Measuring Cost Of Living (CPI,WPI & GDP Deflator)

Measuring the Cost of Living

- *Inflation* refers to a situation in which the economy's overall price level is rising.
- The *inflation rate* is the percentage change in the price level from the previous period.

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.

THE CONSUMER PRICE INDEX

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

1. *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.
   - The BLS conducts monthly consumer surveys to set the weights for the prices of those goods and services.

How the Consumer Price Index Is Calculated

2. *Find the prices.* Find the prices of each of the goods and services in the basket for each point in time.
3. *Compute the basket's cost.* Use the data on prices to calculate the cost of the basket of goods and services at different times.

How the Consumer Price Index Is Calculated

4. 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.

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

How the Consumer Price Index Is Calculated

5. *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

- The inflation rate is calculated as follows:

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

Table 1 Calculating the Consumer Price Index 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
2005	$1	$2
2006	2	3
2007	3	4

Table 1 Calculating the Consumer Price Index and the Inflation Rate: An Example

Step 3: Compute the Cost of the Basket of Goods in Each Year

2005	($1 per hot dog × 4 hot dogs) + ($2 per hamburger × 2 hamburgers) = $8 per basket
2006	($2 per hot dog × 4 hot dogs) + ($3 per hamburger × 2 hamburgers) = $14 per basket
2007	($3 per hot dog × 4 hot dogs) + ($4 per hamburger × 2 hamburgers) = $20 per basket

Step 4: Choose One Year as a Base Year (2005) and Compute the Consumer Price Index in Each Year

2005	($8/$8) × 100 = 100
2006	($14/$8) × 100 = 175
2007	($20/$8) × 100 = 250

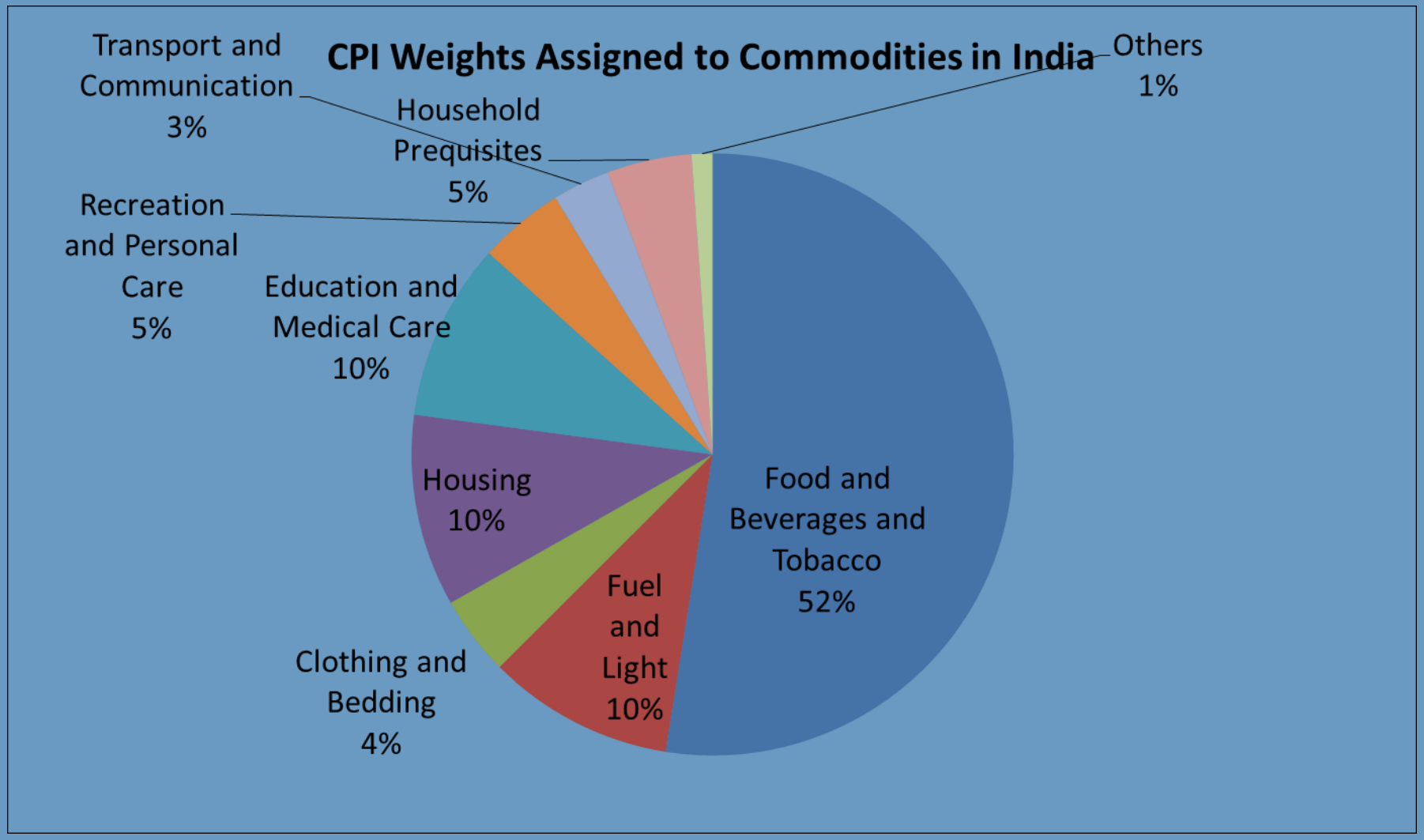
Step 5: Use the Consumer Price Index to Compute the Inflation Rate from Previous Year

