

Econ. 1A.. Chapter 7. CPI and Cost of Living

1. **CPI (Consumer Price Index):** A measure of the average of the prices paid by urban consumers for fixed market basket of goods and services. It tells us what has happened to the value of the money in our pocket.

2. Reading the CPI numbers:

Reference base period: A period for which the CPI is defined to equal 100. Currently the reference base period is 1982-1984. That is, CPI = 100 on the average over the 36 months from January 1982 through December 1984.

Example 1:

The reference base period: 1982-1984 CPI = 100.0

May 2013 CPI = 232.9

Inflation rate = $[(232.9-100)/100] \times 100\% = 132.9\%$

“ The average of the prices paid by urban consumers for a fixed market basket of consumer goods and services was 132.9% higher in May2013 than it was on the average during 1982 – 1984.”

Example 2.

April 2013 CPI = 232.5

May 2013 CPI = 232.9

Inflation rate = $[(232.9-232.5)/232.5] \times 100\% = 0.4\%$.

“ The average of the prices paid by urban consumers for a fixed market basket of consumer goods and services was increases by 0.4% in May 2013.”

3. **Constructing the CPI is a large operation that involves three stages:**

- (1) Selecting the CPI basket.
- (2) Conducting the monthly price survey.
- (3) Calculating the CPI.

4. The CPI basket

The CPI basket contains the goods and services represented in the index and the relative importance, or weight, attached to each of them. Currently, the CPI basket contains around 80,000 different goods and services arranged in the 8 large groups.

The 8 groups in the CPI basket

Housing:	40.9%	Food and beverage	15.2%
Transportation	17.2%	Medical care	7.0%
Apparel	3.6%	Recreation	6.0%
Education and communication	6.7%	Other goods and services	3.4%

5. The monthly price survey

Each month, the Bureau of Labor Statistics (BLS) sends observers to check and record the prices of 80,000 goods and services in the CPI basket in 30 metropolitan areas.

6. Calculating the CPI.

To calculate CPI, it takes three steps:

- (1) Find the cost of CPI basket at based-period prices;
- (2) Find the cost of CPI basket at current-period prices;
- (3) Calculate CPI for the based period and the current period.

7.

Example: a simplified calculation of CPI.

(a) Base Period: 2010 Current Period: 2014

(b)

Good	Q (2010)	P (2010)	PQ	P'(2014)	P'Q
Orange	10	\$1.00	\$10	\$2.00	\$20
Haircut	5	\$8.00	\$40	\$10.00	\$50

Cost of CPI basket:

Based period 2010: $\Sigma PQ = \$10 + \$40 = \$50$.

Current period 2014: $\Sigma P'Q = \$20 + \$50 = \$70$

Formula: $\text{CPI} = (\text{cost of CPI basket at current period prices} / \text{cost of CPI basket at base period prices}) \times 100\%$

$$\text{CPI (2010)} = (\$50 / \$50) \times 100\% = 100\% = 100$$

$$\text{CPI (2014)} = (\$70 / \$50) \times 100\% = 140\% = 140.$$

8. Measuring inflation and deflation

Inflation Rate (π): The percentage change in the price level from one year to the next.

Formula: $\pi = [(CPI \text{ in current year} - CPI \text{ in previous year}) / CPI \text{ in previous year}] \times 100\%$.

(a) **Inflation:** a situation in which the price level is rising and the inflation rate is positive.

Example:

	<u>CPI.</u>	
2013	120	
2014	140	Inflation rate (π) = $[(140 - 120) / 120] \times 100\% = 16.7\% > 0$.

(1) **We have inflation.**

(2) **The cost of living rises and the value of money decreases.**

(b) **Deflation**: a situation in which the price level is falling and the inflation rate is negative.

Example:

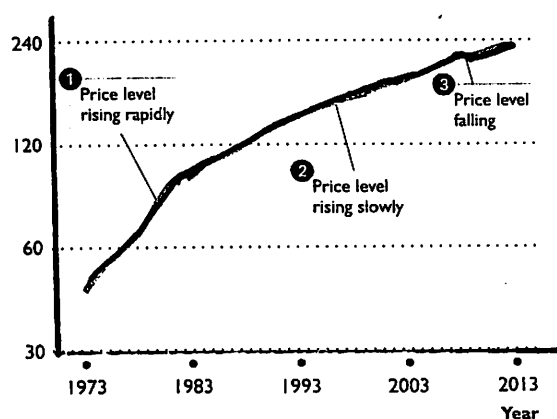
	CPI	
July 2008	220.0	
July 2009	215.4	Inflation rate (π) = $[(215.4-220.0)/220.0] \times 100\% = -2.1\% < 0$.

(1) We have deflation.

(2) The cost of living falls and the value of money increases.

