

Measuring the cost of living

LECTURE: 4

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Overview

- ✓ Learn how the Consumer Price Index (CPI) is constructed.
- ✓ Calculating Consumer Price Index and the Inflation Rate.
- ✓ Problems in measuring the cost of living.
- ✓ Correcting economic variables for the effects of inflation.

Measuring the Cost of Living

In determining the cost of living, Statistics first identifies a “market basket” of goods and services the typical consumer buys.

Annually, Statistics surveys consumers to determine what they buy and the overall cost of the goods and services they buy.

The Consumer Price Index (CPI) is used to monitor changes in the cost of living (i.e. the selected market basket) over time. When the CPI rises, the typical family has to spend more dollars to maintain the same standard of living.

The goal of the CPI is to measure changes in the cost of living. It reports the movement of prices not in dollar amounts, but with an index number.

THE CONSUMER PRICE INDEX

The consumer price index (CPI) is a measure of the overall cost of the goods and services bought by a typical consumer.

The Bureau of Labor Statistics reports the CPI each month.

It is used to monitor changes in the cost of living over time.

When the CPI rises, the typical family has to spend more dollars to maintain the same standard of living.

How the Consumer Price Index Is Calculated

Fix the Basket:

- Determine what prices are most important to the typical consumer.
- The Bureau of Labor Statistics (BLS) identifies a market basket of goods and services the typical consumer buys.

Find the Prices:

- Find the prices of each of the goods and services in the basket for each point in time.

Compute the Basket's Cost:

- Use the data on prices to calculate the cost of the basket of goods and services at different times.

Choose a Base Year and Compute the Index:

- Designate one year as the base year, making it the benchmark against which other years are compared.
- Compute the index by dividing the price of the basket in one year by the price in the base year and multiplying by 100.

Compute the inflation rate:

- The inflation rate is the percentage change in the price index from the preceding period.

How the Consumer Price Index Is Calculated

$$\text{Consumer price index} = \frac{\text{Price of basket of goods and services in current year}}{\text{Price of basket in base year}} \times 100$$

That is, the price of the basket of goods and services in each year is divided by the price of the basket in the base year, and this ratio is then multiplied by 100. The resulting number is the consumer price index.

The Inflation Rate ($\pi\%$)

- The **inflation rate** is calculated as follows:
-

$$\text{Inflation Rate in Year 2} = \frac{\text{CPI in Year 2} - \text{CPI in Year 1}}{\text{CPI in Year 1}} \times 100$$

Calculating the CPI and the inflation rate: an example

Step 1: Survey consumers to determine a fixed basket of goods

Basket = 4 hot dogs, 2 hamburgers

Step 2: Find the price of each good in each year

Year	Price of hot dogs	Price of hamburgers
2015	\$1	\$2
2016	2	3
2017	3	4

Step 3: Compute the cost of the basket of goods in each year

2015	$(\$1 \text{ per hot dog} \times 4 \text{ hot dogs}) + (\$2 \text{ per hamburger} \times 2 \text{ hamburgers}) = \8 per basket
2016	$(\$2 \text{ per hot dog} \times 4 \text{ hot dogs}) + (\$3 \text{ per hamburger} \times 2 \text{ hamburgers}) = \14 per basket
2017	$(\$3 \text{ per hot dog} \times 4 \text{ hot dogs}) + (\$4 \text{ per hamburger} \times 2 \text{ hamburgers}) = \20 per basket

Step 4: Choose one year as a base year (2008) and compute the CPI in each year

2015	$(\$8 / \$8) \times 100 = 100$
2016	$(\$14 / \$8) \times 100 = 175$
2017	$(\$20 / \$8) \times 100 = 250$

Step 5: Use the consumer price index to compute the inflation rate from previous year