2006	(175 − 100)/100 × 100 = 75%
2007	(250 − 175)/175 × 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.
  - CPI = ($1,236/$1,200) × 100 = 103.
  - Prices increased 3 percent between 2002 and 2004.

Consumer Price Index- Weights in India



Source: CSO

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

Problems in Measuring the Cost of Living

- Substitution Bias
- The basket does not change to reflect consumer reaction to changes in relative prices.
  - Consumers substitute toward goods that have become relatively less expensive.
  - The index overstates the increase in cost of living by not considering consumer substitution.

Example:

Imagine that in the base yr, apples are cheaper than pears, and so consumers buy more apples than pears. When the BLS constructs the basket of goods, it will include more apples than pears.

Suppose the next yr pears are cheaper than apples. Consumers will naturally respond to the price changes by buying more pears and fewer apples.

Yet when computing the consumer price index, the BLS uses a fixed basket, which in essence assumes that consumers continue buying the now expensive apples in the same quantities as before.

For this reason, the index will measure a much larger increase in the cost of living than consumers actually experience.

Problems in Measuring the Cost of Living

- Introduction of New Goods
  - The basket does not reflect the change in purchasing power brought on by the introduction of new products.
  - New products result in greater variety, which in turn makes each rupees more valuable.
  - Consumers need fewer rupees to maintain any given standard of living.

Example:

Suppose you could choose b/n a 1000 RS gift coupon at a large store that offered a wide array of goods and a 1000 RS gift coupon at a small store with the same prices but a more limited choice. Which would you prefer?

First option. In essence, the increased set of possible choices make each dollar more valuable. The same is true with the evolution of economy over time:

New products result in greater variety, which in turn makes each rupees more valuable.

Yet because the consumer price index is based on a fixed basket of goods and services, it does not reflect the increase in the value of rupees that arises from the introduction of new goods.

Problems in Measuring the Cost of Living
Unmeasured Quality Changes

- If the quality of a good rises from one year to the next, the value of a dollar rises, even if the price of the good stays the same.
- If the quality of a good falls from one year to the next, the value of a dollar falls, even if the price of the good stays the same.
- When the quality of a good in the basket changes – ex, when a car model has get better mileage from one year to the next-the Bureau adjusts the price of the good to account for the quality changes.
- The BLS tries to adjust the price for constant quality, but such differences are hard to measure.

Problems in Measuring the Cost of Living

- The substitution bias, introduction of new goods, and unmeasured quality changes cause the CPI to overstate the true cost of living.
- The issue is important because many government programs use the CPI to adjust for changes in the overall level of prices.
- The CPI overstates inflation by about 1 percentage point per year.

The GDP Deflator versus the Consumer Price Index

- Because nominal GDP is current output valued at current prices and real GDP is current output valued at base year prices
- The GDP deflator is calculated as follows

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

The GDP Deflator versus the Consumer Price Index

- The BLS calculates other prices indexes:
- The index for different regions within the country.
- The producer price index, which measures the cost of a basket of goods and services bought by firms rather than consumers.

