

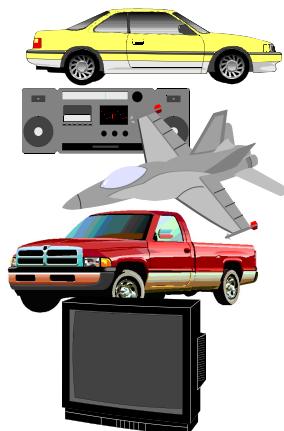
# Measuring economic Performance

Prof. Haripriya Gundimeda

Macro Economics Lectures

HS 101

## *Trinity of Economic Performance*



- ***Gross Domestic Product (GDP)***
- ***Wholesale price index (WPI)*** - measuring Inflation.
- ***Unemployment rate***

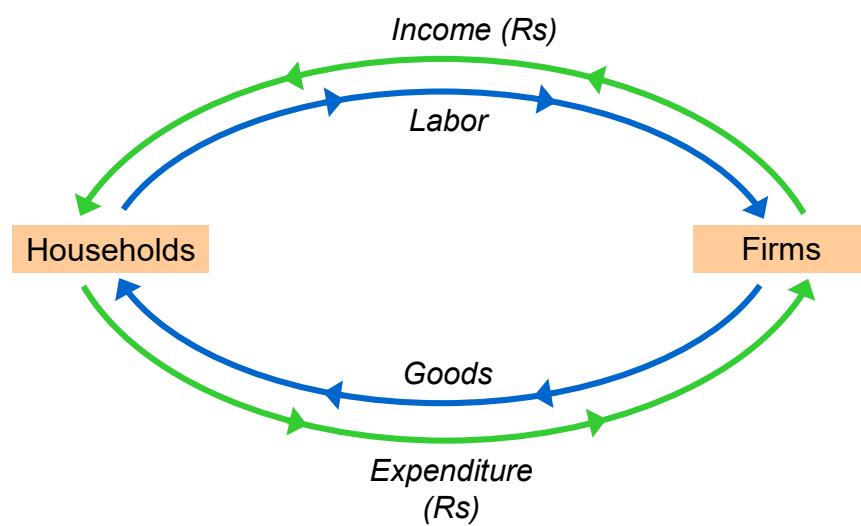
## Gross Domestic Product: Expenditure and Income

Two definitions:

- Total expenditure on domestically-produced final goods and services.
- Total income earned by domestically-located factors of production.

*Expenditure equals income because every rupee spent by a buyer becomes income to the seller.*

### The Circular Flow

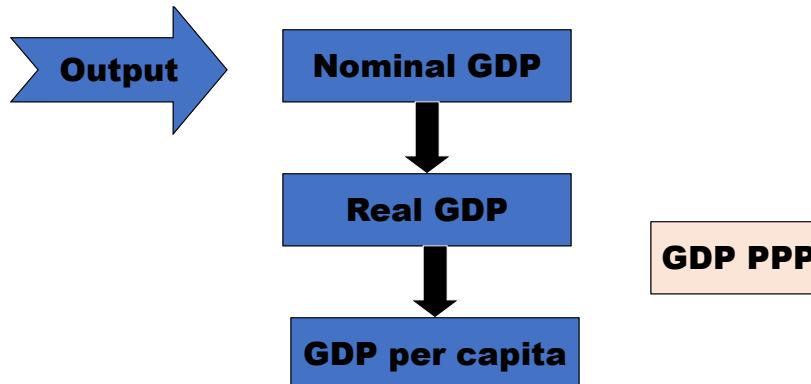


## Measures of Output

- At firm level, Output is no. of CDs produced or compute produced or printer produced, cars produced etc.
- At Country / Economy level,

THINK BIG!!!!!!!

it is the Gross Domestic Product



## Measures of Output – how to arrive at the value of OUTPUT produced?

### THREE DIFFERENT WAYS

- Output
  - Sum of value added in each sector
- Income
  - Sum of payments to factors of production
- Expenditure
  - Sum of expenditures on final goods and services

## The expenditure components of GDP

- consumption
- investment
- government spending
- net exports

### Consumption (C)

definition: The value of all goods and services bought by households.  
Includes:



- **durable goods**  
last a long time  
ex: cars, home appliances
- **nondurable goods**  
last a short time  
ex: food, clothing
- **services**  
work done for consumers  
ex: dry cleaning, air travel.

## Investment (I)

Definition 1: Spending on [the factor of production] capital.

Definition 2: Spending on goods bought for future use

Includes:

- ***business fixed investment***

Spending on plant and equipment that firms will use to produce other goods & services.

- ***residential fixed investment***

Spending on housing units by consumers and landlords.

- ***inventory investment***

The change in the value of all firms' inventories.

## Investment vs. Capital

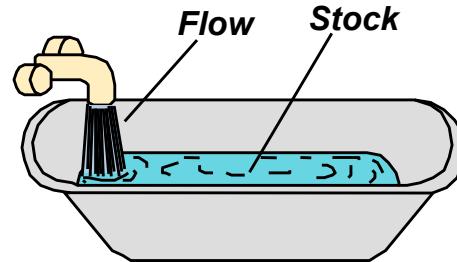
Note: Investment is spending on new capital.

Example (*assumes no depreciation*):

- 1/1/2007:  
economy has Rs 500 billion worth of capital
- during 2007:  
investment = Rs 600 billion
- 1/1/2008:  
economy will have Rs 560 billion worth of capital

## Stocks vs. Flows

A **stock** is a quantity measured at a point in time.



A **flow** is a quantity measured per unit of time.

## Stocks vs. Flows - examples

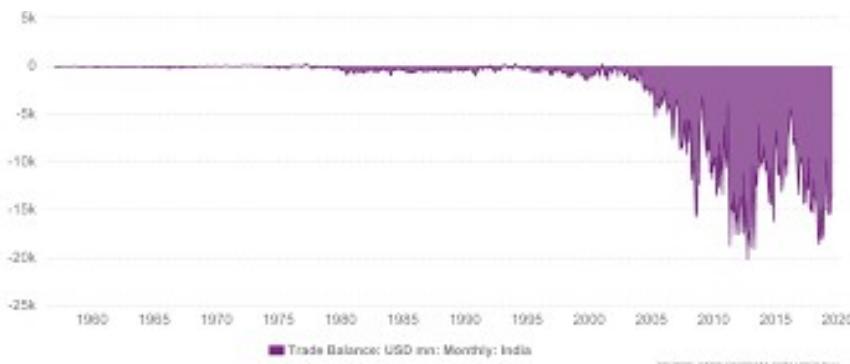
<i>stock</i>	<i>flow</i>
a person's wealth	a person's annual saving
# of people with college degrees	# of new college graduates this year
the govt debt	the govt budget deficit

## Government spending (G)

- **G** includes all government spending on goods and services..
- **G** excludes transfer payments (e.g., unemployment insurance payments), because they do not represent spending on goods and services.

### Net exports: $NX = EX - IM$

def: The value of total exports (**EX**) minus the value of total imports (**IM**).



## An important identity

$$Y = C + I + G + NX$$

*↑*  
*value of  
total output*      *aggregate  
expenditure*

## Gross Domestic Product

Total value of goods and services produced in a given year

This requires knowing:

- How much was produced (**quantity**)?
- What the production was worth (**price**)?

## Example -- Company X (IFB, Siemens)

### ❖ Production in 2016

- 200 washers at Rs. 5000
- 100 dryers at Rs. 4000

### ❖ Production in 2018

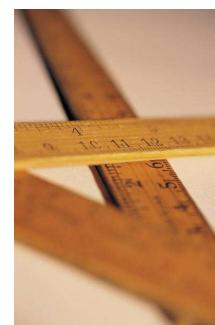
- 300 washers at Rs. 6000
- 100 dryers at Rs. 4500

*What is the total value of goods produced by Company X in 2016?*



## Price as a Yardstick

- Price provides a common unit in which we can value all quantities.



## Example -- Company X

❖ Production in 2016

- 200 washers at Rs. 5000
- 100 dryers at Rs. 4000



$$\begin{aligned} \text{Nominal Production} &= 200 \times \text{Rs. } 5000 + 100 \times \text{Rs. } 4000 \\ &= \text{Rs. } 14,00,000 \end{aligned}$$

❖ Production in 2018

- 300 washers at Rs. 6000
- 100 dryers at Rs. 4500



## Example -- Company X

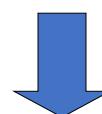
❖ Production in 2016

- 200 washers at Rs. 5000
- 100 dryers at Rs. 4000



❖ Production in 2018

- 300 washers at Rs. 6000
- 100 dryers at Rs. 4500



$$\begin{aligned} \text{Nominal Production} &= 300 \times \text{Rs. } 6000 + 100 \times \text{Rs. } 4500 \\ &= \text{Rs. } 22,50,000 \end{aligned}$$

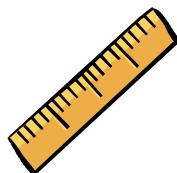
By how much has production increased between 2016 and 2018?

❖ Production in 2016

- 200 washers at Rs. 5000
- 100 dryers at Rs. 4000

❖ Production in 2018

- 300 washers at Rs. 6000
- 100 dryers at Rs. 4500



*What yardstick should we use?*

*We use common base year to compare the production.*

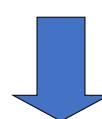
If base year is 2016:

❖ Production in 2016

- 200 washers at Rs. 5000
- 100 dryers at Rs. 4000

❖ Production in 2018

- 300 washers at Rs. 6000
- 100 dryers at Rs. 4500



$$\begin{aligned} \text{Real Production (2016)} &= 300 \times \text{Rs. 5000} + 100 \times \text{Rs. 4000} \\ &= \text{Rs. 1900,000} \end{aligned}$$

If base year is 2018:

- ❖ Production in 2016
  - 200 washers at Rs. 5000
  - 100 dryers at Rs. 4000

- ❖ Production in 2018
  - 300 washers at Rs. **6000**
  - 100 dryers at Rs. **4500**



$$\begin{aligned}
 & \text{Real Production of 2016 (at 2018 base prices)} = 200 \times \text{Rs. } 6000 \\
 & + 100 \times \text{Rs. } 4500 \\
 & = \text{Rs. } 16.5 \text{ Lakhs}
 \end{aligned}$$

## Measures of Output – how to arrive at the value of OUTPUT produced?

### THREE DIFFERENT WAYS

- Output
  - Sum of value added in each sector
- Income
  - Sum of payments to factors of production
- Expenditure
  - Sum of expenditures on final goods and services

## Final goods, value added, and GDP

- GDP = value of final goods produced
- = sum of value added at all stages of production.
- The value of the final goods already includes the value of the intermediate goods,  
so including intermediate and final goods in GDP would be double-counting.
- A firm's **value added** is the value of its output minus the value of the intermediate goods the firm used to produce that output.