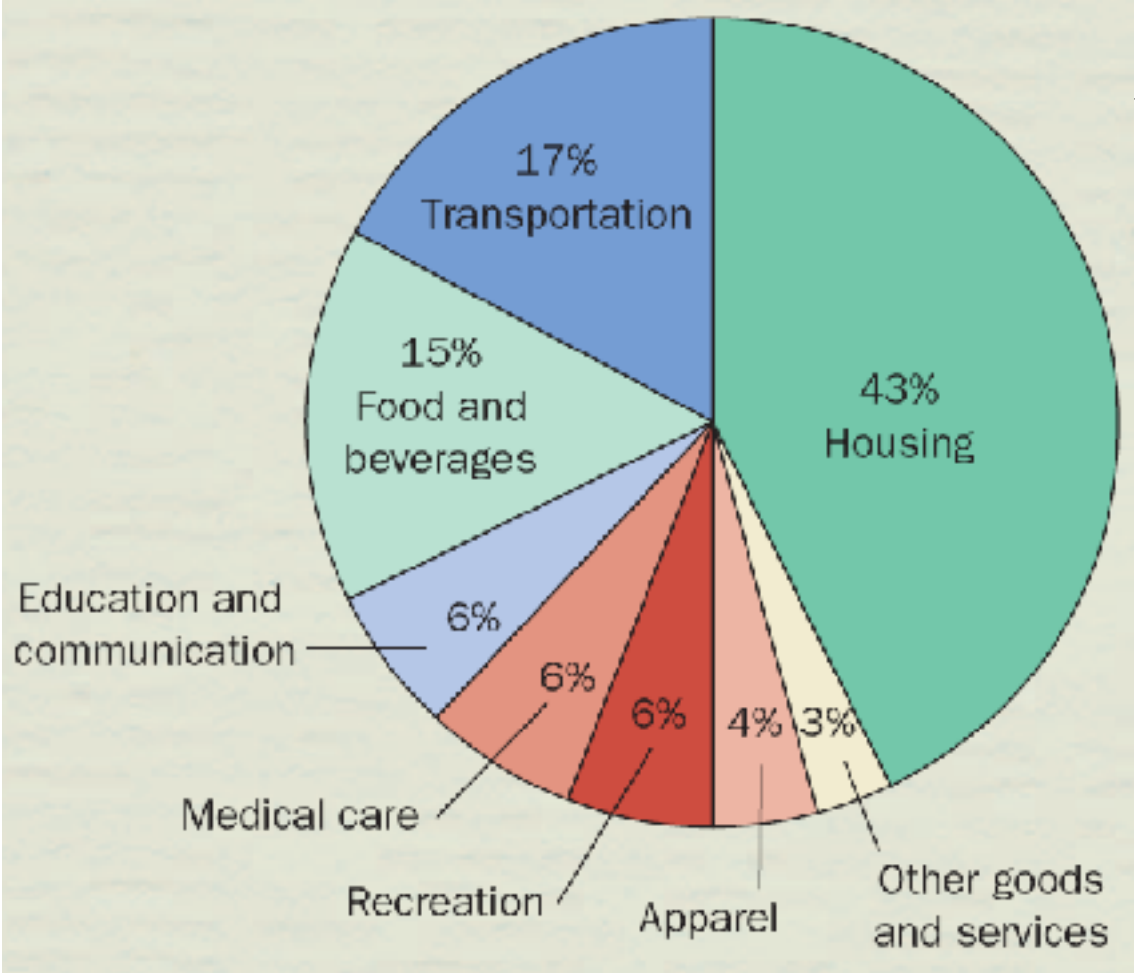
2016	$(175 - 100) / 100 \times 100 = 75\%$
2017	$(250 - 175) / 175 \times 100 = 43\%$

How the Consumer Price Index Is Calculated

Calculating the Consumer Price Index and the Inflation Rate: Another Example

- Base Year is 2002.
- Basket of goods in 2002 costs \$1,200.
- The same basket in 2004 costs \$1,236.
- $\text{CPI} = (\$1,236/\$1,200) \times 100 = 103$.
- Prices increased 3 percent between 2002 and 2004.

The typical basket of goods and services



This figure shows how the typical consumer divides spending among various categories of goods and services. Each percentage is called as “relative importance” of the category.