The GDP Deflator versus the Consumer Price Index

- Economists and policymakers monitor both the GDP deflator and the consumer price index to gauge how quickly prices are rising.
- There are two important differences between the indexes that can cause them to diverge.

The GDP Deflator versus the Consumer Price Index

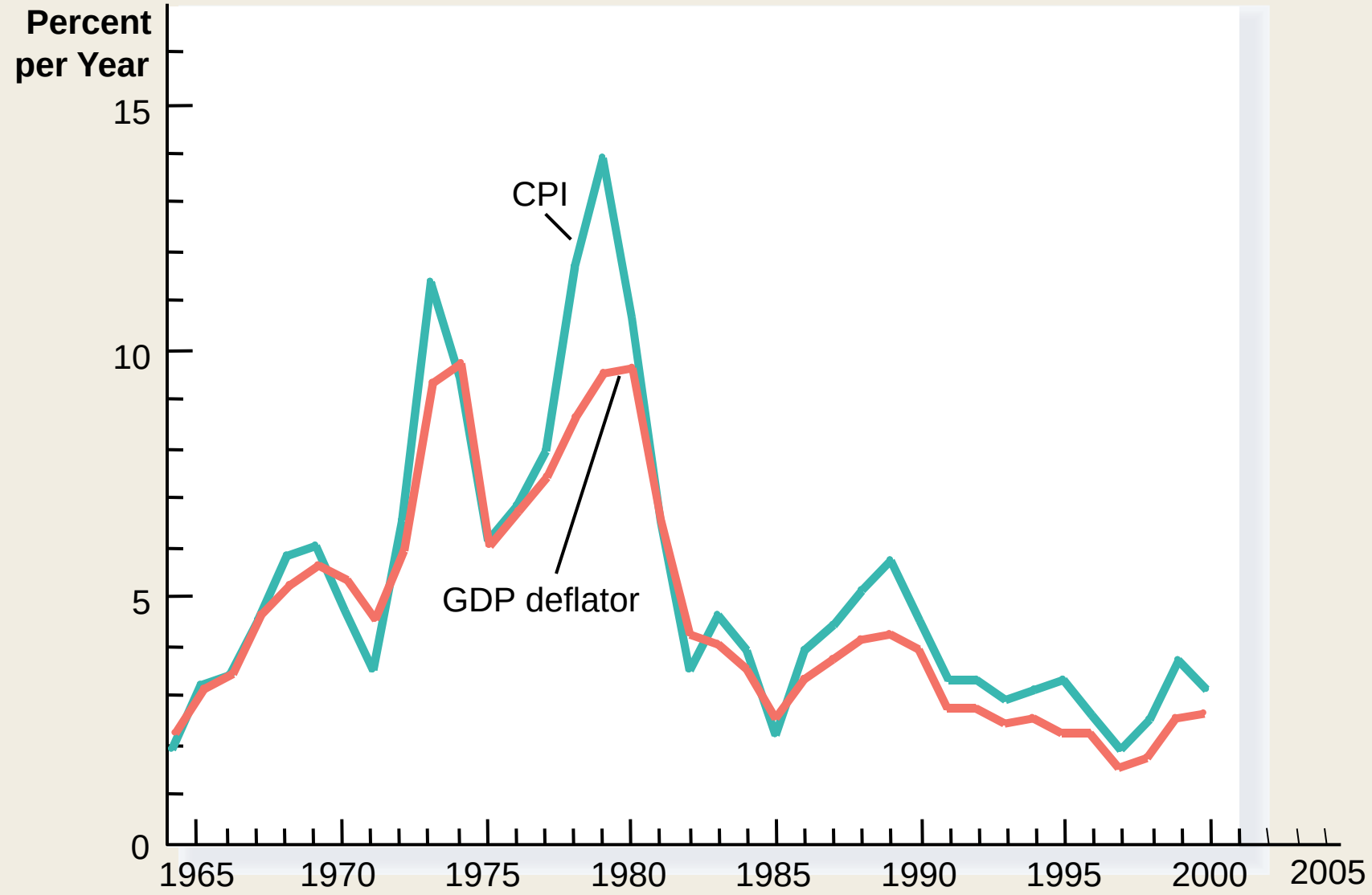
- The GDP deflator reflects the prices of all goods and services produced domestically, whereas...
- …the consumer price index reflects the prices of all goods and services bought by consumers.