The CPI and the Inflation Rate: 1973–2013

CPI (1982-1984 = 100, ratio scale)

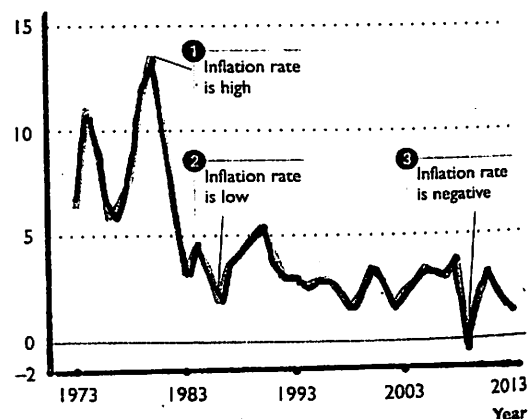


(a) CPI: 1973–2013

SOURCE OF DATA: Bureau of Labor Statistics.

- 1 The price level in part (a) was rising rapidly during the 1970s and 1980s and the inflation rate in part (b) was high.
- 2 The price level was rising slowly during the 1990s and 2000s and

Inflation rate (percent per year)



(b) CPI inflation rate: 1973–2013

the inflation rate was low.

- 3 In 2009, the price level fell and the inflation rate was negative.

9. The CPI is to measure the cost of living or *the value of money*. The CPI is sometimes called a **cost of living index** – a measure of the change in the amount of money that people need to spend to achieve a **given standard of living**.
10. The CPI is not a perfect measure of the cost of living (value of money). But it is the best we have right now. The CPI may be biased. The main resources of bias are (a) New goods bias; (b) quality change bias; (c) commodity substitution bias; (d) outlet substitution effect bias.

Notes:

- (1) A Congressional Advisory Commission on the Consumer Price Index in 1996 pointed out that CPI overestimates inflation by 1.1%. i.e., if CPI inflation rate is 3.1% a year, most likely inflation is actually 2%.
- (2) The bias in the CPI distorts private contracts and increases government outlays.
 - (a) Many private contracts, such as wage contracts, are linked to the CPI. For example, a firm and its workers might agree to a three-year wage deal that increases the wage rate by 2% plus the percentage change in the CPI. If the CPI is overestimated, such a deal ends up giving the workers more real income than the firm intended.
 - (b) Close to a third of federal government outlays, including Social Security checks, are linked directly to the CPI. If the CPI is over estimated, government outlays will be higher than the government intended.

11. Alternative Price Index

- (a) GDP price index (GDP deflator) : An average of current prices of all goods and services included in GDP expressed as a % of base-year prices.
- (b) Personal consumption expenditures (PCE) price index: An average of the current prices of the goods and services included in the consumption expenditure component of GDP expressed as % of base-year prices.
- (c) PCE price index excluding food and energy (core CPI).

Nominal and Real Values**12. Comparison the cost of a good we pay at different dates**

The cost of a good in current year = the cost of a good in previous year x (CPI in current year/CPI in previous year.)

	<u>Price of stamp</u>	<u>CPI</u>
1913	2c	9.9
2013	46c	232.1

1913's price of stamp in 2013 dollar = $2c \times (232.1/9.9) = 46.9c$.

Nominal and Real Values in Macroeconomics**13. Nominal GDP and RGDP**

$$\text{RGDP} = (\text{NGDP}/\text{GDP price index}) \times 100$$

	<u>GDP price index</u>	<u>NGDP(bi)</u>	<u>RGDP(bi)</u>
2005	100.0	12,623	12,623
2011	111.0	14,527	13,088

Base year: 2005

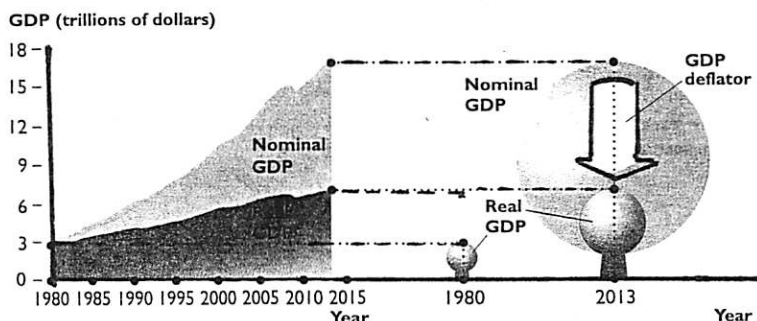
Note that GDP price index is usually called **GDP deflator**.

Deflating the GDP Balloon

Nominal GDP increased every year between 1980 and 2013 except for 2009. Part of the increase reflects increased production, and part of it reflects rising prices.

You can think of GDP as a balloon that is blown up by growing production and rising prices. In the figure, the GDP price index or *GDP deflator* lets the inflation air—the contribution of rising prices—out of the nominal GDP balloon so that we can see what has happened to real GDP.

The small red balloon for 1980 shows real GDP in that year. The green balloon shows nominal GDP in 2013. The red balloon for 2013 shows real GDP for that year.