Problems in Measuring the Cost of Living

The CPI is an accurate measure of the selected goods that make up the typical bundle, but it is not a perfect measure of the cost of living.

Substitution bias

Introduction of new
goods

Unmeasured quality
changes

The GDP Deflator versus the Consumer Price Index :

The GDP deflator is calculated as follows:

$$\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

The GDP deflator vs. consumer price index

GDP DEFLATOR

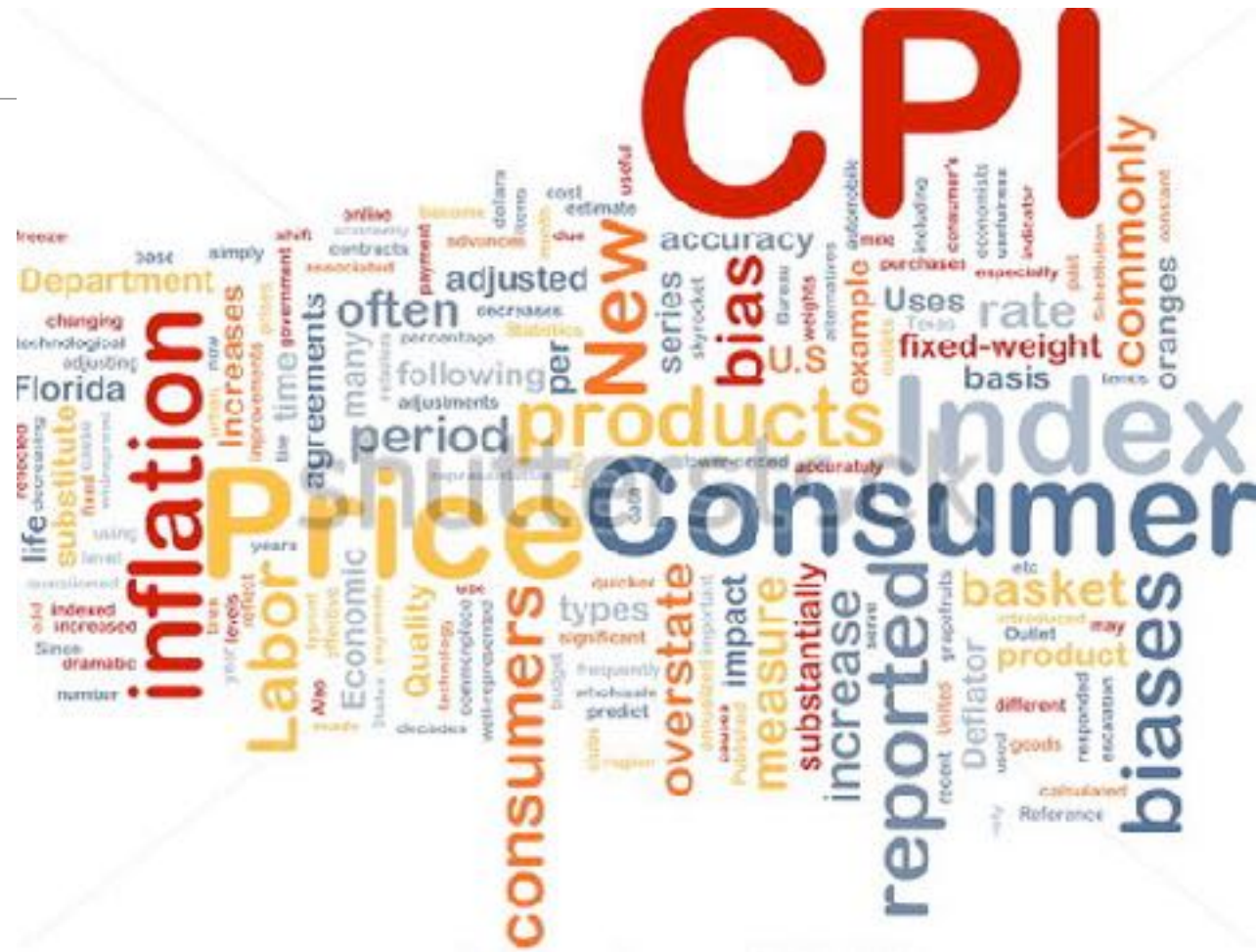
- Ratio of nominal GDP to real GDP
- Reflects prices of all goods & services produced domestically
- Compares the price of currently produced goods and services
- To the price of the same goods and services in the base year