## Value added

definition:

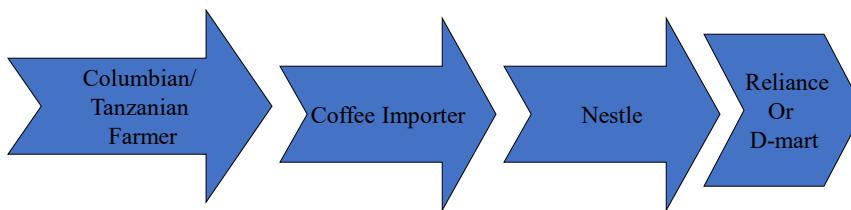
A firm's **value added** is the value of its output  
minus the value of the intermediate goods  
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## Value-Added

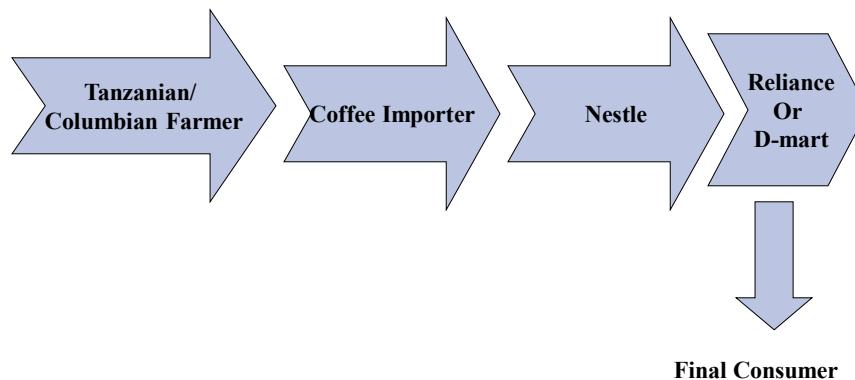
Rs. 800 per kg of  
Columbian / Tanzanian  
coffee



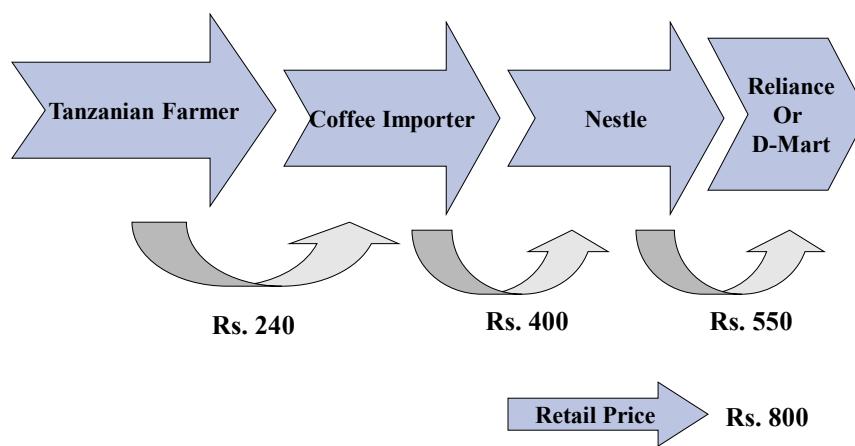
## Market Chain for (Columbian / Tanzanian) Coffee Beans/Coffee



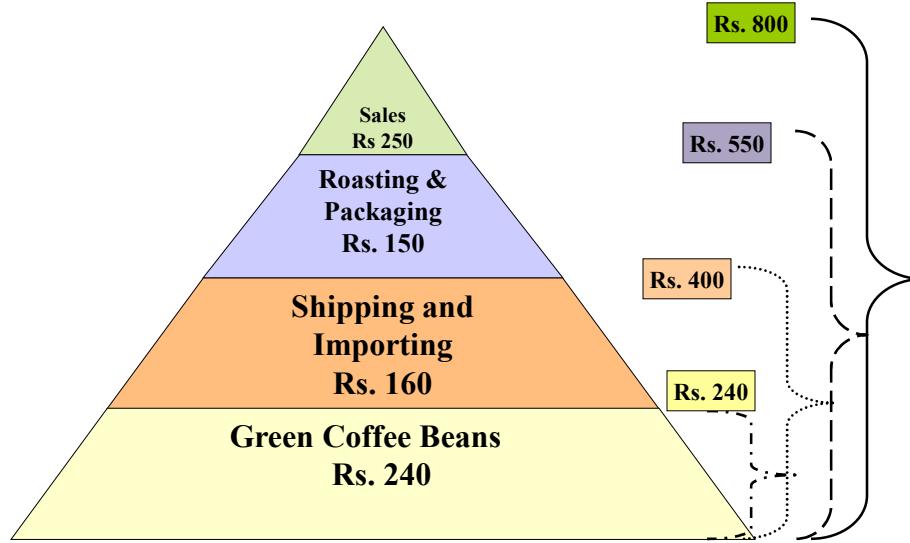
## Market Chain for (Columbian/ Tanzanian) Coffee Beans / Coffee



## Market Chain for Coffee Beans



## Value-Added



**Measures of Output – how to arrive at the value of OUTPUT produced?**

### THREE DIFFERENT WAYS

- Output
  - Sum of value added in each sector
- Income
  - Sum of payments to factors of production
- Expenditure
  - Sum of expenditures on final goods and services

## Measures of Output

- Output
  - $\text{Rs. } 240 + \text{Rs. } 160 + \text{Rs. } 150 + \text{Rs. } 250 = \text{Rs. } 800$
- Income
  - Payments to labor, management and capital for producing one kg of coffee
- Expenditure
  - Rs. 800 final payment for 1 kg. of coffee

**Which measure is the most reliable in India?**

## Rules for Computing GDP

- 1) To compute the total value of different goods and services, the national income accounts use market prices.

Assuming an economy producing only 4 Apples and 3 Oranges:

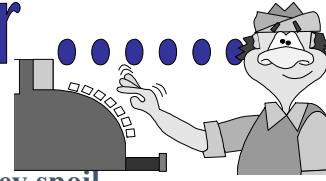


$$\begin{aligned}
 \text{GDP} &= (\text{Price of apples} \times \text{Quantity of apples}) \\
 &\quad + (\text{Price of oranges} \times \text{Quantity of oranges}) \\
 &= (\text{Rs. } 30.00 \times 4) + (\text{Rs. } 15.00 \times 3)
 \end{aligned}$$

$$\text{GDP} = \text{Rs. } 165.00$$

- 2) Used goods – old furniture, old coins, second hand car etc.  
- are not included in the calculation of GDP.

# More Rules for ...



3) Treatment of inventories - depends on **if the goods are sold** or **if they spoil**.

- If the goods are sold, their value is included in GDP.
- If they spoil, GDP remains unchanged.

**Ex:** Imagine a bakery hiring workers to produce additional bread but fails to sell it. **If the bread spoils – how to treat this?**

Though firm has paid more in wages, no change in revenue – its profit  $\downarrow \approx \uparrow$  wage payment

**Total Expenditure remains same as no one buys additional bread**

**Total income remains same as wage increase but profit  $\downarrow$**

**NOTE:** When goods are finally sold out of inventory, they are considered used goods (and are not re-counted).

# More Rules for Computing GDP

4) Some goods are not sold in the marketplace and therefore don't have market prices.

**For example:** home ownership and government services.

We must use their **imputed value** as an estimate of their value.

5) Intermediate goods -  
are not counted in GDP – only the value of final goods.

**Reason:** the value of intermediate goods is already included in the market price.



## Problem with fixed prices.....

- Over time prices change for a number of products, e.g.,
- price of computer has ↓ (Assembled PC < 12k)
  - Price of mobile phone has ↓ (From 6K to 1.5K on an average)
  - Price of PV cell has ↓ (From 10\$ to 1.5\$)
  - Price/cost of higher education has ↑ (MBA from 50K to 250K)
  - ❖ And their importance in the economy also shifts (e.g., Jute, Cotton, diode based electronic devices).

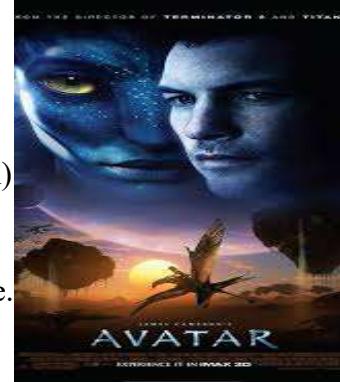
## Problem with fixed prices.....



⇒ It is misleading to use the prices that prevailed 10-15 years back while comparing the output.

## Relevance of Constant Prices

- ❑ What is the Most Popular Hollywood movie of all time?
- ❑ Movie popularity usually gauged by box office receipts.
- ❑ By that measure:
  1. Avatar domestic receipts (\$769 million)
  2. Titanic (\$601 million) and
  3. The Dark Knight (\$533 million)
- ❑ But this ranking ignores an obvious but important fact prices, including those movie tickets, have been rising over time.



<https://encrypted-tbn3.gstatic.com/images?q=tbn:ANd9GcRN4hEe-8BRMQmh0jZbkC2UePfqiUwuFBZW4qORMk37zqjSJY>  
[https://upload.wikimedia.org/wikipedia/en/2/2b/Gone\\_With\\_the\\_Wind\\_Poster\\_1939.jpg](https://upload.wikimedia.org/wikipedia/en/2/2b/Gone_With_the_Wind_Poster_1939.jpg)

## Relevance of Constant Prices

- ❑ In the 1930s, about 90 million Americans went to the cinema each week, compared to about 25 million today.
- Gone with the Wind was released in 1939.
- ❑ But the movies from that era don't show up in conventional popularity ranking because ticket prices were only a quarter.
- ❑ In the ranking based on nominal box office receipts, Gone with the Wind does not make the top 50 films.
- ❖ Scarlett and Rhett fare a lot better once correct the effect of price rise.

## Problem with fixed prices - WAY OUT

- Shift the base year prices
  - ❖ 1950-51 prices
  - ❖ 1960-61 prices
  - ❖ 1970-71 prices
  - ❖ 1981-82 prices
  - ❖ 1993-94 prices
  - ❖ 1999-00 prices
  - ❖ 2004-05 prices
  - ❖ 2011-12 prices
- Chain weighting as “averaging” of prices

**Any comment based  
on base year?????**

## Real vs. Nominal GDP

- Nominal: measure in current prices
- Real: measure in constant prices



# What is GDP Deflator?

## GDP Deflator

**Nominal GDP** measures the current Rs. value of the output of the economy.

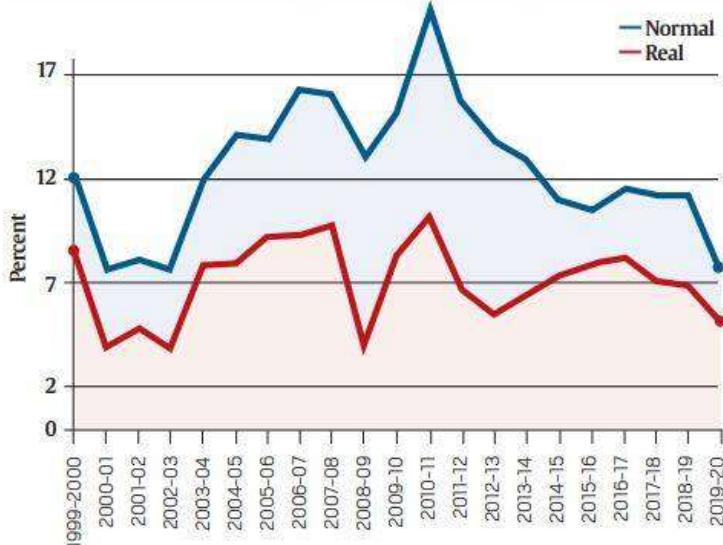
**Real GDP** measures output valued at constant prices.

**GDP deflator**, also called the implicit price deflator for GDP, measures the price of output relative to its price in the base year. It reflects what's happening to the overall level of prices in the economy.