The GDP Deflator versus the Consumer Price Index

- The consumer price index compares the price of a fixed basket of goods and services to the price of the basket in the base year (only occasionally does the BLS change the basket)...
- …whereas the GDP deflator compares the price of currently produced goods and services to the price of the same goods and services in the base year.

- GDP deflator is the ratio of nominal GDP to real GDP. Because nominal GDP is current output valued at current prices and real GDP is current output valued at base year prices, GDP deflator reflects the current level of prices relatives to the level of prices in the base year.

Figure 2 Two Measures of Inflation



When they do diverge and what may be the cause?

1979 and 1980 Oil prices more than doubled during these two years.

Oil price hike.

CPI & WPI

- What is the Wholesale Price Index?
- It measures the **changes in the prices of goods sold and traded** in bulk by wholesale businesses to other businesses.
- Published by the **Office of Economic Adviser,** Ministry of Commerce and Industry.
- It is the **most widely used inflation indicator in India**.
- Major criticism for this index is that the **general public does not buy products at wholesale price**.
- The base year of All-India WPI has been revised from **2004-05 to 2011-12 in 2017**.

What is the Consumer Price Index?

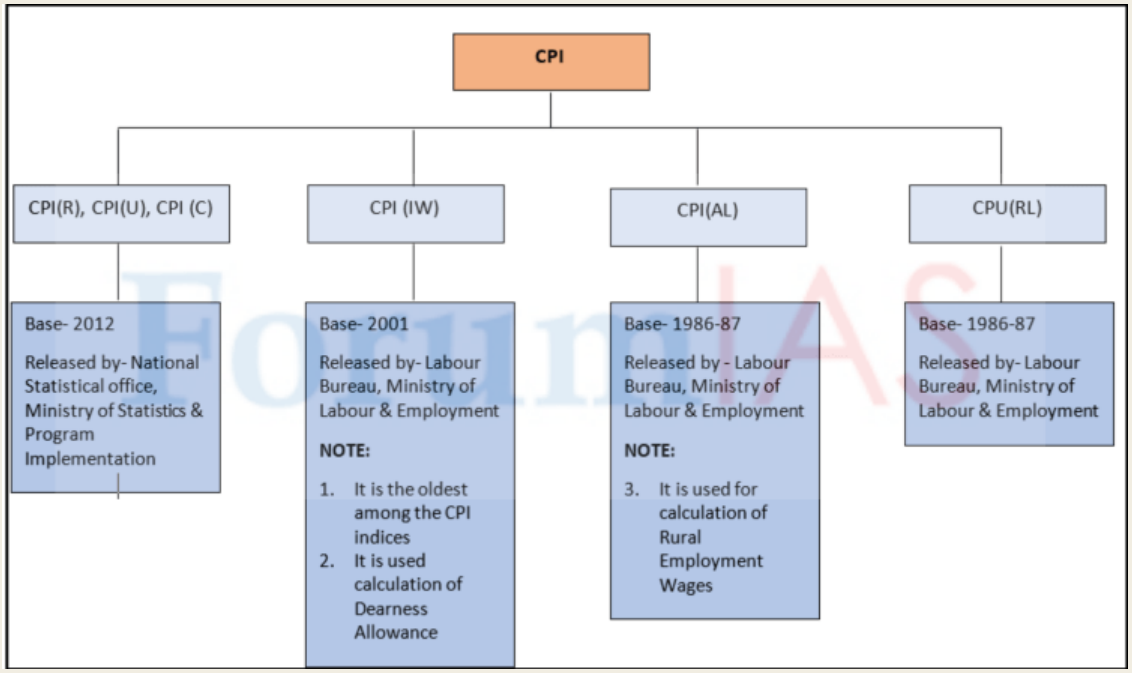
- It measures **price changes from the perspective of a retail buyer**. It is released by the National Statistical Office (NSO).
- The CPI **calculates the difference in the price of commodities and services** such as food, medical care, education, electronics etc, which Indian consumers buy for use.
- The CPI has **several sub-groups including food and beverages,** fuel and light, housing and clothing, bedding and footwear.
- Four types of CPI are as follows:
  - CPI for Industrial Workers (IW). CPI for Agricultural Labourer (AL). CPI for Rural Labourer (RL). CPI (Rural/Urban/Combined).
  - Of these, the first three are compiled by the **Labour Bureau in the Ministry of Labour and Employment**. Fourth is compiled by the **NSO in the Ministry of Statistics and Programme Implementation**.
- **Base Year** for CPI is **2012**.
  - Recently, the Ministry of Labour and Employment released the **new series of Consumer Price Index for Industrial Worker (CPI-IW)** with base year 2016.
- The Monetary Policy Committee (MPC) uses CPI data to control inflation. In April 2014, the **Reserve Bank of India (RBI)** had adopted the CPI as its key measure of inflation.