CPI

- Reflects prices of goods & services bought by consumers
- Compares price of a fixed basket of goods and services
- To the price of the basket in the base year

Quick quiz:

Explain briefly what the consumer price index is trying to measure and how it is constructed.

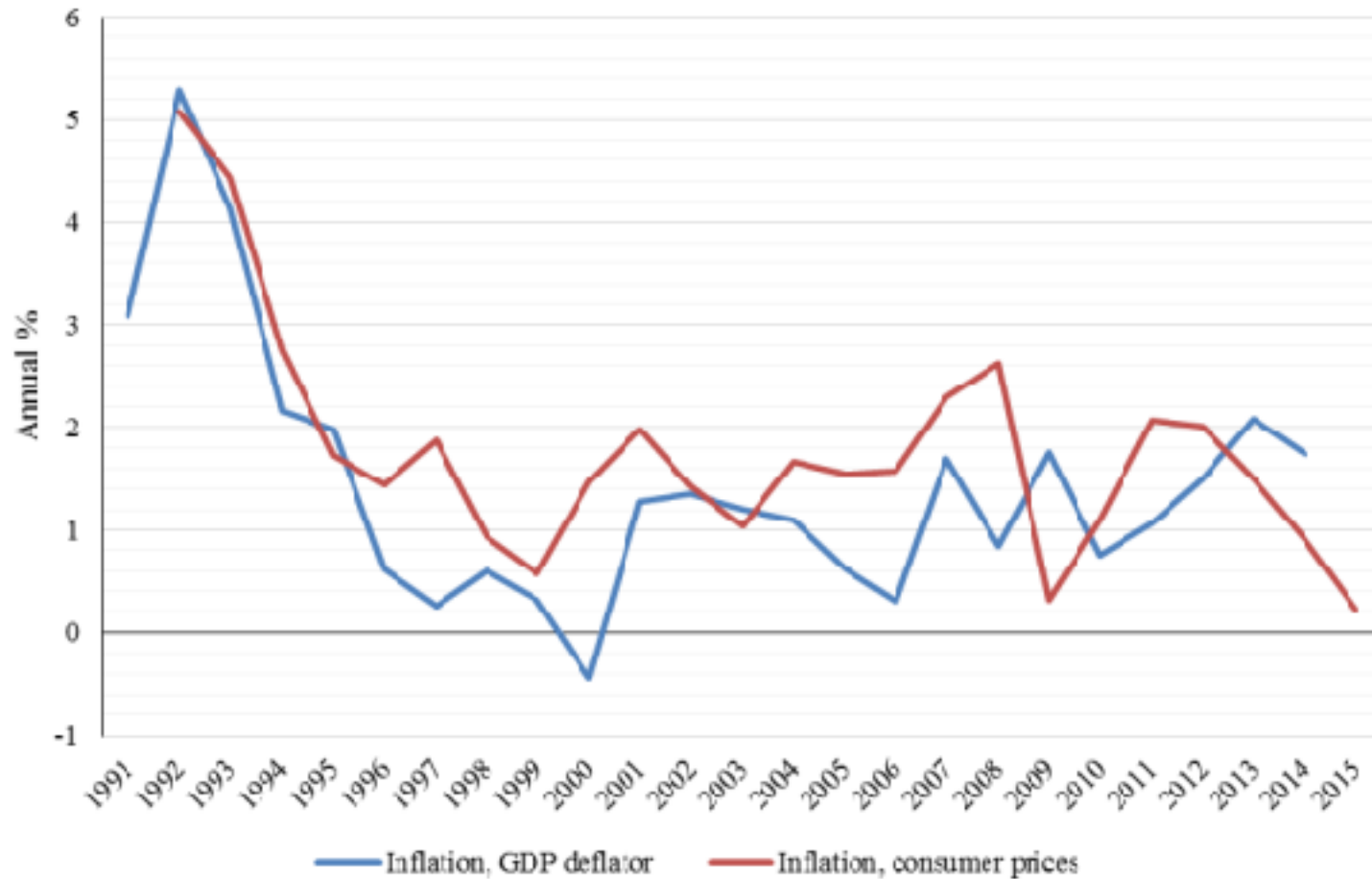


What is inflation?



Two measures of inflation

Germany CPI and GDP Deflator Inflation 1991 - 2015



This figure shows the inflation rate—the percentage change in the level of prices—as measured by the GDP deflator and the consumer price index using annual data in Germany since 1991. Notice that the two measures of inflation generally move together.

Effects of Inflations



	Consumers	Producers	Economy
Zero inflation	Not affected at all	No incentive to produce more, Same production	Stagnant for almost same level of production
Mild Inflation	Affected but not much, Demand may be same	Have incentive to produce more, Higher production	Economy expands as production increase
High Inflation	Affected much, Demand may be lower in many products	Producers of inelastic products affected, Production lower for lower demand	Economy squeezes as production falls

Real and Nominal Interest Rates

The **nominal interest rate** is the interest rate not corrected for inflation.

☐ It is the interest rate that a bank pays.

The **real interest rate** is the nominal interest rate that is corrected for inflation.

Real interest rate = (Nominal interest rate – Inflation rate)

Real and Nominal Interest Rates

You borrowed \$1,000 for one year.

Nominal interest rate was 15%.

During the year inflation was 10%.