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

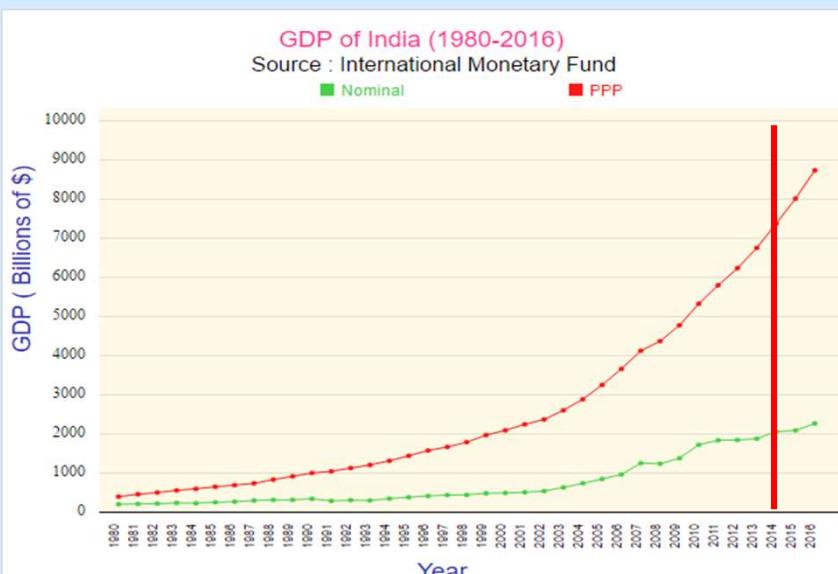
$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{GDP Deflator}}$$

### NORMAL VS REAL GDP YEAR ON YEAR GROWTH



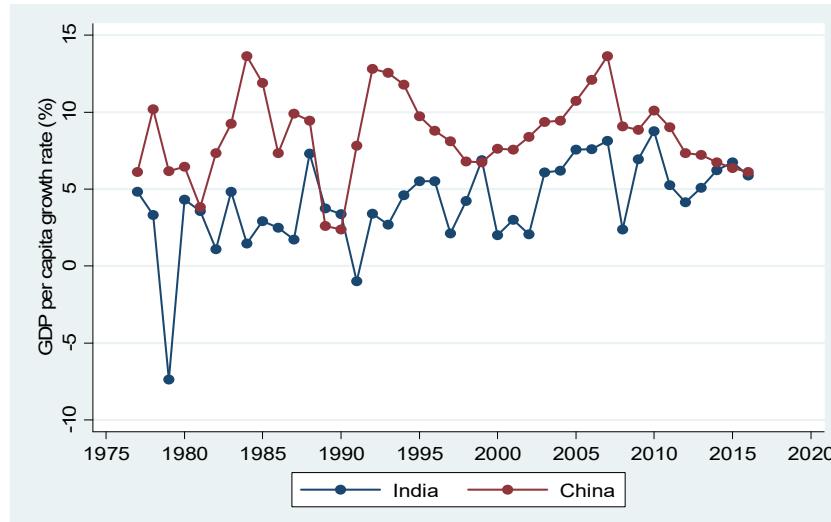
Data up to 2011-12 are based on the 2004-05 GDP series; data from 2012-13 are based on the 2011-12 series

### GDP (Nominal and PPP) - Trend



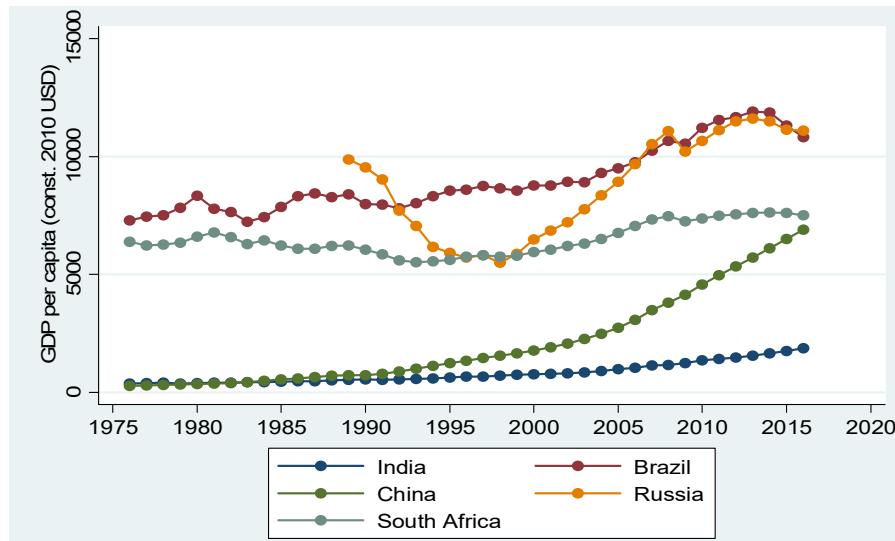
<http://statisticstimes.com/economy/gdp-of-india.php>

## GDP per capita growth (2010 USD) – India vs. China



Data Source: World Bank

## GDP per capita (2010 USD)– Trend BRICS



Data Source: World Bank

# Problems in comparing GDP

Understated GDP due to informal sector

Household scale economies

Exchange rates used to covert GNP in local currency into US dollars is based on relative prices of internationally traded goods

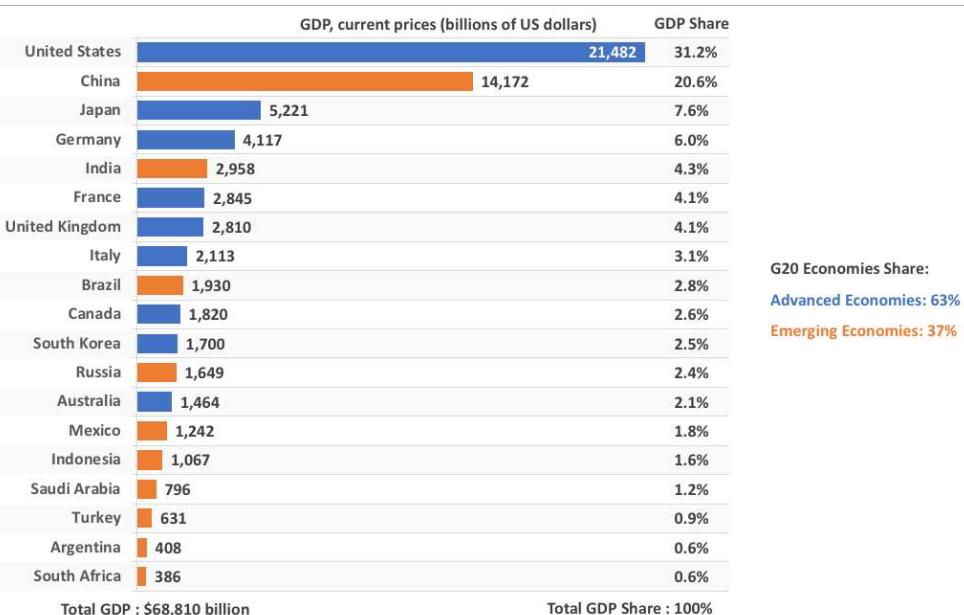
In developing countries many of the cheap, labour intensive, unstandardized goods and services have no impact on the exchange rate as they are not traded.

The price of foreign exchange is less than market clearing price (import barriers, restrictions on access to foreign currency, export subsidies or state trading) (free market rate vs official rate),

Comparison – Resistant Services (health care, education, government administration comprising more than 10 percent of most countries expenditure) distort cross national comparisons

Purchasing power parity

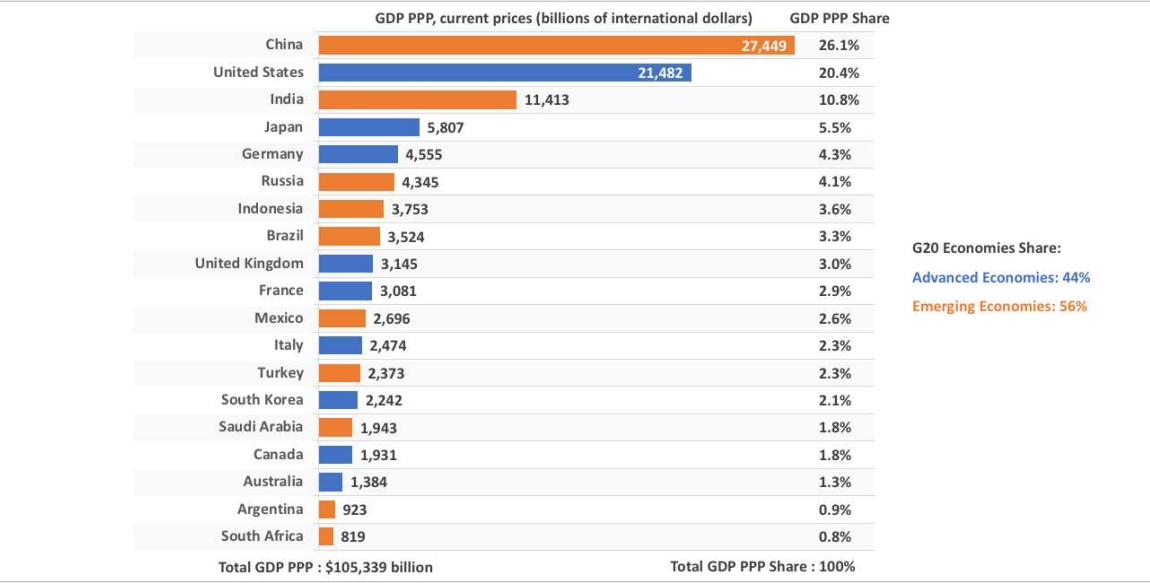
G20 NATIONS GDP – 2019 FORECAST



Data Source: IMF World Economic Outlook, October 2018

Data Analysis by: MGM Research

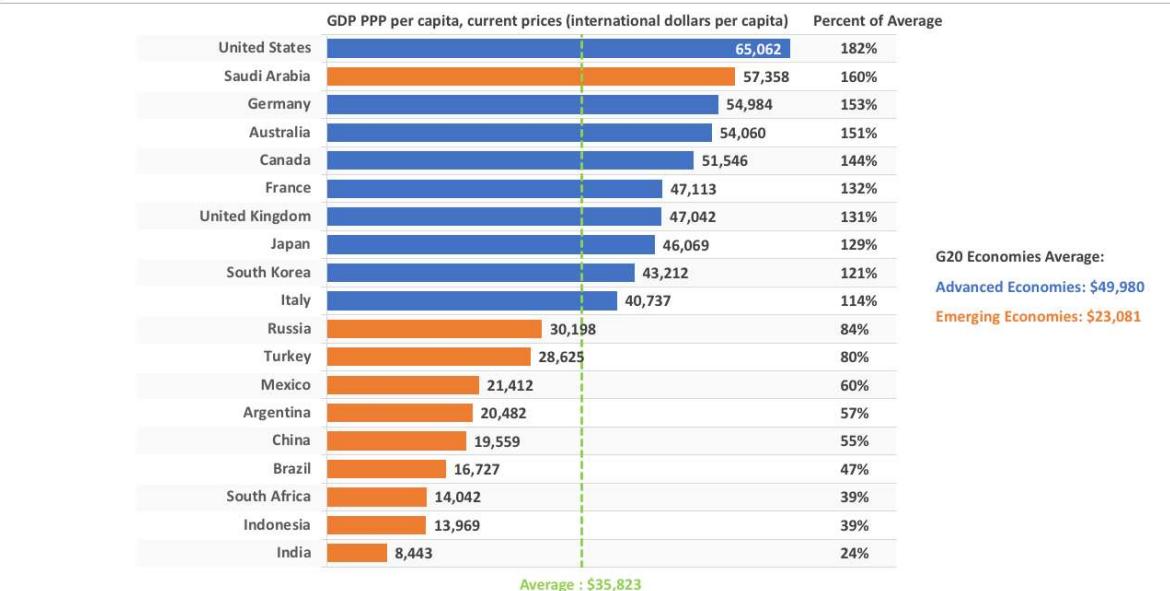
### G20 NATIONS GDP PPP – 2019 FORECAST



Data Source: IMF World Economic Outlook, October 2018

Data Analysis by: MGM Research

### G20 NATIONS GDP PPP PER CAPITA – 2019 FORECAST



Data Source: IMF World Economic Outlook, October 2018

Data Analysis by: MGM Research

## Other measure of Income: GNP, NNP

- GDP
  - Output produced within a geographic location (India, US, etc.)
- GNI/GNP (Gross National Income/Product)
  - Output produced by citizens of a geographic region
  - Value must be remitted back to country

⇒ **GNP = GDP + Factor Payments from Abroad – Factor Payments to Abroad**

**Net Domestic Product = GDP – Depreciation**

**Net National Product = GNP – Depreciation**

**Note:** Depreciation is called ‘consumption of fixed capital’ i.e., the cost of producing the output of the economy.

## Examples.....

- Kumaraswamy, citizen of Tamil Nadu, works in Dubai and sends wages back to India.
- Peter Hans of France works in Bombay, and sends earnings back to France



**UAE GDP includes K'swamy's wages & France's GNP includes Peter Hans earnings**



**Indian GNP includes K'swamy's wages And GDP includes Peter Hans earnings**

# Measuring India's GDP

## Outline of the Methodology of National Income Estimation in India

Sector		Nature of Available Data	Description of the Method of Estimation
<b>Category A</b>			
Agriculture	49.58	Annual figures of Commodity wise output and prices and value of different types of inputs or input-output proportions	<b>Product approach:</b> Aggregation of Commodity-wise price-output multiplications yield gross value of output from which total value of input is deducted to arrive at the estimate of value added.
Forestry and Logging	1.25		
Fishing	0.57		
Mining and Quarrying	1.07		
Registered Manufacturing	7.91		
Construction	4.63		