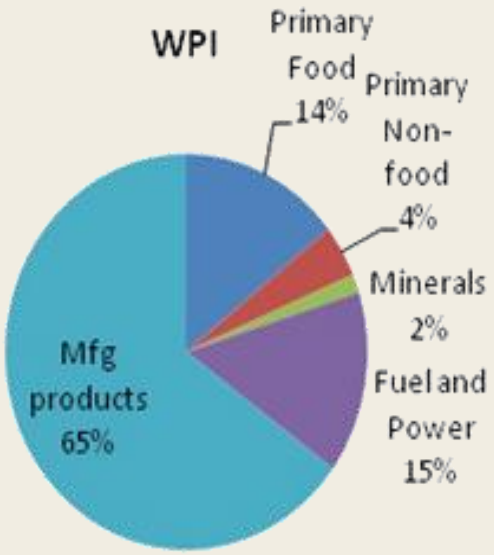
- What is the difference between CPI and WPI?

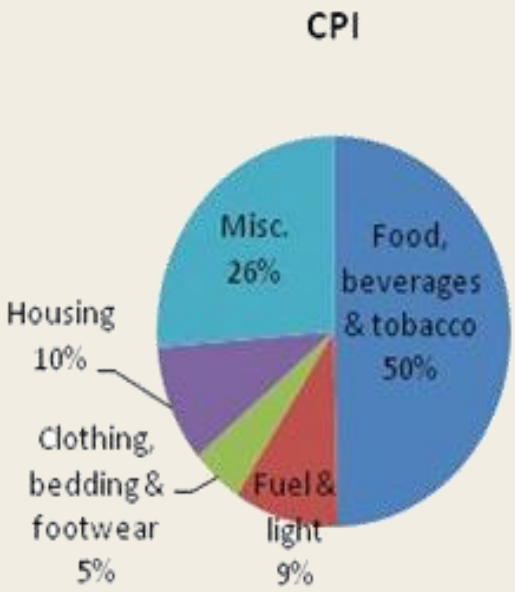
- WPI tracks **inflation at the producer level** and CPI **captures changes in prices levels at the consumer level**.
- WPI **does not capture changes in the prices of services,** which CPI does.
- **In WPI, more weightage is given to manufactured goods,** while in **CPI,** more weightage is given **to food items**.

- What is Inflation?

- Inflation refers to the **rise in the prices of most goods and services** of daily or common use, such as food, clothing, housing, recreation, transport, consumer staples, etc.
- Inflation measures the **average price change in a basket of commodities and services over time**.
- Inflation is **indicative of the decrease in the purchasing power** of a unit of a country's currency.
  - This could ultimately lead to a deceleration in economic growth.
- However, a **moderate level of inflation is required in the economy** to ensure that production is promoted.
- In India, **inflation is primarily measured by two main indices** — WPI & CPI which measure wholesale and retail-level price changes, respectively.







COMPOSITION OF CPI AND WEIGHTS

Group & sub-group	Rural	Urban	Combined
Food and beverages	**54.18**	**36.29**	**45.86**
Cereals and products	12.35	6.59	9.67
Meat and fish	4.38	2.73	3.61
Egg	0.49	0.36	0.43
Milk and products	7.72	5.33	6.61
Oils and fats	4.21	2.81	3.56
Fruits	2.88	2.9	2.89
Vegetables	7.46	4.41	6.04
Pulses and products	2.95	1.73	2.38
Sugar and confectionery	1.7	0.97	1.36
Spices	3.11	1.79	2.5
Non-alcoholic beverages	1.37	1.13	1.26
Prepared meals, snacks, sweets etc.	5.56	5.54	5.55
Pan, tobacco and intoxicants	**3.26**	**1.36**	**2.38**
Clothing and footwear	**7.36**	**5.57**	**6.53**
Clothing	6.32	4.72	5.58
Footwear	1.04	0.85	0.95
Housing		**21.67**	**10.07**
Fuel and light	**7.94**	**5.58**	**6.84**
Miscellaneous	**27.26**	**29.53**	**28.32**
Household goods and services	3.75	3.87	3.8
Health	6.83	4.81	5.89
Transport and communication	7.6	9.73	8.59
Recreation and amusement	1.37	2.04	1.68
Education	3.46	5.62	4.46
Personal care and effects	4.25	3.47	3.89