$$\begin{aligned} \textit{Real interest rate} &= \textit{Nominal interest rate} - \textit{Inflation} = \\ &= 15\% - 10\% = 5\% \end{aligned}$$

GDP growth and inflation, % per year

	Growth rate of GDP					Inflation				
	2015	2016		2017		2015	2016		2017	
		ADO 2016	Update	ADO 2016	Update		ADO 2016	Update	ADO 2016	Update
Central Asia	3.0	2.1	1.5	2.8	2.6	6.1	10.8	11.5	5.9	6.4
Armenia	3.0	2.0	2.0	2.3	2.3	3.7	3.8	1.5	4.0	4.0
Azerbaijan	1.1	-1.0	-2.5	1.0	1.0	4.0	12.0	12.0	5.2	5.2
Georgia	2.8	2.5	3.0	3.5	4.0	4.0	5.0	3.0	4.0	4.0
Kazakhstan	1.2	0.7	0.1	1.0	1.0	6.6	12.6	14.7	4.6	6.0
Kyrgyz Republic	3.5	1.0	1.0	2.0	2.0	6.5	10.0	5.0	8.0	8.0
Tajikistan	6.0	3.8	3.8	4.0	4.0	5.1	8.5	8.5	7.5	7.5
Turkmenistan	6.5	6.5	5.5	7.0	5.5	5.5	6.6	5.0	6.0	4.4
Uzbekistan	8.0	6.9	6.9	7.3	7.3	8.5	10.0	10.0	11.0	11.0

Conclusion

The consumer price index shows the cost of a basket of goods and services relative to the cost of the same basket in the base year.

The index is used to measure the overall level of prices in the economy.

The percentage change in the CPI measures the inflation rate.

The consumer price index is an imperfect measure of the cost of living for the following three reasons: substitution bias, the introduction of new goods, and unmeasured changes in quality.

Conclusion

Because of measurement problems, the CPI overstates annual inflation by about 1 percentage point.

The GDP deflator differs from the CPI because it includes goods and services produced rather than goods and services consumed.

In addition, the CPI uses a fixed basket of goods, while the GDP deflator automatically changes the group of goods and services over time as the composition of GDP changes.

THANKS FOR YOUR ATTENTION!