## Outline of the Methodology of National Income Estimation in India

Sector		Nature of Available Data	Description of the Method of Estimation
<b>Category B</b>			
Electricity	0.45	Actual figures of all types of factor earnings reported in the annual accounts of difference companies or undertakings published on a more or less regular basis.	<b>Income approach:</b> Actual figures of employee compensation, interest, rent and operating surplus or profits relating to different enterprise/ org. in each sector are aggregated to arrive at the estimates of value added
Railways	1.86		
Air Transport	0.09		
Water Transport	1.17		
Communication	0.47		
Banking and Insurance	1.17		
Real Estate	0.03		
Public Administration and Defence	4.04		

## Outline of the Methodology.....

Sector		Nature of Available Data	Description of the Method of Estimation
<b>Category C</b>			
Unregistered Manufacturing	5.81	Estimates of working force derived from the decennial population census data and the estimates of average productivity of labour derived from the data shown by periodical sample surveys	<b>Income approach:</b> Decennial estimates of working force are interpolated/ extrapolated, & periodical estimates of Av. productivity are carried forward or backward by using certain indicators. Yr-to-year estimates of workers & their Av. productivity so derived, are then multiplied to arrive at the estimates of value added.
Gas and Water Supply	0.06		
Unorganised Road & Water Transport	0.72		
Storage	0.05		
Trade, Hotels and Restaurants	9.57		
Ownership of Dwellings	2.81		
Other Services	6.69		

## Methodology of Estimation

	Economic Activities
1	Agricultural including Animal Husbandry
2	Forestry and Logging
3	Fishing
4	Mining and Quarrying
5	<b>Manufacturing:</b> Registered manufacturing Unregistered manufacturing
6	Construction
7	Electricity, Gas, and Water Supply
8	Transport, Storage and Communication
9	Trade, Hotels and Restaurants
10	Banking and Insurance
11	Real Estate, Ownership of Dwellings and Business Services
12	Public Administration and Defence
13	Other Services

## Comparison of countries - PPP?

**It states that if international arbitrage is possible,  
then a dollar must have the same purchasing  
power in every country.**

# Measuring Cost of Living

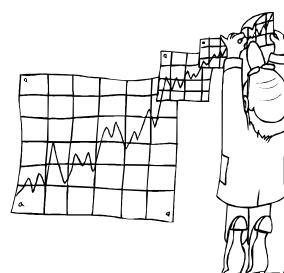
## Measuring Cost of Living: The Wholesale Price Index

❖ Rs. 100 today doesn't buy as much as it was buying 5 years ago or 10 years ago or 20 years ago.

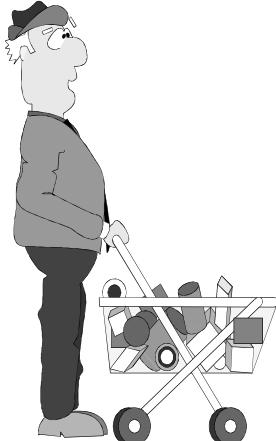
⇒ **Cost of everything has gone up.**

This increase in the level of overall prices is called **Inflation**.

Wholesale price index (WPI) was the commonly used indicator to measure the level of prices or Inflation.



# Computing the WPI



- ❑ **Wholesale Price Index (WPI)** turns the prices of many goods and services into a single index measuring the overall level of prices.

## How this can be done reliably?

- a) By computing average of all prices

### Limitation:

Approach treats all goods and services equally.

In reality, people buy more food than clothing  
⇒Food should have greater weight in WPI than the price of clothing.

## Computing WPI.....



- ❑ Computing WPI in an economy producing apple and oranges only.
- ❖ Suppose that the typical consumer buys 5 apples and 2 oranges every month. Then the basket of goods consists of 5 apples and 2 oranges, and the WPI is:

$$\text{WPI} = \frac{(5 \times \text{Current Price of Apples}) + (2 \times \text{Current Price of Oranges})}{(5 \times 2011 \text{ Price of Apples}) + (2 \times 2011 \text{ Price of Oranges})}$$

- ❑ In this WPI calculation, 2011 is the base year. The index tells how much it costs to buy 5 apples and 2 oranges in the current year relative to how much it cost to buy the same basket of fruit in 2011.

## Main uses of WPI

- to provide estimates of inflation at the wholesale transaction level for the economy as a whole.
- ❖ This helps in timely intervention by the Government to check inflation in particular, in essential commodities, before the price increase spill over to retail prices.
- WPI is used as deflator for many sectors of the economy including for estimating GDP
- WPI is also used for indexation by users in business contracts.
- Global investors also track WPI as one of the key macro indicators for their investment decisions

**Govt. periodically reviews and revises the base year of WPI**

- to capture structural changes in the economy and
- improve quality, coverage & representativeness of the indices.

## Wholesale Price Index - composition

Total of 199 new items - added and 146 items - deleted.  
498 items are common between the 2004 -05 and 2011-12 series.

Description	No. of Items (1981-82)	No. of Items (1993-94)	No. of Items (2004-05)	No. of Items (2011-12)
I. Primary Articles	93	98	102	117
II. Fuel, Power, Light & Lubricant	20	19	19	16
III. Manufactured Products	334	318	555	564
All Commodities	447	435	676	697

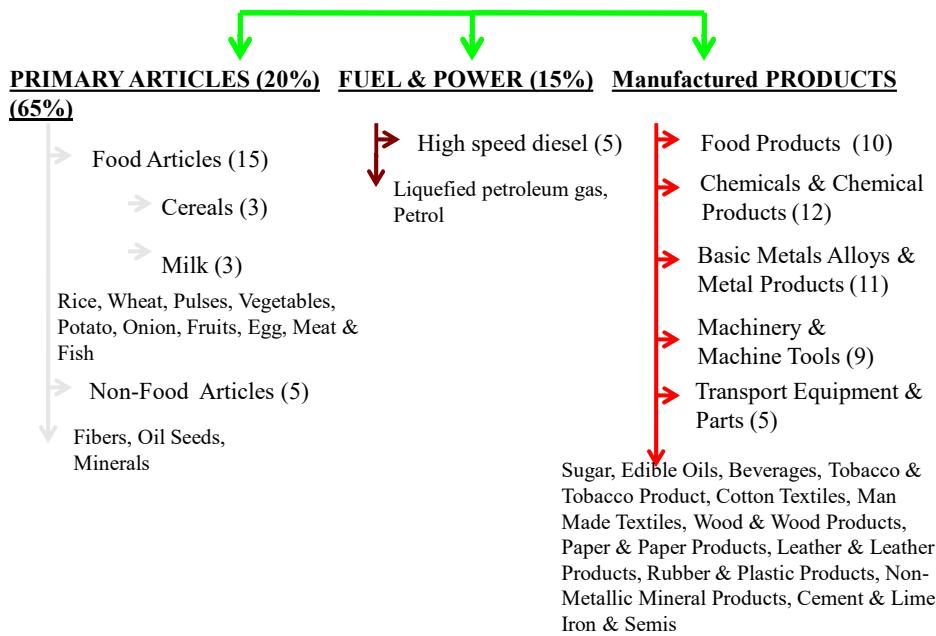
New series introduced on May 12, 2017

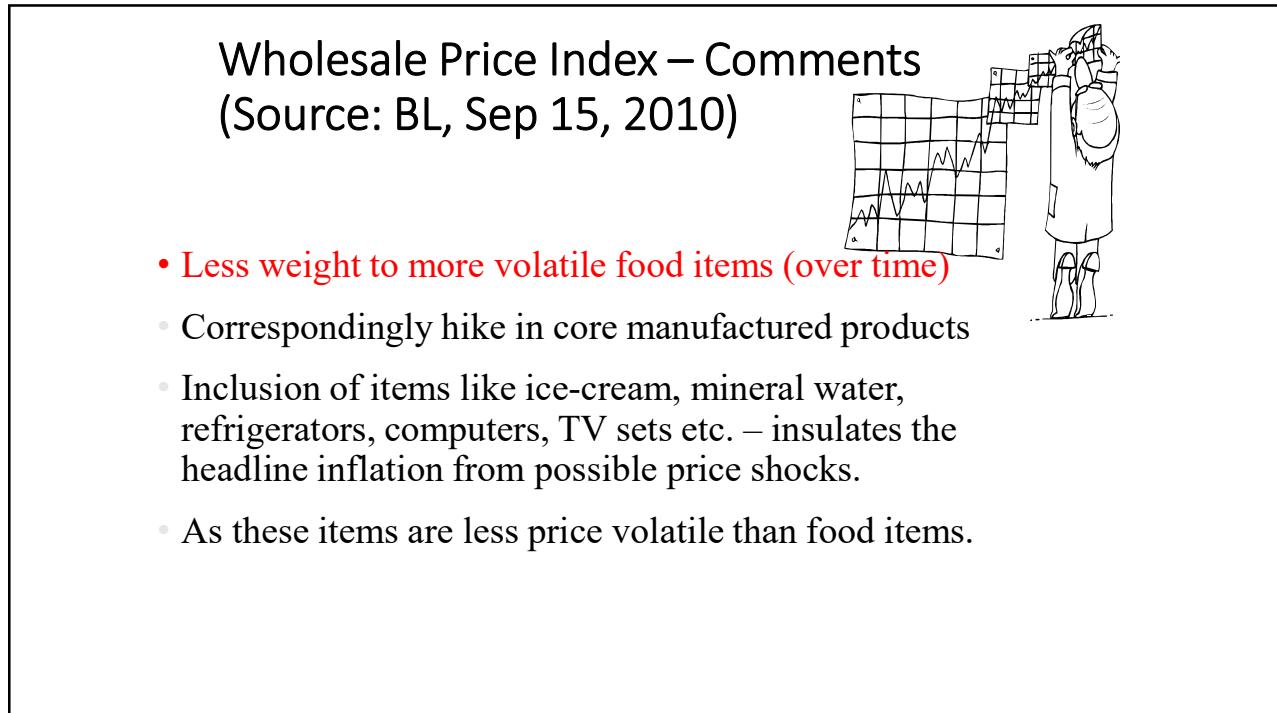
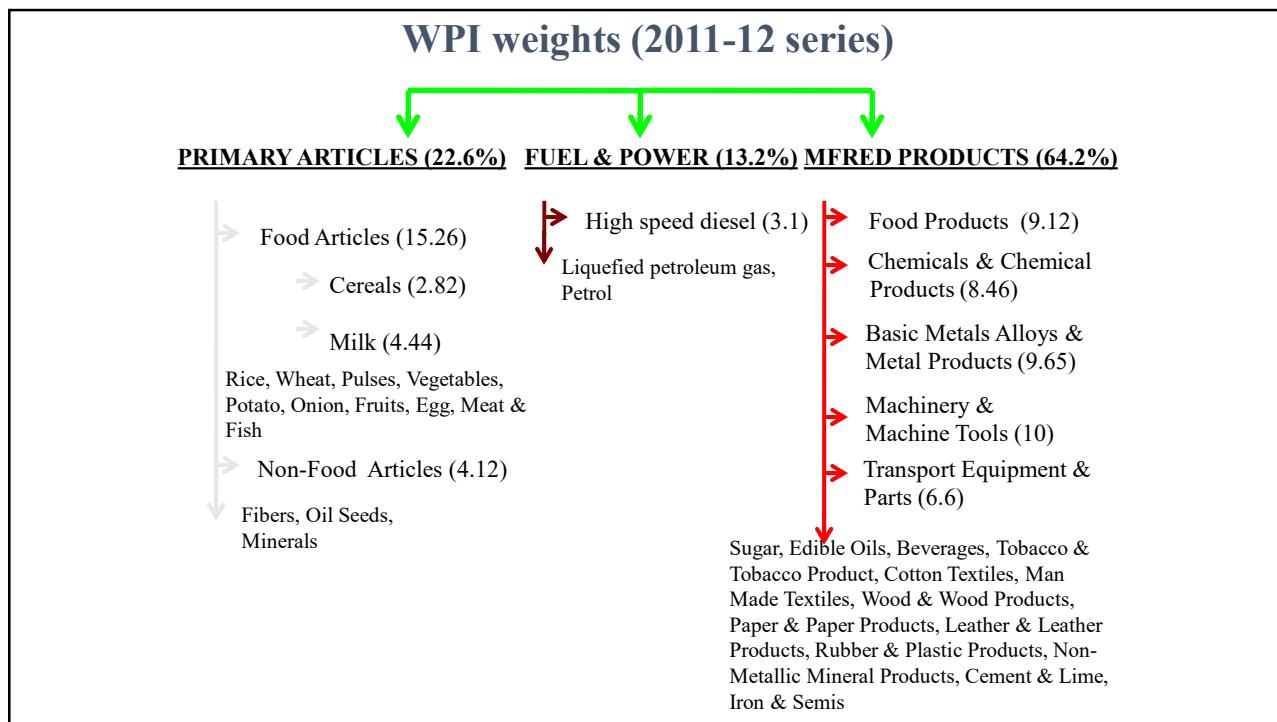
Working group constituted on March 2012

## Wholesale Price Index – weights?

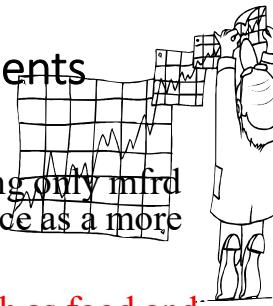
Description	% Share of items (1981-82)	% Share of items (1993-94)	% Share of items (2004-05)	% Share of items (2011-12)
I. Primary Articles	32.3	22.03	20.12	22.62
II. Fuel, Power, Light & Lubricants	10.66	14.23	14.91	13.15
III. Manufactured Products	57.04	63.75	64.97	64.23
All Commodities	100	100	100	100

### WPI weights (2004-05 series)





## Wholesale Price Index – Comments



**NOTE:** As per purists, core inflation using ~~only mfrd products carries considerable significance as a more accurate predictor of long term trend~~

- weeding out transitory components such as food and energy.

