

Lecture 4: The Shortcomings of our Measures of Prices and Output

I. OVERVIEW

- The last 2 lectures described how aggregate measures of price and quantity for the economy are constructed. While these measures are very informative and are widely used in many countries to summarize the state of the macroeconomy, it is important to realize that they are by no means perfect.
- In today's class, we will examine some of the weaknesses of these measures. We will also take a quick overview of how aggregate output and prices have behaved in the United States in the post-war period.
- This will set the stage for the rest of the course in which we try to explain various phenomena that seem to be present in the data on aggregate price and quantity.

II. PROBLEMS WITH USING GDP TO MEASURE OUTPUT AND ECONOMIC WELLBEING

1. Non-Market Transactions

- Recall that GDP was the value of all new goods and services produced in the domestic economy. Because we used market prices to value the goods that are being sold, only market transactions are included in GDP. Statisticians are unable to accurately measure the quantity of certain types of non-market activity, for example a poor farming family that grows and consumes their own vegetables may not be counted as contributing to GDP.

2. Underground Economy

- In some countries, there is a substantial underground economy; people shielding their activities from the government either to avoid taxes or because the activities are illegal. The value of these underground transactions is often ignored in official statistics.

3. Income Distribution

- GDP per capita is only a measure of the average level of output per person in the economy. Economic well-being depends both on the size of the pie as well as the distribution of the pie. Bill Gates alone counts as \$10,000 worth of output for 10 million people!

4. Non-Material Well Being

- People care about their quality of life; a high GDP per capita may not be all that great if coupled with low literacy, life expectancy, low environmental quality etc.

5. New Goods

- New goods become especially troublesome in calculating Real GDP. Recall that we used some base year's prices to calculate the value of Real GDP for a particular year. But what if there are goods that were not around in the base year? What is the appropriate price for those goods?

6. Quality Improvements

- Quality Improvements are also a problem when we calculate GDP. The easiest example is computers. Every year computers become more powerful and become cheaper as well. So the contribution of computers to Nominal GDP may be falling even though the production of computing power is vastly improving
- However, this is mitigated by the fact that more powerful computers are often used to produce more output in other sectors of the economy. In general, though the problem occurs with other goods whose quality has improved substantially over the years.

Chain Weighted Real GDP

- One way around this problem posed by new goods and quality improvements is to use chain-weighted Real GDP as a measure of output. This is done as follows: first calculate Real GDP for adjacent pairs of years (when there are fewer new goods). Then calculate the growth rate of Real GDP for these adjacent years. Finally, take Real GDP from the base year and the Real GDP growth rates to calculate Real GDP for any subsequent year.

- Example: Consider the following 4 years of data, which is given to us.

	1992	1993	1994	1995
Nominal GDP	\$10 billion	\$10.50 bill.	\$11.025 bill.	\$11.576 bill.
Real GDP (1992 Base)	\$10 billion	\$10.25 bill.		
Real GDP (1993 Base)		\$10.50 bill.	\$10.710 bill.	
Real GDP (1994 Base)			\$11.025 bill.	\$11.240 bill.

- We can use this information to calculate the Chain weighted Real GDP as the following:

Real GDP Growth		2.5% [Row 2]	2% [Row 3]	2% [Row 4]
Chain Weighted Real GDP (1992 dollars)	\$10.00 bill.	$\$10 * 1.025 =$ \$10.25 bill.	$\$10.25 * 1.02 =$ \$10.46 bill	$\$10.46 * 1.02 =$ \$10.67 bill.