Source: Ministry of Statistics and Programme Implementation

COMPOSITION OF WEIGHTS OF WPI

Groups	Weight	
	2011-12	2004-05
All commodities	100	100
Primary articles	22.62	20.12
Fuel & power	13.15	14.91
Manufactured products	64.23	64.97

Source: Office of Economic Adviser, Department for Promotion of Industry and Internal Trade

The Print

The annual rate of inflation based on all India Wholesale Price Index (WPI) falls to 4.95% (Provisional) for the month of December, 2022 (over December, 2021) against 5.85% recorded in November, 2022

Fall inflation in December, 2022 primarily due to fall in prices of food articles, mineral oils, crude petroleum & natural gas, food products, textiles and chemicals & chemical products

CORRECTING ECONOMIC VARIABLES FOR THE EFFECTS OF INFLATION

- Price indexes are used to correct for the effects of inflation when comparing dollar figures from different times.

Dollar Figures from Different Times

- Do the following to convert dollar values from year T into today's dollars:

$$\text{Amount in today's dollars} = \text{Amount in year T's dollars} \left(\frac{\text{Price level today}}{\text{Price level in year T}} \right)$$

Dollar Figures from Different Times

- Do the following to convert (inflate) Mohan's wages in 1931 to dollars in 2014:

$$\text{Salary}_{2014} = \text{Salary}_{1931} \frac{\text{Price level in 2014}}{\text{Price level in 1931}}$$

$$= \$80{,}000 \frac{195}{15.2}$$

$$= \$1{,}026{,}316$$

Real and Nominal Interest Rates

- Interest represents a payment in the future for a transfer of money in the past.

Real and Nominal Interest Rates

- The *nominal interest rate* is the interest rate usually reported and not corrected for inflation.
  - It is the interest rate that a bank pays.
- The *real interest rate* is the interest rate that is corrected for the effects of inflation.

Real and Nominal Interest Rates

- You borrowed $1,000 for one year.
- Nominal interest rate was 15%.
- During the year inflation was 10%.
- Real interest rate = Nominal interest rate – Inflation
- = 15% – 10% = 5%

Who is hurt by Inflation?

Unanticipated inflation hurts Fixed-Income Receivers, Savers and Creditors.

Savers:

Example: A HH may save $1,000 in a CD in a commercial bank or saving and loan association at 6% annual interest. But if inflation is 13%, the real value of purchasing power of that 1,000$ will be cut to about $938 by the end of the year.

Although the saver will receive $ 1,060 (equal to $1,000 plus $ 60 of interest), deflating that for $1,060 for 13 percent inflation means that its real value is only about $ 938 (= $ 1,060/1.13)