- Alternate methods that measure core inflation are – trimmed-mean method used by **Federal Reserve Bank of Dallas, US – strips only the most volatile items off the index each month**

## Issues in measuring cost of living

- ❖ WPI vs. CPI
- ❖ Headline vs. Core

**Core inflation** - computed by excluding the prices of primary articles, fuel group and processed food from WPI/CPI.

**Note 1:** If food & fuel together constitute 2/3<sup>rd</sup> (65% in India) of consum<sup>n</sup> basket – it would ignores key aspect of inflation

**Note 2:** Core inflation number impacts interest rate policy in India.

## Issues in measuring cost of living

### I) Reporting issue

❖ Headline vs. Core inflation

### II) Index coverage

➤ WPI vs. CPI

### III) Index specific issues

➤ Seasonality

➤ Quality Adjustment – substitute?

➤ Rationing

➤ Housing

Can we have a common number?

## Some key towns.....

- ❖ **Anakapalle, Kolhapur, Muzzafarnagar**
- ❖ **Nagpur, Guntur, Rajkot, Mahesana (Kadi)**
- ❖ **Lasalgaon**
- ❖ **Erode**
- ❖ **Vazhakulam**

## Advantage of WPI – some towns....



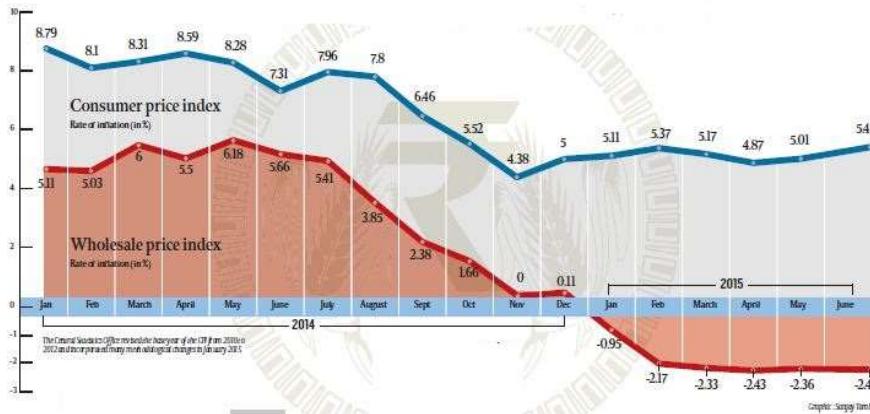
**From April 2014 we started computing CPI also**

**Consumer Price Index – weights? (>630 items)**

% Share of items		Newer Description
(2001)	(2012)	
46.2	45.86	IA) Food
2.27	2.38	IB) Pan, Supari, Tobacco & Intoxicants
6.43	6.84	Fuel & Light
15.27	10.07	Housing
6.57	6.53	Clothing, Bedding and Footwear
23.26	28.32	Miscellaneous – Medical, edu <sup>n</sup> , Recreation, X-port/ communication, personal care etc.

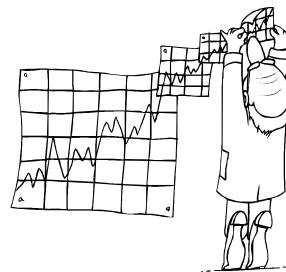
## WPI vs. CPI

(Source: <http://images.indianexpress.com/2015/07/graph1.jpg>)



## Issues in measuring an Index

- ❖ Choice of Base Year
- ❖ Choice of sample commodity
- ❖ Which Price? How to verify?



### Which Price?

Price should be one that is charged to the consumer

- Retail price inclusive of all indirect taxes like excise duty, sales tax, etc. which are realised from the consumer and
- it should be exclusive of rebates, etc. allowed to consumer in general.

## Choice of Base Year (2004-05) ([www.mospi.nic.in](http://www.mospi.nic.in))



- ❖ Base year should be a normal i.e, a stable year in respect of economic activities like production, trade, etc and their prices. It should not suffer from business cycles,
- ❖ Reliable price data must be reasonably available for the selected base year,
- ❖ Should be as recent as possible so that by the time revised series of items and their prices are released, it should not have outlived its utility, and
- ❖ Base year for closely related economic indicators should not be widely off the mark.

## Choice of Sample ([www.mospi.nic.in](http://www.mospi.nic.in))



- ❖ Sampling - to be done over different specifications of each commodity.
- NOTE:** Target population might be consuming different varieties of each article – COMMON KNOWLEDGE.
- ❖ E.g., Different varieties of rice - coarse, medium, fine, superfine, etc. might be consumed by consumers.
  - ❖ Including all these varieties in the index - neither feasible nor desirable.
  - ❖ A judicious choice of the popular varieties (one or two) consumed by index population, to be included in index.
- This is done on the basis of popularity of varieties revealed by the family budget data, market intelligence, etc.

## Scrutinizing Prices ([www.mospi.nic.in](http://www.mospi.nic.in))

- ❖ In field - Price Collectors to verify from customers from time to time
- ❖ Price Supervisors to check the veracity of prices quoted by the Price Collectors by making spot visits frequently.

**NOTE:** Price data recorded by Price Collectors to be carefully scrutinized by Price Supervisors before sending for processing.

- ❖ In DPU, price data is further scrutinized and doubtful cases such as those arising from abnormal price variations between markets, between shops, over time (week to week), etc. may be referred back to the price collection agency for rectification/clarification.

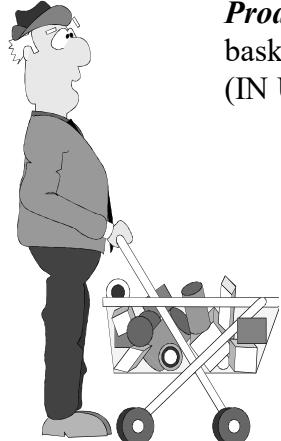
**Note:** Special care should also be taken to ensure that the quotations from shop to shop, market to market and week to week are not subject to extraneous variations e.g. variations due to changes in quality, unit of price, etc.

## Scrutinizing Prices ([www.mospi.nic.in](http://www.mospi.nic.in))

- Prices of various commodities should be compared with the corresponding prices of previous month.
- 3 Checks require Scrutiny -
  - ❖ If Price variations > 10% for non-seasonal items and
  - ❖ If Price variations > 50% for seasonal items
  - ❖ Similarly, variations > 3 points in item level index vis-a-vis previous month also need thorough rechecking

[http://mospi.nic.in/mospi\\_new/upload/manual\\_cpi\\_2010.pdf](http://mospi.nic.in/mospi_new/upload/manual_cpi_2010.pdf)

# Other price index....

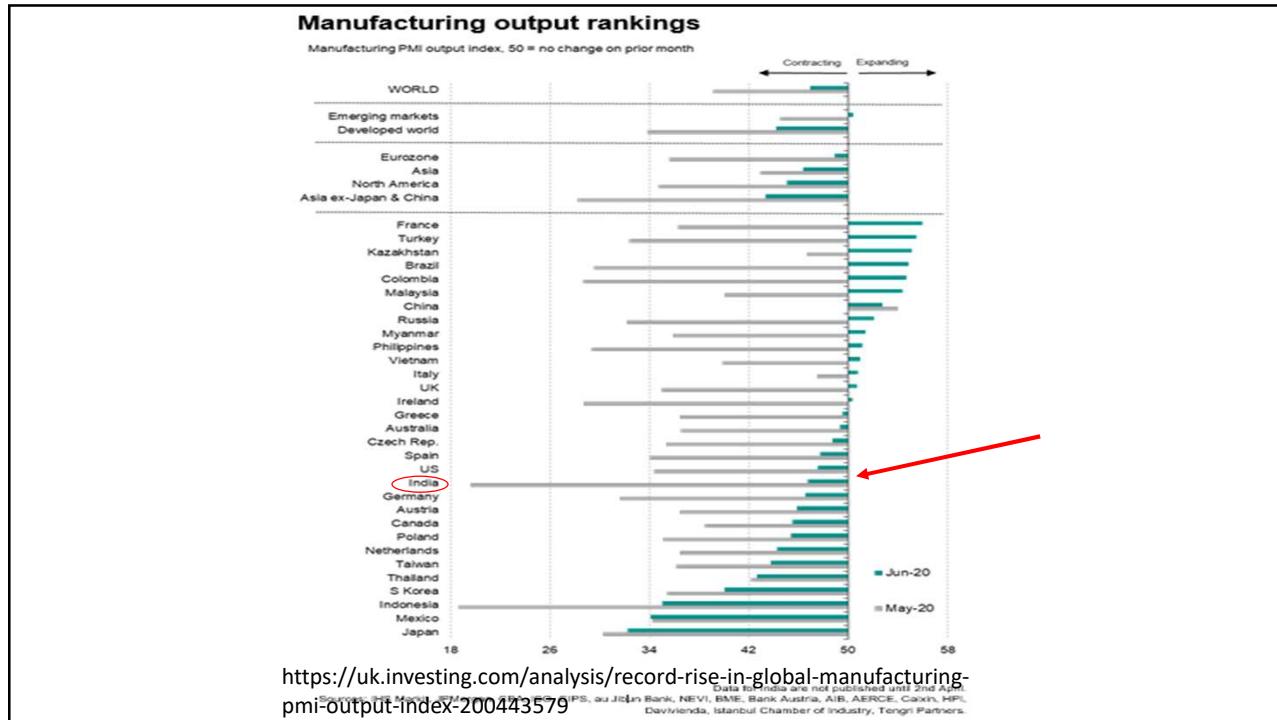
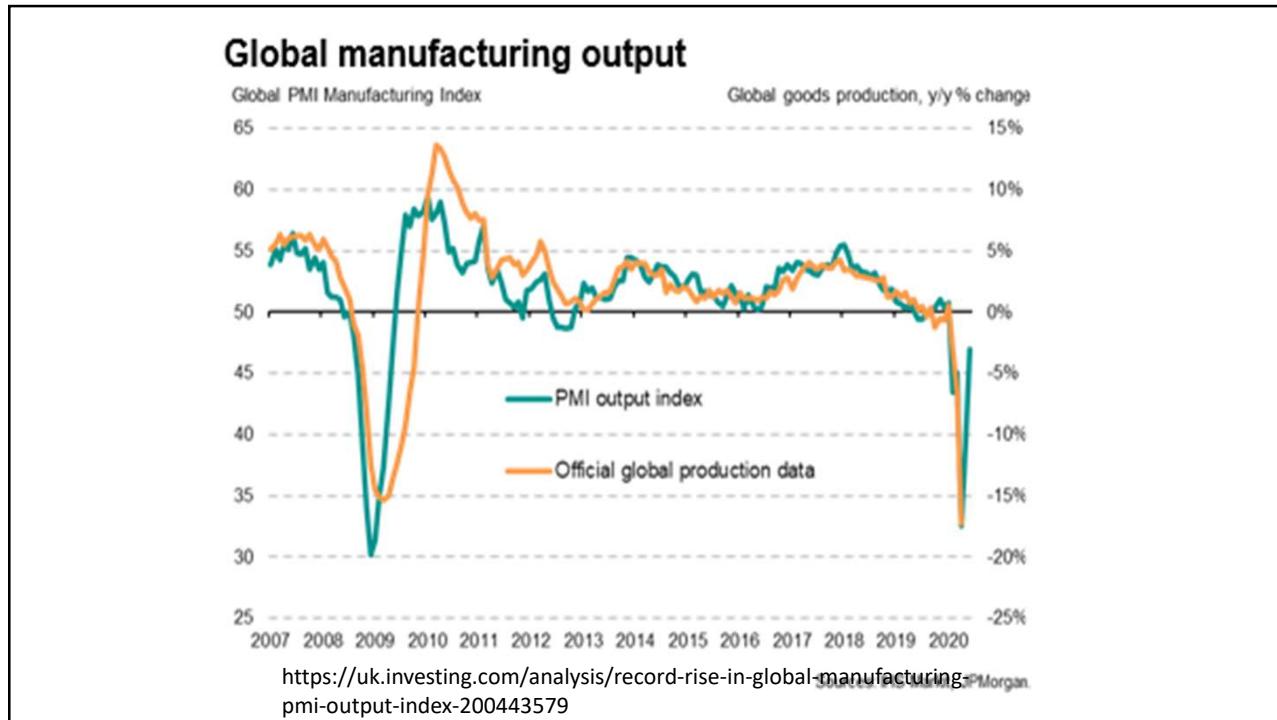


