Problem Set 6: Macroeconomics: Theory and Measurement

Matthew J. Baker: Principles of Economics

November 26, 2003

These problems will familiarize you with some of the essential calculations you will perform in just about every economics class you take. The problem set is due one week from today.

## 1 Making a price index

Suppose that the typical consumer buys just two goods: food and clothing. The amounts of each good purchased by the typical consumer, and the prices of these two goods over two years, are listed in the table below:

| Good | Quantity | Price in Year 1 | Price in Year 2 |
|---|---|---|---|
| Food | 53 | \$7.50 | \$9.00 |
| Clothing | 26 | \$15.00 | \$18.00 |

1. Calculate the total cost of purchasing the typical amount of food and clothing in both years.
2. Using Year 1 as the base year (i. e., year 1 prices = 100), develop a price index for the price level in the two years.
3. What percent inflation has occurred between years 1 and 2?
4. Suppose that, contrary to the typical consumer, you buy more food and less clothing. Will the price level you have calculated above tend to overstate or understate inflation from your perspective?

## 2 Applying price indices and finding growth rates

Consider the following data describing Gross Domestic Product (in billions of dollars) for the United States for the period 1966 to 1970:

| Year | Nominal GDP | (Implicit) Price Index |
|---|---|---|
| 1966 | 749.9 | 113.9 |
| 1967 | 793.9 | 117.6 |
| 1968 | 864.2 | 122.3 |
| 1969 | 930.3 | 128.2 |
| 1970 | 977.1 | 135.2 |

Remember that the growth rate in a variable $x$ can be calculated using the formula $r_x = \frac{x_{current} - x_{past}}{x_{past}}$.

1. Find the value of *Real* GDP in each of the above years. You'll need to remember how to deflate numbers to do this.
2. How much inflation has occurred between 1966 and 1970?
3. Over the five-year period, what was the growth rate of Real GDP? What was the growth rate of Nominal GDP?

## 3 Using growth rates

In this section, it is helpful to remember that the value of an asset $t$ years from now may be calculated using the formula $CV = (1 + r_x)^t V$, where $V$ denotes the initial size of the object in question, $t$ the number of years the object has been growing, and $r_x$ is the percentage growth rate. For example, if we wish to see how much \$1000 will be worth in two years at an interest rate of 7%, we calculate $(1 + .10)^2 * 1000 = 1322.50$.

1. Suppose that you have invested 1000 dollars at an interest rate of 17%. How much money will you have in one year?
2. Suppose that, over this time period, the price level has risen 3%. How much money, in real terms, will you have in one year? (remember how to deflate variables from class!)
3. What is the *real* interest rate on your investment?

4. Baker brags in class about how he invested $1000 in some stocks he hand-picked 10 years ago, and now has three times the total amount of money he invested ($3000). You do some research and reveal that the average growth of the stock market over the 10 years was 17%. How does Baker's return compare with the average return generated by the market over these years? Is Baker a windbag, or what?

5. This next question should put your calculators to the test. Over the past 127 years, GDP per capita in the United States has grown from roughly $3,188 to $28,740. Given this increase over the 127-year period, what is the approximate rate of yearly growth in GDP per capita? (Hint: use the formula given above and solve for $r_x$!)

These next problems will help you with some of the essentials of macroeconomic theory.

# 4 The Quantity Theory of Money

Suppose that this year's money supply is $500 billion, Nominal GDP is $10,000 billion, and Real GDP is $5,000 billion. Remember that, if real GDP is indicated by $Y$, then nominal GDP is $PY$, also, remember that the quantity theory, which describes the long-run behavior of prices, is described by the relationship $MV = PY$.

1. What is the price level? What is the velocity of money?

2. Suppose that the velocity is constant and the economy's output of goods and services rises by %5 each year. What will happen to Nominal GDP and the price level next year if the Fed keeps the money supply constant?

3. What money supply should the Fed set next year if it wants to keep the price level stable (the same)?

4. What money supply should the Fed set next year if it wants inflation to be %10?

# 5 Some sample essay questions - AD/AS and MD/MS

1. Suppose that, because of insufficient aggregate demand, the economy is currently in a recession. Using an AD/AS diagram and an MD/MS diagram, describe how

the economy naturally recovers from this recession, and the behavior of prices, interest rates, GDP, and unemployment while the economy recovers.

2. How would your above story change if instead the government engaged in fiscal policy (for example, by increasing government spending) to correct the recession?

3. How would your above story change if the Fed engaged in monetary policy (for example, by increasing the money supply) to correct the recession?

4. Suppose that the economy is initially in its long run equilibrium, but the Fed wished to reduce the rate of inflation. Describe 1) the policy that they might undertake to do this, 2) how this effects the economy in the short run, and 3) the long-run impact of this policy on interest rates.