

## 7.24: The GDP Deflator and Other Major Price Indices

### Learning Objectives

- Contrast the CPI with other price indices, including the PPI and GDP Deflator

### Additional Price Indices: GDP Deflator, PPI, and More

We indicated earlier in this module that there are a number of important price indices, in addition to the CPI. These include the GDP Deflator, the Producer Price Index and the Employment Cost Index. Let's take a look at those now.

### The GDP Deflator

We introduced the GDP Deflator in the last module as a critical part of our discussion of GDP and economic growth. The **GDP Deflator** is essentially the average price of all goods and services included in GDP. The GDP Deflator goes by several names, such as the Implicit Price Deflator for GDP, and the GDP Price Index, but they all mean the price index which is used to convert nominal into real GDP.

$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{GDP Deflator}}$$

Nominal GDP is distorted by the effects of inflation, which “inflate” its value. Real GDP corrects for this distortion by removing the effects of inflation. As such, real GDP provides a more accurate measure of production economy-wide. Economic growth is typically measured by the percent change in real GDP. Neither of these measures is possible without the GDP deflator.

Since the GDP deflator incorporates the prices of everything included in GDP, the percentage change in the GDP Deflator is the broadest measure of inflation that exists, which is why it tends to be preferred by economists. Unlike the CPI, the baskets of goods and services used to compute the GDP deflator is not fixed, but re-calculates what each year's GDP would have been worth using the base-year's prices.

### Calculating Real GDP using the GDP Deflator

As an example let's take a fictional production table for Switzerland that includes only three goods- cheese, watches and chocolate. Between the years 2009 and 2010 the output and prices of these goods produced by the Swiss economy changed, yet by calculating 2010 output in 2009 prices we can derive the Real GDP and therefore the GDP deflator.

#### Swiss Output in 2009:

<i>Goods</i>	<i>Quantity</i>	<i>Price (2009)</i>	<i>Total Value of Output</i>
Cheese	10	5	10 X 5 = 50
Watches	5	20	5 X 20 = 100
Chocolate	4	3	4 X 3 = 12
<i>Nominal GDP:</i>			50 + 100 + 12 = 162

From the table above the total value of output for each good in 2009 is derived by multiplying the quantity and price of those goods. Nominal GDP is simply the sum of these total values for cheese, chocolate, and watches.

Between 2009 and 2010 both the quantity produced and the prices of these goods increased. This results in a higher nominal GDP for 2010, yet only some of the increase can be attributed to increases in output or ‘real’ economic growth. A significant portion of this increase in nominal GDP is the result of pure price increases which do not make consumers any better off.

#### Swiss Output in 2010:

<i>Goods</i>	<i>Quantity</i>	<i>Price (2010)</i>	<i>Total Value of Output</i>
Cheese	12	5.5	12 X 5.5 = 66
Watches	6	22	6 X 22 = 132
Chocolate	5	3.5	5 X 3.5 = 17.5
<i>Nominal GDP:</i>			66 + 132 + 17.5 = 215.5

We can better gauge the real economic growth from 2009-2010 by recalculating the 2010 quantities in 2009 prices. This makes 2009 our *base year* when calculating the 2010 GDP deflator. The 2010 GDP deflator is the index by which 2010 nominal GDP can be converted into 2010 real GDP in 2009 prices.

#### Swiss Output in 2010 (2009 prices):

<i>Goods</i>	<i>Quantity (2010)</i>	<i>Price (2009)</i>	<i>Total Value of Output</i>
Cheese	12	5	12 X 5 = 60
Watches	6	20	6 X 20 = 120
Chocolate	5	3	5 X 3 = 15
<i>Real GDP (2009 prices):</i>			60 + 120 + 15 = 195

By now it should be apparent that we can adjust the formula for Real GDP above to calculate the GDP deflator. By multiplying both sides by the GDP deflator and then divide both sides by the Real GDP we get the following formula:

$$\text{GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}}$$

We know the nominal GDP in 2010 is 215.5 and the real GDP in 2009 prices is 195. By plugging in these values it is a simple exercise to calculate the GDP deflator for 2010 is equal to 1.11 (rounding to two decimal places). By dividing the 2010 nominal GDP by this value we get Switzerland's real GDP at 2009 price levels.

It is a simple exercise to apply this same method to subsequent years such as 2011, 2012, etc. By recalculating the value of goods and services produced in these years using 2009 prices we can derive a GDP deflator which can be used to quickly convert nominal GDP into real GDP. The GDP deflator is also a useful measure of inflation since the base year 2009.

### Other Price Indices

The basket of goods behind the Consumer Price Index represents an average hypothetical U.S. household, which is to say that it does not exactly capture anyone's personal experience. When the task is to calculate an average level of inflation, this approach works fine. What if, however, you are concerned about inflation experienced by a certain group, like the elderly, or the poor, or single-parent families with children, or Hispanic-Americans? In specific situations, a price index based on the buying power of the average consumer may not feel quite right.

To address problems like these, the BLS publishes a number of experimental price indices: some for particular groups like the elderly or the poor, some for different geographic areas, and some for certain broad categories of goods like food or housing.

The BLS also calculates several price indices that are not based on baskets of consumer goods. For example, the **Producer Price Index (PPI)** is based on prices paid for supplies and inputs by producers of goods and services. It can be broken down into price indices for different industries, commodities, and stages of processing (like finished goods, intermediate goods, crude materials for further processing, and so on). The PPI can be thought of as a measure of the (non-labor) costs of U.S. producers. Similarly, the **Employment Cost Index (ECI)** estimates the average cost of labor compensation to employers, including wages, salaries and fringe benefits. The percentage change in the ECI measures wage inflation in the labor market. There is an **International Price Index** based on the prices of merchandise that is exported or imported.

What's the best measure of inflation? If concerned with the most accurate measure of inflation, use the inflation rate measured with the GDP deflator as it picks up the prices of all goods and services produced. However, it is not a good measure of the cost of living as it includes prices of many products not purchased by households (for example, aircraft, fire engines, factory buildings, office complexes, and bulldozers). If one wants the most accurate measure of inflation as it impacts households, use the CPI, as it only picks up prices of products purchased by households. That is why the CPI is sometimes referred to as the cost-of-living index. As the Bureau of Labor Statistics states on its website: "The 'best' measure of inflation for a given application depends on the intended use of the data."

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### glossary

[glossary-page][glossary-term]Employment Cost Index: [/glossary-term][glossary-definition]estimate of the average cost of labor compensation to employers, including wages, salaries and fringe benefits[/glossary-definition][glossary-term]GDP Deflator: [/glossary-term][glossary-definition] price index which measures the average price of all goods and services included in GDP; used to convert nominal into real GDP[/glossary-definition][glossary-term]Producer Price Index: [/glossary-term][glossary-definition]price index based on prices paid for supplies and inputs by producers of goods and services[/glossary-definition] [/glossary-page]

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