**Producer Price Index (PPI)** - measures the price of a typical basket of goods bought by firms rather than customers.  
(IN USA)

**HSBC Purchasing Manager Index (PMI)** - measures the factory production – based on monthly responses of purchasing executives in  $\approx 500$  mfrg companies.

- A figure  $> 50$  indicates expansion
- $< 50$  - contraction





# WPI vs. GDP Deflator

## WPI Versus GDP Deflator

❑ The GDP deflator measures the prices of all goods produced, whereas the WPI measures prices of only the goods and services bought by consumers.

⇒ An ↑ in the price of goods bought by firms or the govt. will show up in the GDP deflator but not in the WPI.

❑ The GDP deflator includes only those goods and services produced domestically. Imported goods are not a part of GDP. ∴ don't show up in the GDP deflator.

**Note:** If there is an ↑ in the price of Dell computer

What would happen to WPI and GDP deflator?

❖ WPI would be affected since consumers buy computer but no effect on GDP.

## WPI Versus GDP Deflator

- Lastly, WPI assigns fixed weights to the prices of different goods, whereas GDP deflator assigns changing weights.

i.e., WPI is computed using a fixed basket of goods, whereas GDP deflator allows the basket of goods to change over time as the composition of GDP changes.

## Types of Indexes

- Index are of two types:
  - Index with a fixed basket of goods  
Called as 'Laspeyres Index'  
(WPI)
  - Index with changing basket of goods  
Called as 'Paasche Index'  
(GDP Deflator)

**WHICH INDEX is a BETTER Measure of Cost of Living?**

# Weighted Indexes

Simple price index

$$P = \frac{p_t}{p_0} (100)$$

LASPEYRES PRICE INDEX

$$P = \frac{\sum p_t q_0}{\sum p_0 q_0} \times 100$$

[15-4]

where

$P$  is the price index.

$p_t$  is the current price.

$p_0$  is the price in the base period.

$q_0$  is the quantity used in the base period.

Simple price index

PAASCHE PRICE INDEX

$$P = \frac{\sum p_t q_t}{\sum p_0 q_t} \times 100$$

[15-5]

Where

$P$  is the price index

$p_t$  is the current price

$p_0$  is the price of the base period

$q_t$  is the quantity used in the current period

$q_0$  is the quantity used in the base period

Fisher's ideal index (geometric mean of both the indices)

## Laspeyres versus Paasche Index

When is Laspeyres most appropriate and when is Paasche the better choice?

- **Laspeyres**

- **Advantages** Requires quantity data from only the base period. This allows a more meaningful comparison over time. The changes in the index can be attributed to changes in the price.
- **Disadvantages** Does not reflect changes in buying patterns over time. Also, it may overweight goods whose prices increase.

- **Paasche**

- **Advantages** Because it uses quantities from the current period, it reflects current buying habits.
- **Disadvantages** It requires quantity data for the current year. Because different quantities are used each year, it is impossible to attribute changes in the index to changes in price alone. It tends to overweight the goods whose prices have declined. It requires the prices to be recomputed each year.

## Laspeyres Index - Example

Laspeyres Index							
Item	$p_{t=95}$	$q_{t=95}$	$p_t q_0$	$p_{t=05}$	Price*Qty-95	$q_{t=05}$	$p_t q_t$
Bread	\$ 0.77	50	\$ 38.50	\$ 1.01	\$ 38.50	44.50	
Eggs	\$ 1.85	26	\$ 48.10	\$ 1.84	\$ 48.10	26	\$ 47.84
Milk	\$ 0.88	102	\$ 89.76	\$ 1.01	\$ 89.76	102	\$ 103.02
Apples	\$ 1.46	30	\$ 43.80	\$ 1.56	\$ 43.80	30	\$ 46.80
Orange Juice	\$ 1.58	40	\$ 63.20	\$ 1.70	\$ 63.20	40	\$ 68.00
Coffee	\$ 4.40	12	\$ 52.80	\$ 4.62	\$ 52.80	12	\$ 55.44
			\$ 336.16				\$ 365.60
LASPEYRES PRICE INDEX				$P = \frac{\sum p_t q_0}{\sum p_0 q_0} \times 100$			
				$P = \frac{\sum p_t q_0}{\sum p_0 q_0} (100) = \frac{\$365.60}{\$336.16} (100) = 108.8$			

## Paasche Index - Example

The prices for the six food items from Table 15–2 are repeated below in Table 15–3. Also included is the number of units of each consumed by a typical family in 1995 and 2005.

**TABLE 15–3** Price and Quantity of Food Items in 1995 and 2005

Item	1995 Price	1995 Quantity	2005 Price	2005 Quantity
Bread, white, cost per pound	\$0.77	50	\$0.89	55
Eggs, dozen	1.85	26	1.84	20
Milk, gallon, white	0.88	102	1.01	130
Apples, Red Delicious, 1 pound	1.46	30	1.56	40
Orange Juice, 12 oz concentrate	1.58	40	1.70	41
Coffee, 100% ground roast, 1 pound	4.40	12	4.62	12

## Fisher's Ideal Index

- Laspeyres' index tends to overweight goods whose prices have increased. Paasche's index, on the other hand, tends to overweight goods whose prices have gone down.
- **Fisher's ideal index** was developed in an attempt to offset these shortcomings.
- It is the geometric mean of the Laspeyres and Paasche indexes.

$$\text{Fisher's ideal index} = \sqrt{(\text{Laspeyres' index})(\text{Paasche's index})} \quad [15-6]$$

97

## Laspeyres vs. Paasche Index

- When prices of different goods are changing differently, Laspeyres (fixed basket) index tends to overstate the increase in cost of living.

### HOW?

- It does not take into account that consumers have opportunity to substitute less expensive goods for more expensive goods (e.g., Vegetables – Cauliflower to potato or Onions in 1998).

- Conversely, Passche (changing basket) index tends to understate the increase in cost of living.

### HOW?

- It takes into account the substitution aspect, but does not reflect the ↓ in consumers welfare resulting from such substitution.

# Laspeyres vs. Paasche Index

Since WPI is Laspeyres index – it overstates the impact of ↑ in prices – as it ignores consumers' ability to substitute one good with another (e.g., oranges with apple or sapota).

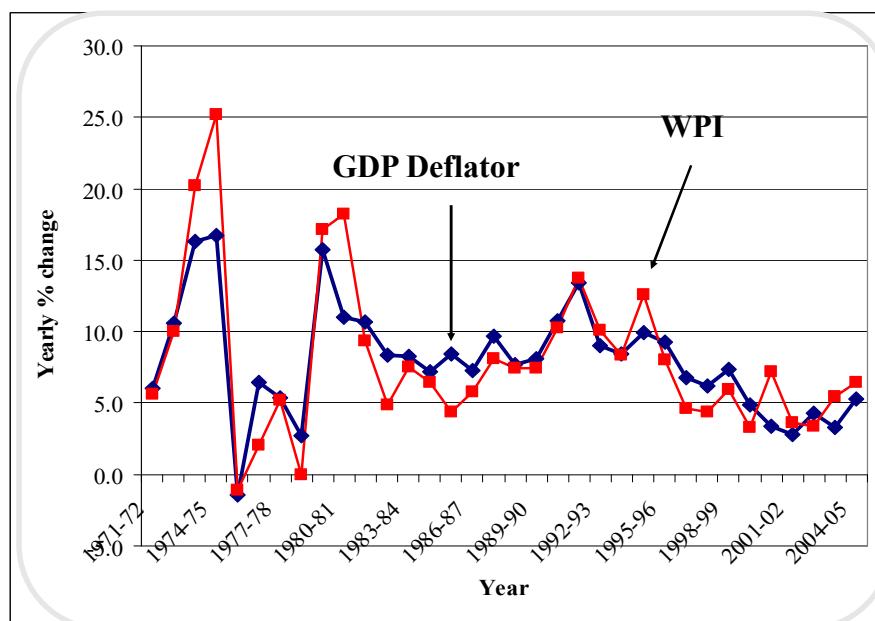
- In contrast, GDP deflator is a Passche index – it understates the impact on consumers – though GDP deflator shows no rise in prices, it certainly makes consumers worse-off.

⇒ No measure is better

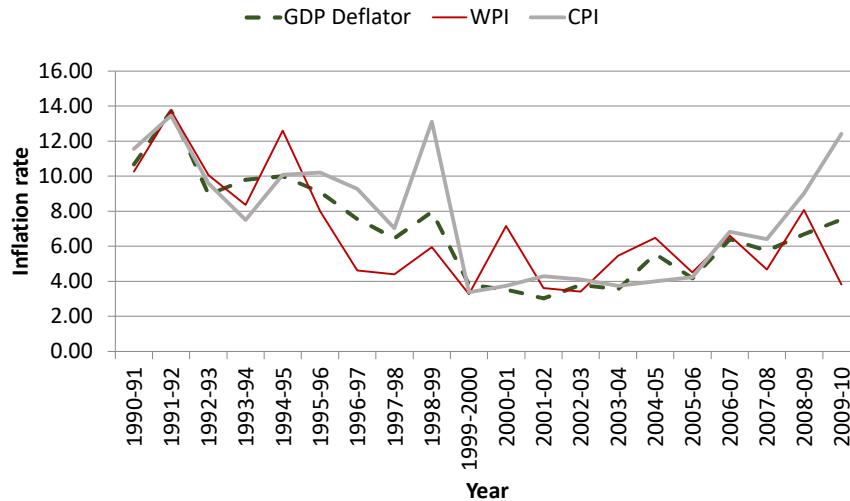
**Q. What has happened in the past few decades?**

In reality both tells the same story.