GDP Measured at Purchasing Power Parity

- We used Real GDP to compare output in a country over time; otherwise, inflation would cause our measure of output to increase even though the production of goods and services was not necessarily increasing.
- Similar problems arise in comparing GDP across countries. First, prices are measured in different currencies, so Russian GDP is measured in Rubles and Japanese GDP is measured in yen. One way around this is of course to convert everything to dollars using the current market exchange rate.
- However, this is not a satisfactory method to use for two reasons: first, market exchange rates fluctuate considerably, especially over short periods of time. Fluctuations in the exchange rate will cause GDP to fluctuate without any fluctuations in production of goods and services or the values of these goods.
- Second, the buying power of a dollar can vary widely across countries. If we take a fairly homogenous good like a haircut, its price can be as high as \$15-20 in developed countries yet as low as \$0.50 in developing countries.
- So if we are to compare the production of haircuts across countries, we need to use the same price for haircuts in all countries. GDP calculated using the same set of prices in all countries is known as GDP measured at Purchasing Power Parity (PPP).
- A simple example can illustrate the concept. Per-capita GDP in Kenya in 1999 was about \$350 GDP. In other words the value of goods produced in Kenya was about \$350 per person. However, this number is misleading because \$350 in Kenya can buy a lot more goods and services than \$350 in the U.S. would because prices are much lower in Kenya.
- GDP per capita measured at PPP, i.e. the per-capita value of Kenyan GDP using a common set of prices (typically U.S. prices) is about \$1000. In other words, the average Kenyan earns about \$350 a year, which because of the fact that prices are lower there than in the U.S., is equivalent to earning \$1000 in the U.S.

IV. PROBLEMS IN USING THE CPI TO MEASURE PRICES

1. Fixed Basket of Goods

- Because it has a fixed basket of goods, the CPI tends to overestimate inflation - does not correct for consumer's ability to switch away from goods that become expensive. For example, suppose that chicken is an item in the CPI basket. If chicken becomes more expensive than beef then some consumers may stop eating chicken altogether and start eating beef, however, the same quantity of chicken remains part of the CPI basket even though people are consuming less.
- This can clearly be seen in the chocolate-ice cream economy from the last lecture. In 1998, consumers bought 2 pints of ice cream for every chocolate bar they consumed. So the representative basket consisted of 2 pints of ice cream and a bar of chocolate.
- However, in 1999, consumers bought 3 pints of ice cream for every chocolate bar. Therefore, a \$0.50 change in the price of ice cream has the same impact as a \$1.50 change in the price of chocolate. This is captured by the GDP deflator; however, the CPI basket still has a 2:1 ratio so a \$0.50 change in the price of ice cream only has the same impact as a \$1.00 change in the price of chocolate.

2. Changes in Quality

- Does not account for changes in quality which improve purchasing power- computers regardless of when you buy them always seem to cost \$2500 - yet the average computer today is 850 MHz, 2 years ago it was about 300 MHz. This causes the CPI to overestimate inflation; the price of computing has decreased even though the price of the computer is unchanged.

3. New Goods

- The introduction of new goods that render old goods obsolete may pose a problem because the old goods still remain in the CPI basket until it is revised again. So even though people are buying the cheaper new good, the more expensive old good is being used to calculate CPI; this again leads to overestimation of inflation.

V. PROBLEMS IN USING THE GDP DEFLATOR TO MEASURE PRICES

1. Changes in Quality

- Just like the CPI, the deflator is unable to fully incorporate the increased purchasing power that comes with improvements in quality so this tends to push the deflator to overestimate inflation.

2. New Goods

- We saw that the introduction of new goods poses a problem when calculating Real GDP; therefore it poses a problem in calculating the GDP deflator because the deflator is the ratio of nominal to Real GDP.

3. Imports

- If prices of imported goods fall but prices of domestic goods are high, consumer's purchasing power may not fall by much even if the GDP deflator indicates a high price level.

VI. IMPORTANCE OF MEASURING INFLATION ACCURATELY

- CPI is used for several economically and politically significant activities
 1. Calculating Cost of Living increases in Social Security payments.
 2. Index wage increases in collective bargaining agreements between unions and workers.
 3. Revising income tax brackets.
 4. Calculating the interest payments on the inflation-adjusted government bonds.

- The Boskin Commission calculates that the CPI overestimates inflation by about 1%, which translates into almost a trillion dollars more in cumulative government outlays over a dozen years!