(a) Nominal GDP and real GDP

(b) The GDP balloon

SOURCE OF DATA: Bureau of Economic Analysis.

To see real GDP in 2013, we use the GDP price index to deflate nominal GDP. With the inflation

air removed, we can see by how much real GDP grew from 1980 to 2013.

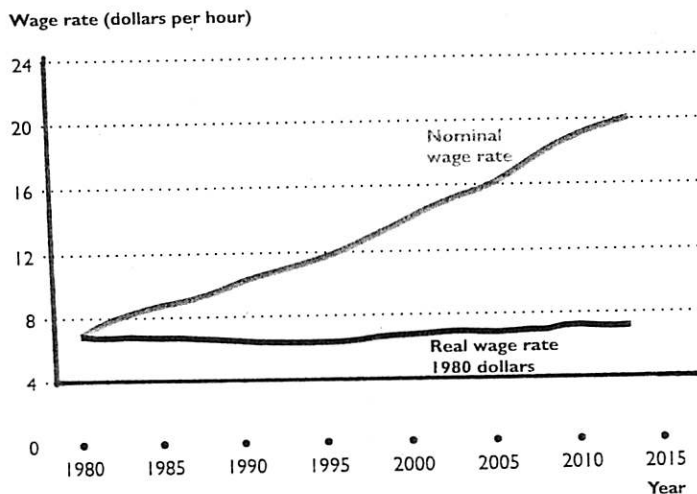
- 14. **Nominal Wage Rate:** The average hourly wage rate measured in current dollar.
- Real Wage Rate:** The average hourly wage rate measured in the dollars of a given reference base period. It shows that the quantity of goods and services that an hour work can buy.

$$\text{Real wage rate} = (\text{Nominal wage rate in current year} / \text{CPI in current year}) \times 100\%$$

	CPI	nominal wage rate	real wage rate
1984	100.0	8.48	8.48
2013	232.1	20.10	8.66

Nominal and Real Wage Rates: 1980–2013

The nominal wage rate has increased every year since 1980. The real wage rate decreased slightly from 1982 through the mid-1990s, after which it increased slightly again. Over the entire 33-year period, the real wage rate remained steady.



SOURCE OF DATA: Bureau of Labor Statistics.

15. **Nominal Interest Rate (i):** % return on a loan expressed in dollar.

Real Interest Rate (r): % return on a loan expressed in purchasing power of money
i.e., the nominal interest rate adjusted for the effects of inflation.

Real interest rate = nominal interest rate – inflation rate.

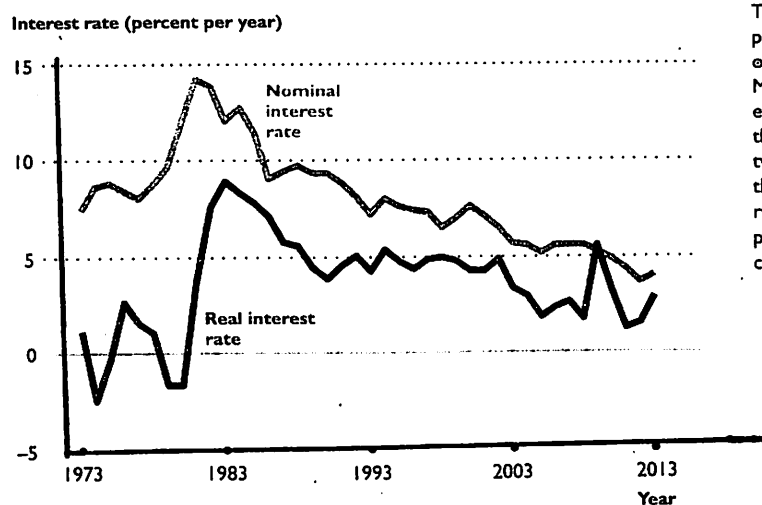
$$r = i - \pi.$$

Example:

- (1) Suppose that you have \$1,000 in a bank deposit – a loan by you to a bank – on which you receive **interest** of \$50 a year. The nominal interest rate (i) = $(50/1,000) \times 100\% = 5\%$.
- (2) At the end of one year your bank deposit has increased to \$1,050 – the original \$1,000 plus the \$50 **interest**.
- (3) Suppose that prices have increased by 3%, so now you need \$1,030 to buy what \$1,000 would have bought a year earlier. How much interest have you really received? The answer is \$20, or a real interest rate (r) of 2% a year, i.e., $r = 20/1,000 = 2\%$.

Using formula: $r = i - \pi = 5\% - 3\% = 2\%$.

Nominal and Real Interest Rates: 1973–2013



The interest rate shown here is that paid by the safest large corporations on long-term bonds (known as Moody's AAA). The real interest rate equals the nominal interest rate minus the inflation rate. The vertical gap between the nominal interest rate and the real interest rate is the inflation rate. The real interest rate is usually positive, but during the 1970s, it became negative.

SOURCES OF DATA: Federal Reserve and Bureau of Labor Statistics