Causes and Theories of Inflation

A. Causes and Theories of Inflation

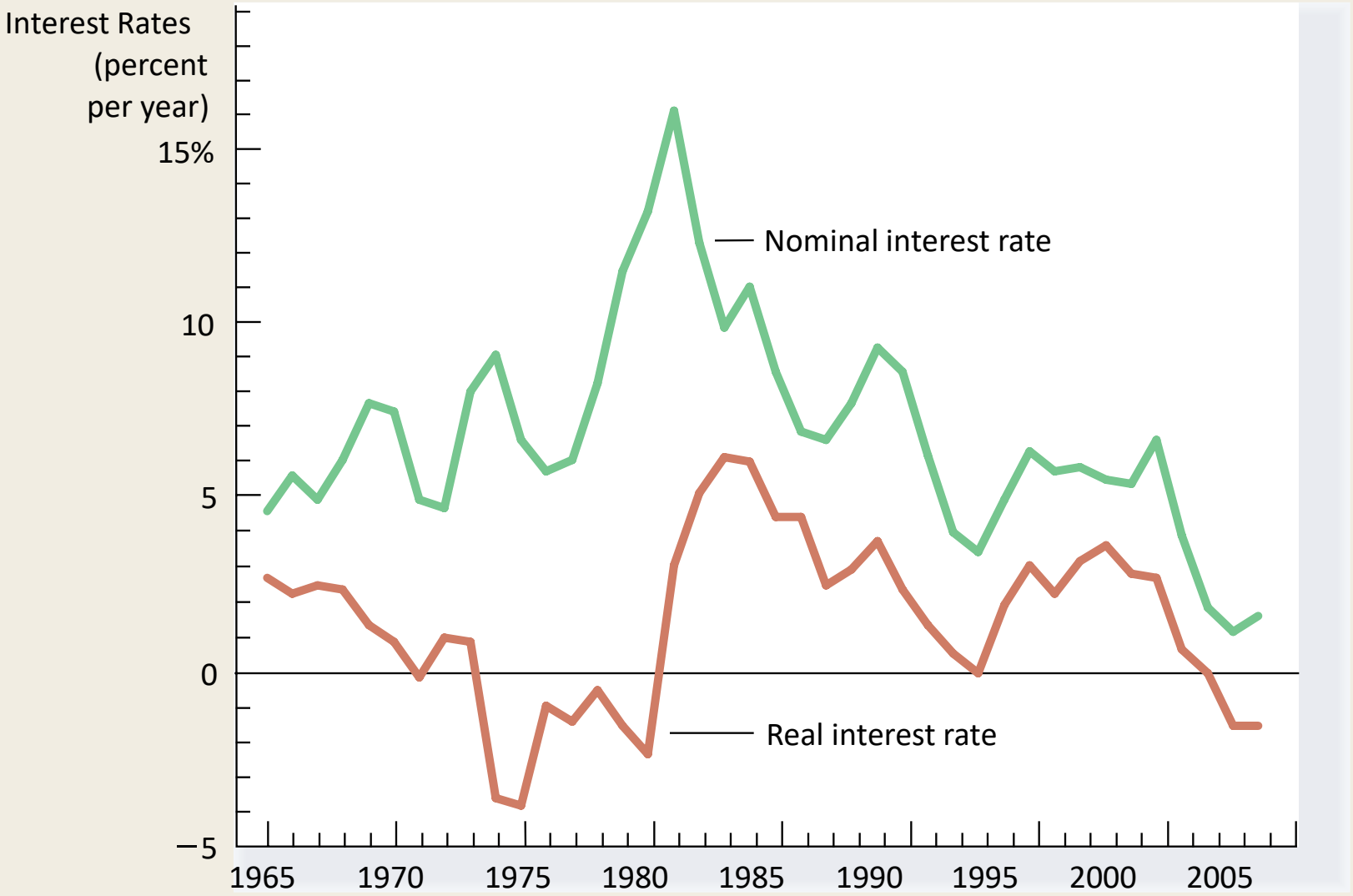
1. Demand-pull inflation: Spending increases faster than production. When resources are already fully employed, the business sector can not respond to excess demand by expanding output. So the excess demand bids up the prices of the limited output, producing demand –pull inflation. The essence of this inflation is that "too much spending chasing too few goods."
2. Cost-push or supply-side inflation: Prices rise because of rise in per-unit production costs (Unit cost = total input cost/units of output).The theory of cost push inflation explains rising prices in terms of factors that raise per-unit production cost at each level of spending.
    a. Output and employment *decline* while the price level is rising.
    b. The major source of cost-push inflation has been the so called supply shocks.. These typically occur with dramatic increases in the price of raw materials or energy. The rocketing prices of imported oil in 1973-74 and again in 1979-80 are food example of cost push inflation.
3. Complexities: It is difficult to distinguish between demand-pull and cost-push causes of inflation, although cost-push will die out in a recession if spending does not also rise.

