14.02 Principles of Macroeconomics, Fall 1999
3 pages

Problem Set 1
Due: Friday, September 17.

Answers

Question 1. (10 points each) True, false or uncertain? Give a brief but careful explanation.

a) According to some international data source, Hong Kong and Singapore have an odd-looking history of the ratio of exports to GDP: it was above 100 % between 1984 and 1995 for Hong Kong, and between 1972 and 1992 for Singapore. Then there must be some error in the data.

False. Think of the national accounting identity

$$Y = C + G + I + X - Q$$

Note that if Q (imports) is large enough, then $X > Y$ is possible. And it makes sense with these two countries: both import raw and intermediate materials, assemble them into final products (mostly in electronics) and sell them abroad. In principle, $I < 0$ could also lead to exports exceeding production: a country can sell capital or inventories accumulated in earlier years. However, this is not likely to happen through this many years.

b) When comparing the evolution of the unemployment rate and inflation in France (see figure here for inflation, and see p11 for unemployment rate: it was similar to Europe), we find a complete failure of the Phillips relation.

False. The disinflation (a decreasing inflation) from 1981 to 1986 was accompanied by a large (and increasing) unemployment rate. This is exactly what the Phillips relation is saying. However, inflation stayed constant (and low) since then, while unemployment stayed high, which does not fit the Phillips relation.

Question 2

a) (10 points) From 1989 to 1993, Russia's real GDP has declined by approximately 40 %. Does it necessarily mean that true output has also declined by a similar amount?

The answer is no, and there are (at least) two major candidates why. The first cites the underground economy: the economic transition came with a decline in law enforcement, which made it possible to hide economic activities from the tax authorities. This underground sector does produce, but it will not be contained in the official GDP numbers. A second reason could be an increase in home production and other non-market activities, which replaced some of the previous production, but again, it will not be captured by GDP numbers.

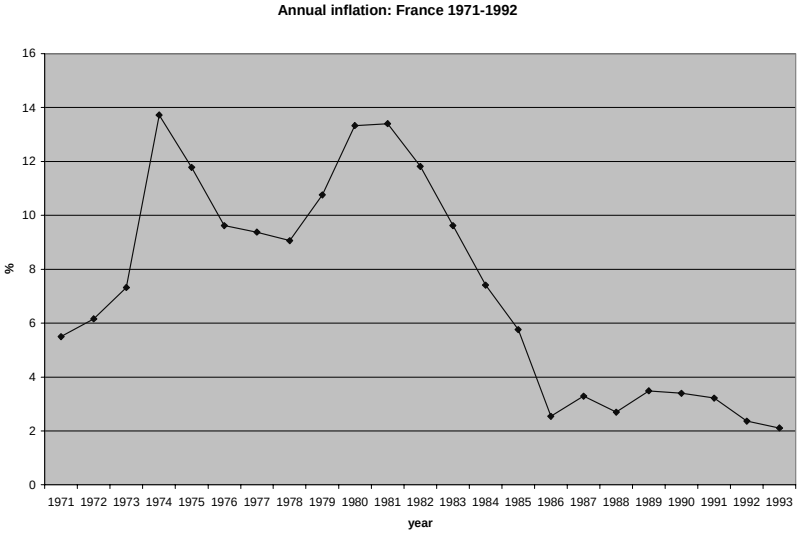

Figure 1:

b) (5 points) How many years would it take to return to the 1989 level with a 4 % annual growth rate?

$1.04^x = \frac{1}{0.6} = 1.6667$

$x \log 1.04 = \log 1.667$

$x = \frac{\log 1.667}{\log 1.04} = 13.029$

It takes a bit more than 13 years.

Question 3 Short answer (20 points).

Why do people care about inflation?

This question was meant to be ambiguous, and no clear-cut answer is available. The following terms and ideas are the most likely reasons why people care about (like or dislike) inflation. One is that it affects the *income distribution* among people: for example, if pensions are not indexed to inflation (or not fully), then retirees will see their benefits meld away. Or if there are fixed interest rate loans or other contracts, then high (or higher than expected) inflation hurts past lenders and benefits past borrowers, low (or lower than expected) inflation the other way around.

Inflation also leads to *distortions*. Some prices (just like interest rates in the previous example) might be fixed by law or hard to adjust. Or if tax brackets are fixed, high inflation will push people into higher and higher tax rates, although their real income (in terms of how many goods they can buy) has not increased.

Both of these create more *uncertainty,* people and also firms will find it hard to predict their future financial situation, or to make decisions about purchases, investments etc.

Question 4

A small cafe declares itself an independent state. One of its first tasks is to do some national accounting. In 1997, it produced 5,000 brownies, 20,000

bagels and 50,000 cups of coffee. Prices were \$1 per brownie, \$0.5 (50 cents) per bagel and \$1 per cup of coffee. In 1998, production was 12,000 brownies, 24,000 bagels and 50,000 cups of coffee, at \$1, \$1 and \$0.5 per unit, respectively.

a) (5 points) Calculate nominal GDP in each year.

Nominal GDP in 1997: $5,000 * 1 + 20,000 * 0.5 + 50,000 * 1 = 65,000$

Nominal GDP in 1998: $12,000 * 1 + 24,000 * 1 + 50,000 * 0.5 = 61,000$

b) (5 points) Calculate real GDP in each year, using 1997 as base year.

Real GDP in 1997, using 1997 prices: $5,000 * 1 + 20,000 * 0.5 + 50,000 * 1 = 65,000$

Real GDP in 1998, using 1997 prices: $12,000 * 1 + 24,000 * 0.5 + 50,000 * 1 = 74,000$

c) (5 points) Calculate real GDP in each year, using 1998 as base year.

Real GDP in 1997, using 1998 prices: $5,000 * 1 + 20,000 * 1 + 50,000 * 0.5 = 50,000$

Real GDP in 1998 using 1998 prices: $12,000 * 1 + 24,000 * 1 + 50,000 * 0.5 = 61,000$

d) (10 points) Determine the growth rate of GDP based on your answers in a, b and c. Did the economy grow or not?

The growth rate of nominal GDP was $\frac{61000-65000}{65000} = -0.061538$.

Similarly, the growth rate of real GDP (1997 as base year) was $\frac{74000-65000}{65000} = 0.13846$, and $\frac{61000-50000}{50000} = 0.22$ with 1998 as base year. Just looking at these three numbers, one might think that the economy did not necessarily grow. But this is not the case: in 1998, it produced the same amount of coffee and a larger amount of brownies and bagels than in 1997, so it did grow.

e) (10 points) Find the change in the GDP deflator, both with 1997 and 1998 as base year. Relate your finding to your answers in d.

The GDP deflator is the ratio of nominal to real GDP. So, with 1997 as base year, it is 1 in 1997 and $\frac{61000}{74000} = 0.82432$. With 1998 as base year, the deflator is $\frac{65000}{50000} = 1.3$ in 1997 and 1 in 1998. Notice that the GDP deflator has decreased in both cases, which means that prices on average have gone down. This can help us explain why real GDP growth was larger than nominal GDP growth: with decreasing prices, even the same production will give a smaller nominal GDP.

Question 5 (5 points each) Explain why each of the following would or would not be counted in GDP.

a) You buy a used bike for \$50 on a yard sale.

This bike was already counted in the GDP of the year of its production. To avoid double-counting, sales of used items are excluded from GDP calculations.

b) A taxi driver buys gasoline for his cab.

In this case, gasoline is an intermediate product and not a final good. Hence, this transaction will not be counted. When somebody takes the cab and pays the bill, that will be counted (unless it was a business trip which serves as an intermediate good in consulting...)