## WPI vs. GDP Deflator



## Inflation Rates Based on GDP Deflator, WPI and CPI (Industrial Workers)



## Chapters completed so far

- Mankiw 7<sup>th</sup> edition
- .. Chapter 23 (Measuring national income)
- Chapter 24 (Measuring cost of living)

Over to the chapter on Unemployment (chapter 28)

# Measuring Unemployment

## Measuring Unemployment

- ❑ Unemployment Rate is the statistic that measures the percentage of people who want to work but do not have jobs – reflecting performance of the economy.
- ❑ To find unemployment rate, we need to know
  - number of people who want to work
  - what portion of them does not have work

# Measuring Unemployment

- ❑ **Labor force** is defined as the sum of the employed and unemployed, and the **unemployment rate** is defined as the percentage of the labor force that is unemployed.
- ❑ **Labor force participation rate** is the percentage of the adult population who are in the labor force.

$$\text{Unemployment Rate} = \frac{\text{Number of Unemployed}}{\text{Labor Force}} \times 100$$

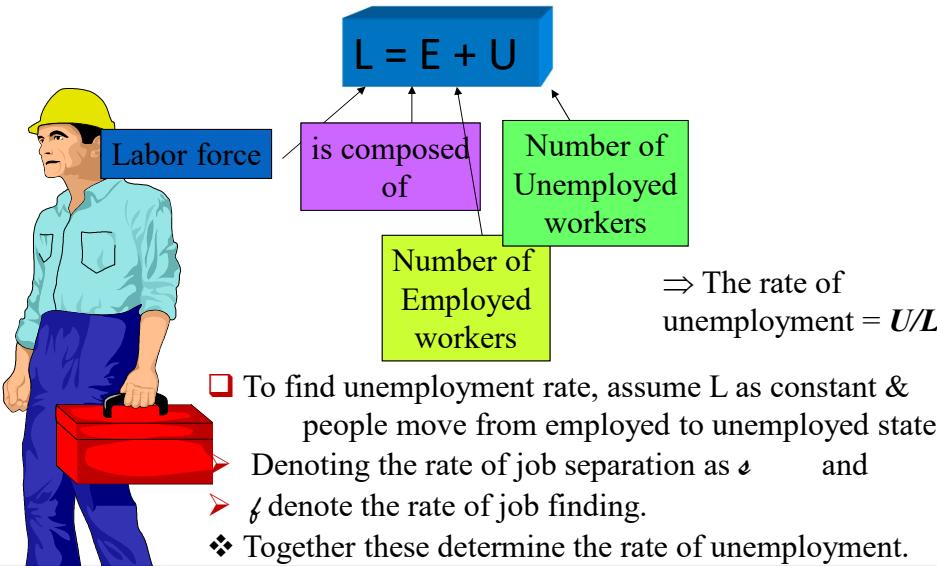
$$\text{Labor-Force Participation Rate} = \frac{\text{Labor Force}}{\text{Adult Population}} \times 100$$

## Job Loss, Job Finding and the Natural Rate of Unemployment

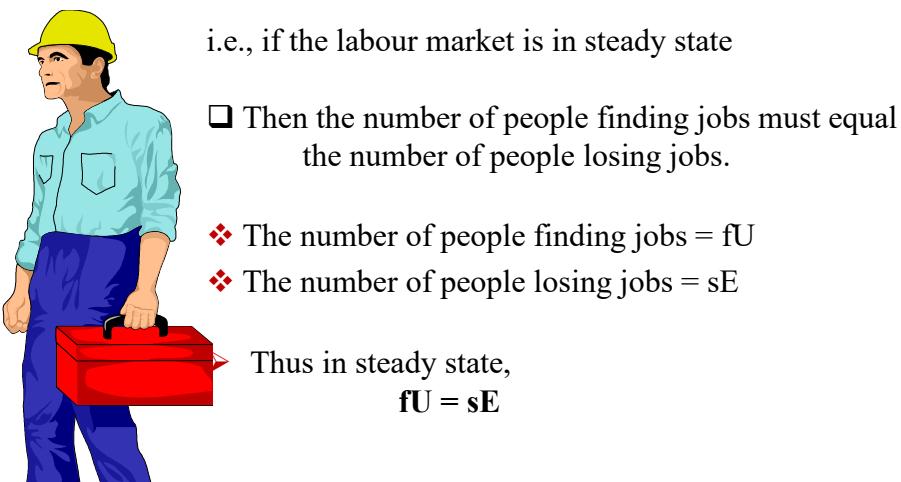


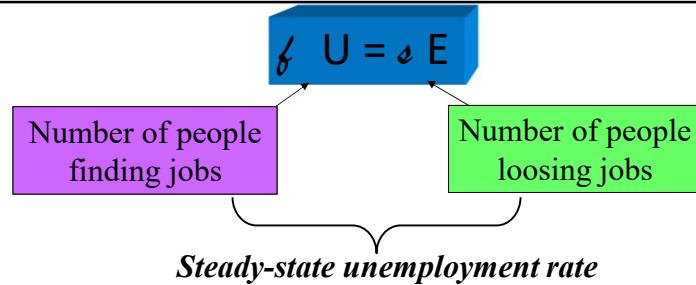
- ❑ The average rate of unemployment around which the economy fluctuates is called the **natural rate of unemployment**.
  - ❑ The natural rate is the rate of unemployment toward which the economy gravitates in the long run.
  - ❑ Let's start with some fundamental equations that will build a model of labor-force dynamics that shows what determines the natural rate.
    - ❖ If L denote the labour force
    - ❖ E the number of employed and U the unemployed
- $L = U + E$

# Job Loss, Job Finding and the Natural Rate of Unemployment



# Job Loss, Job Finding and the Natural Rate of Unemployment





Since  $E = L - U$ , that is the number of employed equals the labor force minus the number of unemployed.

Substituting  $(L-U)$  for  $E$  in the steady-state condition, we find:

$$f U = s (L - U)$$

Dividing both sides by  $L$  and to obtain:

$$f U/L = s (1 - U/L)$$

Solving for  $U/L$  for find :

$$U/L = s / (s + f)$$

## Natural Rate of Unemployment - Example

$$U/L = s / (s + f)$$

### How many jobs you would be changing in your working life? - POLL

- ❑ Suppose 1% of employed lose their jobs every month ( $s = 0.01$ )  
⇒ On an average jobs last 100 months or approx. 8 years
- ❑ Assuming 20% of unemployed find job each month (i.e.,  $f = 0.2$ )  
⇒ Spells of unemployment lasts 5 months.

### The steady state rate of unemployment will be:

$$\begin{aligned} \diamond U/L &= s/(s+f) = 0.01/(0.01+0.2) = 0.01/0.21 \\ &= 0.0476 \end{aligned}$$

❖ The rate of unemployment  $\cong 5\%$

# POLICY IMPLICATION

- Any policy aimed at lowering the natural rate of unemployment must either
  - ❖ reduce the *rate of job separation* or
  - ❖ increase the *rate of job finding*.
- Similarly, any policy that affects the rate of job separation or job finding also changes natural rate of unemployment.

**NOTE:** Though model relates unemployment rate to job separation & job finding, it fails to answer a central question:  
**WHY is there unemployment in the first place?**

## TWO REASONS: Job Search and Wage Rigidity

<http://www.ndtv.com/india-news/quotable-quotes-of-the-obama-visit-438595> accessed on May 6 2016



### Quotable quotes of the Obama visit

[India](#) | [NDTV Correspondent](#) | Updated: Nov. 08, 2010 19:53 IST

**New Delhi:** US President Barack Obama is on a four-day presidential visit to India. During the trip, Obama got over 50,000 jobs for Americans, wooed India Inc, interacted with India's Gen Next and addressed the Indian Parliament. We take a look at some of the quotable quotes from this visit:

- When American people ask me why you are visiting India, I want to say that look India just created 50,000 jobs and so we should not be talking about protectionism – Obama

## *Why you want to join MNC?*

- ***Why MNCs pay higher salaries?***
  - ***Moral Hazard***
  - ***Adverse Selection***
  - ***Hiring and Training Costs – Labour turnover***



- ***Efficiency wage*** theories propose a third cause of wage rigidity.
- Efficiency-wage theories hold that high wages make workers more productive. So, though a wage reduction would lower a firm's wage bill, it would also lower worker productivity and the firm's profits.
- **Four different theories:**
  - ❖ **Theory 1 – mostly in developing countries**
    - Wage influence nutrition
    - Better paid workers can afford more nutritious diet
    - healthier workers more productive
    - ⇒ Firm can pay > eqbm wage to maintain healthy work force.

# Efficiency Wage

**Theory 2: High wages reduce labor turnover.**

- Higher pay ↑ workers' incentive to stay with the firm this ↓ hiring and training costs.

**Theory 3: Average quality of a firm's workforce depends on the wage it pays to its employees.**

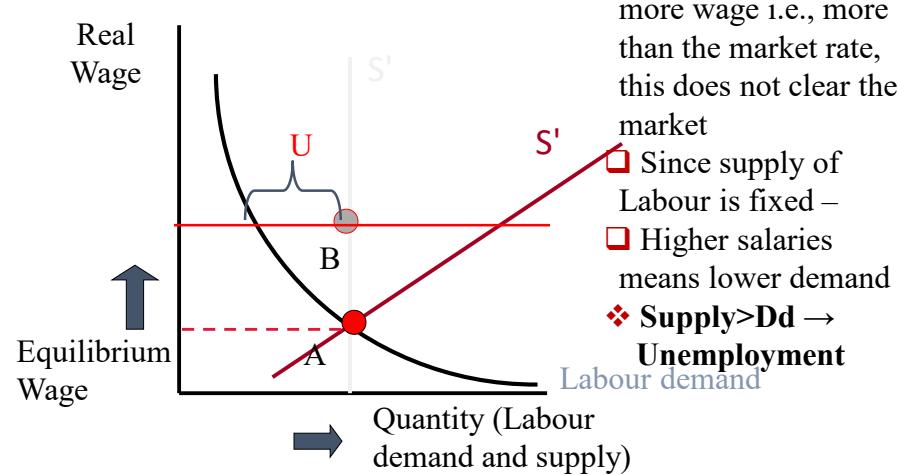
- If a firm ↓ its wage, best employees may take jobs elsewhere – leaving firm with inferior employees.

**➤ Adverse Selection problem .**

**Theory 4: A high wage improves worker effort.**

- Firm cannot monitor its employee – **moral hazard problem**
- Higher the wage, greater the cost to worker of getting fired.

## Supply and Demand for Labour



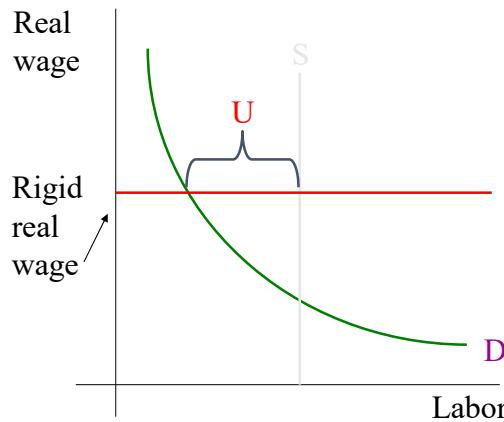
## Job Search and Frictional Unemployment

- ❑ The unemployment caused by the time it takes workers to search for a job is called *frictional unemployment*.
- ❑ Economists call a change in the composition of demand among industries or regions a *sectoral shift*.
- ❑ Since sectoral shifts are always occurring, and because it takes time for workers to change sectors, there is always frictional unemployment.
- ❑ In trying to reduce frictional unemployment, some policies inadvertently ↑ the amount of frictional unemployment.
- ❑ One such program is called *unemployment insurance*.
- ❑ In this program, workers can collect a fraction of their wages for a certain period after losing their job.

## Real-Wage Rigidity and Structural Unemployment

- ❑ *Wage rigidity* is the failure of wages to adjust until labor supply equals labor demand.
- ❑ In eqbm model of labour market, real wage adjusts to equilibrate supply & demand. Yet wages are not flexible.
- ❑ Sometimes, real wage is stuck about the market clearing level.
- ❑ The unemployment resulting from wage rigidity and job rationing is called *structural unemployment*.
- ❑ Workers are unemployed not because they can't find a job that best suits their skills, but rather, at the going wage, the supply of labor exceeds the demand.
- ❑ These workers are simply waiting for jobs to become available.

## *Real-Wage Rigidity and Structural Unemployment*



- ❑ If the real wage is stuck above the equilibrium level,  
then the supply of labor exceeds the demand.
- ❑ Result: **unemployment U**.

## *Causes of Real-Wage Rigidity*

- ❑ **Minimum Wage Laws**
- ❑ **Monopoly power of Unions**
- ❑ **Efficiency Wages**

## *Structural Employment*

To see how structural unemployment is likely to emerge, consider the employment of Alton Abernathy. For the better part of his adult life, Alton attached "needle arms" to record players at the HyFy Electronics factory in Shady Valley.

Alton was the best needle-arm attacher who had ever worked at the HyFy Electronics factory. For over thirty years Alton attached needle arms to record players.

Over the course of Alton's career, technological progress occasionally threatened to replace phonograph records with newer sound recording systems that might have eliminated Alton's job of attaching needle arms.