B. Core Inflation

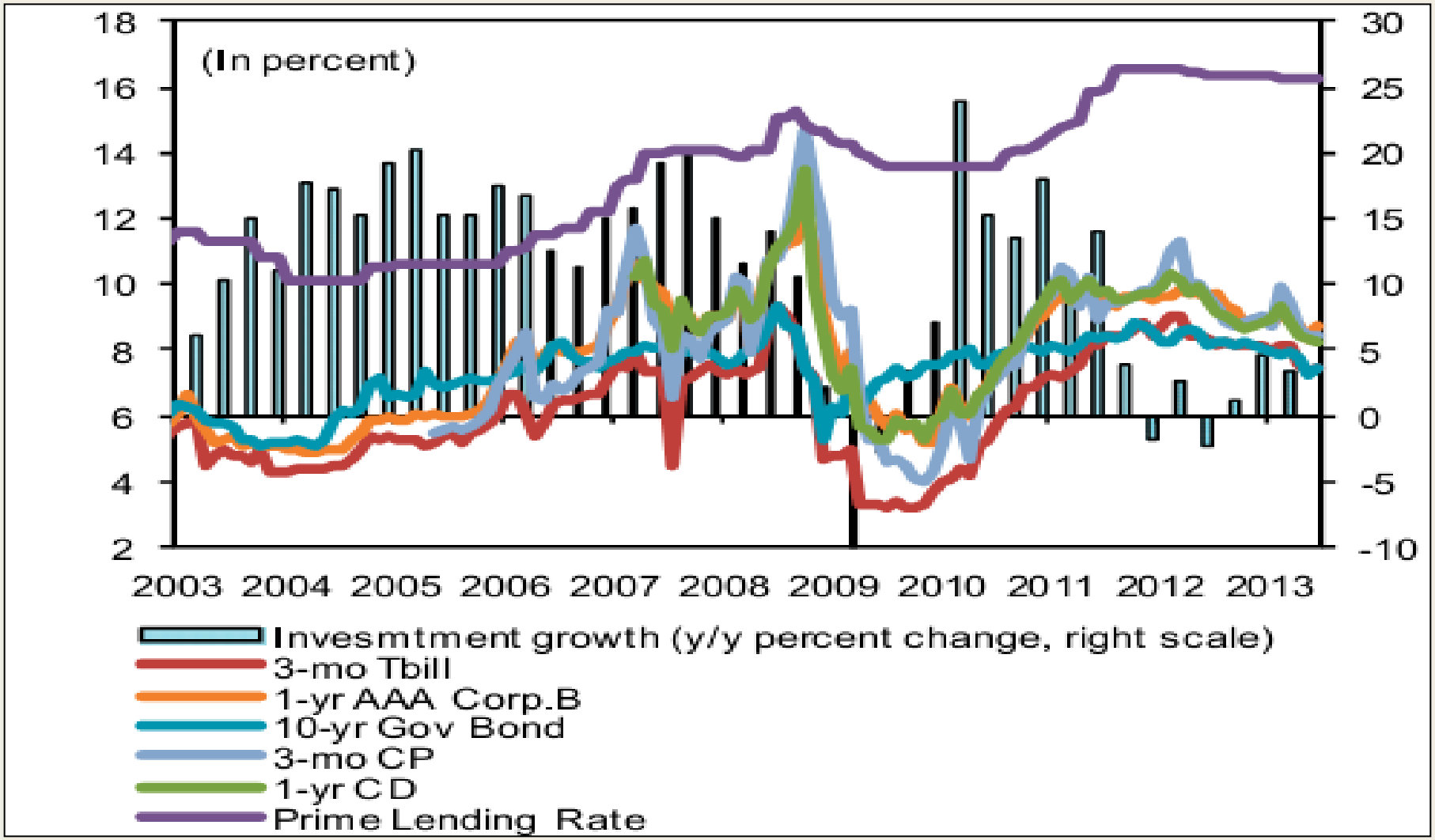
1. Food and energy prices are very volatile due to changes in supply and demand, which are usually temporary changes.
2. To prevent a misinterpretation of the changes in the CPI that might be due to temporary changes in supply and demand, economists use core inflation.
    a. Core inflation doesn't include food and energy goods.Core inflation is the underlying inflation rate after volatilie food and energy prices have been removed.
    b. If core inflation is low and stable, current policy may not need to be changed even if the CPI is rising.

- Economists will be greatly concerned if core inflation increases

Figure 3 Real and Nominal Interest Rates



Nominal Interest Rates in India. ex



Source: IMF

Sources of Data on the Indian Economy

- GOI (Economic Surveys);
- RBI Bulletins,
- RBI reports on currency and finance
- CMIE
- EPW Research Foundation
- The directorate general of foreign trade
- The directorate general of Commercial Intelligence and statistics
- Tata services Limited (statistical Outline of India)

Summary

- 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.

Summary

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

Summary

- 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.

Summary

- Dollar figures from different points in time do not represent a valid comparison of purchasing power.
- Various laws and private contracts use price indexes to correct for the effects of inflation.
- The real interest rate equals the nominal interest rate minus the rate of inflation.