First, came 8-track tapes; fortunately a false alarm and a passing fad. Record players, and Alton's employment lived on.

Next, came cassette tapes; a bigger threat, but not big enough to change the public's fancy for record players. Alton's needle-arm attaching employment lived on.

[http://amosweb.com/cgi-bin/awb\\_nav.pl?s=wpd&c=dsp&k=structural+unemployment](http://amosweb.com/cgi-bin/awb_nav.pl?s=wpd&c=dsp&k=structural+unemployment)

## *Structural Employment*

Then came CDs. A dark day for Alton. Digital compact disc technology rapidly replaced phonograph record technology as the primary means of distributing recorded music. The HyFy Electronics factory ceased the production of record players, closed its doors, and in so doing eliminated Alton's needle-arm attaching employment. In its place, a new factory manufacturing compact disc players, OmniDisc Unlimited, began operation. Much of this factory was automated. The skills needed to manufacture compact disc players involved computer programming and high-tech equipment operation. Needle-arm attaching was no longer a useful skill.

At the age of 58, Alton had become structurally unemployed. Many jobs were available at the new OmniDisc factory, but Alton had neither the skill, training, nor education needed. Technological progress had claimed another victim.

Competition is another factor that can lead to structural unemployment in an economy. For example, [globalization](#) is one of the driving forces behind increased competition around the world. Developing countries generally provide cheap labor; many companies from developed countries relocate their manufacturing facilities to developing nations. As a result, workers who were previously involved in manufacturing become unemployed.

## Union membership as a %age of Employment

Country	% Union Workers
Sweden	84
Denmark	75
Italy	47
UK	41
Australia	34
Canada	33
Germany	33
Netherlands	28
Switzerland	28
Japan	26
US	16
France	11

## Efficiency Wage

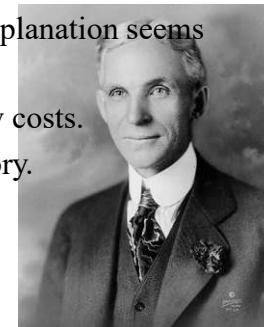
- ❑ *Efficiency-wage* theories propose a third cause of wage rigidity.
- ❑ Efficiency-wage theories hold that high wages make workers more productive. So, though a wage reduction would lower a firm's wage bill, it would also lower worker productivity and the firm's profits.
- ❑ Four different theories:
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  - Firm cannot monitor its employee – **moral hazard problem**
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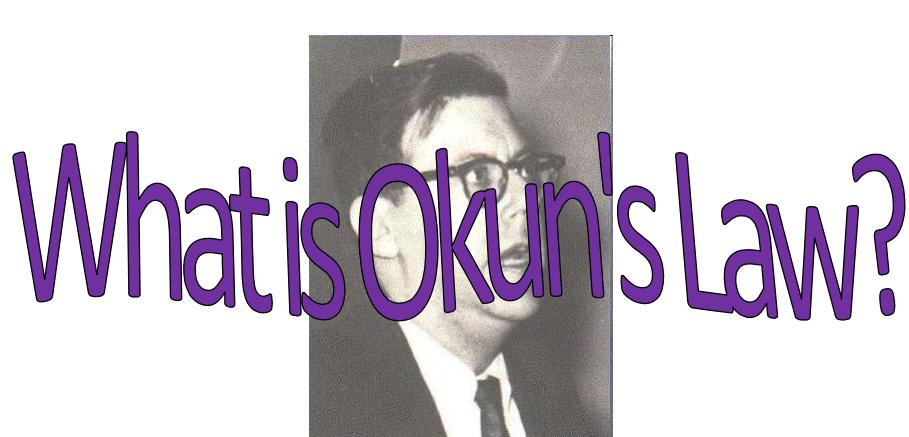
## Case study: Henry Ford's \$5 workday

- ❑ In 1914 Ford Motor company started paying \$5 per day against prevailing \$2 or \$3 wage.
- ❑ **Outcome – Long queue outside Ford plant to get job.**
  - According to Ford “....The payment of 5\$ a day for an 8 hrs day was one of the finest cost cutting moves we ever made.”
- ❑ From traditional economic theory – Ford's explanation seems peculiar.
- ❑ He was suggesting that high wages imply low costs.
  - ⇒ Perhaps he discovered Efficiency-Wage Theory.
  - ❖ **Outcome: Increase in firm's productivity.**
    - ↓ Absenteeism (fell by 75%)
    - ↓ Shop floor costs



### Alternative Measures of Labour Underutilization

	<b>Definition</b>	<b>% in Mar 2001</b>
U1	Persons employed 15 weeks or more / total labour force (includes only very long term unemployed)	1.2
U2	Job losers & persons completed temporary jobs, as a % of labor force (excludes job leavers)	2.4
U3	Total unemployed as a % of labour force (official unemployment rate)	4.6
U4	(Total unemployed + discouraged) / (labour force + discouraged)	4.8
U5	(Total unemployed + marginally attached) / (labour force + marginally attached)	5.3
U6	(Total unemployed + marginally attached + employed part time) / (labour force + marginally attached)	7.6



<http://zashuna.quazen.com/reference/biography/>

## Okun's Law Unemployment & GDP relation

**Note:** Employed workers help to produce goods and services, and unemployed workers do not.

→ ↑ In unemployment rate should be associated with ↓ in real GDP.

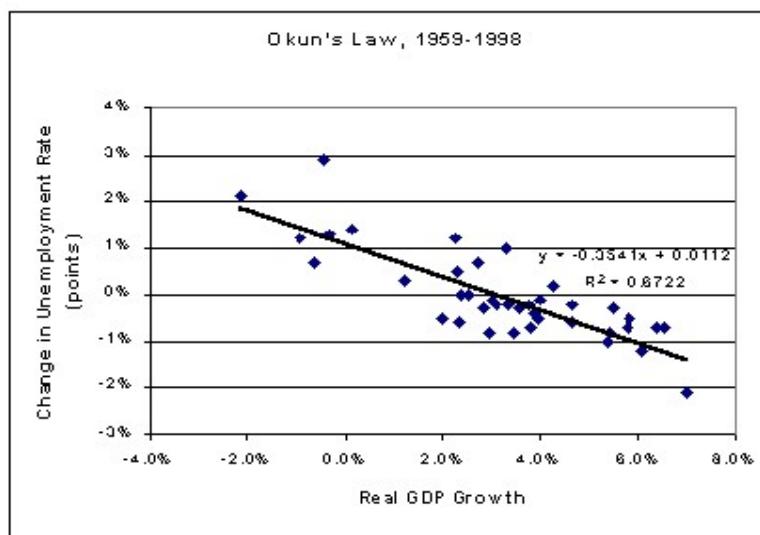
❑ The negative relationship between unemployment and GDP is called ***Okun's Law***, after Arthur Okun, the economist who first studied it.

❑ It is defined as:

Percentage Change in Real GDP =

Relation between Real GDP & Unemployment –  $2 \times$  the  
Change in the Unemployment Rate

# Okun's Law



## Okun's Law

**Ex.:** If the past relation between Real GDP & Unemployment Rate is 3% (found out for US economy during 1959-1998), then

Percentage Change in Real GDP =  
 $3\% - 2 \times \text{the Change in the Unemployment Rate}$

- ❑ If the unemployment rate remains the same, real GDP grows by about 3%
- ❑ For every percentage point the unemployment rate rises, real GDP growth typically falls by 2%.
- ❑ If the unemployment rate rises from 6% to 8%, then real GDP growth would be:

$$\text{Percentage Change in Real GDP} = 3\% - 2 \times (8\% - 6\%) = -1\%$$

## GDP as welfare measure?

### Two Issues:

- ❑ Does GDP correctly measure production?
- ❑ Is production a good proxy for welfare?

## I. Problems in GDP Measurement -

- **Underground economic activity**

Illegal activities (Middleman or facilitator???)

(Gas, Passport, License, NOC, Affidavit etc.)

Tax avoidance (4-5% of earning population paying tax)

Assets Hoarding (e.g., Gold)

**Note:** Problem primarily in developing countries like India

## International Differences in the Underground Economy

Country	Underground Economy as a Percentage of GDP
Bolivia	68 %
Zimbabwe	63%
Peru	61%
Thailand	54%
Mexico	33%
Argentina	29%
Sweden	18%
Australia	13%
United Kingdom	12%
Japan	11%
Switzerland	9%
United States	8%

Source: Friedrich Schneider, Figures are for 2002

## Underground Economy: Beneficial Or Subversive

The OECD countries underground economies ranged from 8 percent to 30 percent of their GDP.

Countries	Percentage
India	22 %to 50 %
Taiwan	25 % to 45 %
Pakistan	20 % to 50 %
Brazil	7% in early 1980s and shot up to more than 100% by the early 1990s.

### I. Problems in GDP Measurement -

Non-market transactions

(Barter system in villages, payment to domestic servants)

## I. Problems in GDP Measurement -

- **Negative consequences of production**  
(Environmental Externalities/pollution)



Degradation of Environment  
(clean air, deforestation etc.)



Depletion of natural wealth

This Depletion is unaccounted (ESDP?)

## Problems with GDP –negative externalities





# Is production a good proxy for welfare?

❑ Growth vs. Development?

❑ Growth or HDI?

❑ Growth vs. Inequality

➤ (GDP ↑ in most countries, median income ↓)

❑ GDI – Middle-east????

❑ H-Index ??????

NATIONAL

## Estimates panel wants GDP norms changed



T.C.A. Sharad Raghavan

Sobhana K. Nair



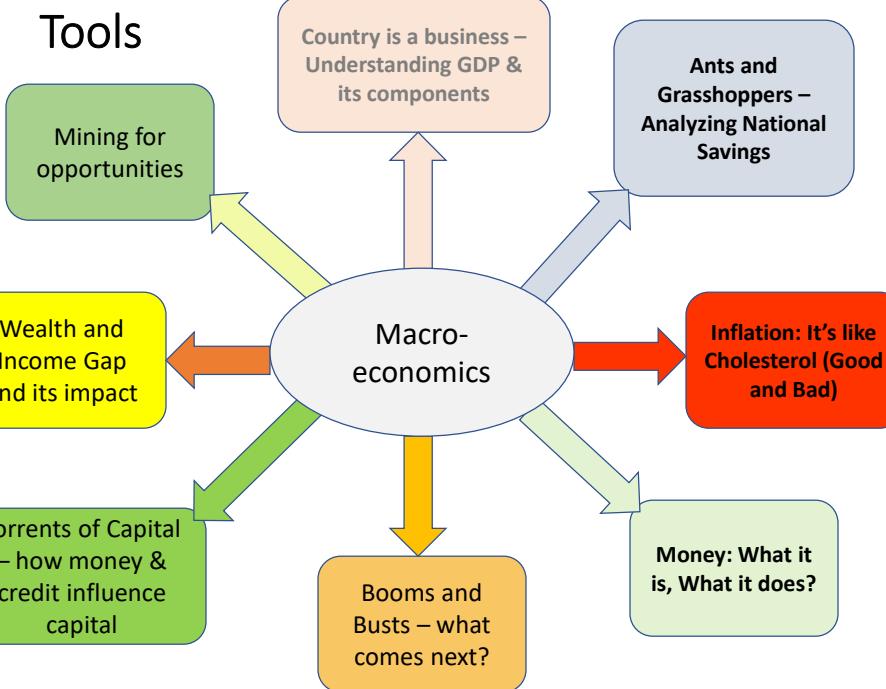
NEW DELHI, OCTOBER 12, 2018 21:45 IST

- Committee noted that the GDP calculation doesn't measure the depletion of natural resources, a point several economists including former CEA Arvind Subramanian have pointed out.
- The report said the current measure of GDP did not incorporate the economic contributions of women in running households and maintaining accounts, nor did
- it have any measure of whether an increase in GDP resulted in an increase in happiness.

❑ “Whereas any rise in GDP growth requires utilisation of natural resources, their utilisation and depletion is not taken into account while measuring GDP.”

<https://www.thehindu.com/news/national/estimates-panel-wants-gdp-norms-changed/article25208100.ece?homepage=true>

***Thank You!***



## WPI vs. CPI ([www.mospi.nic.in](http://www.mospi.nic.in))

