# MEASURING THE VALUE OF ECONOMIC ACTIVITY: GROSS DOMESTIC PRODUCT

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# RESOURCES

Principles of Macroeconomics: Mankiw (Fourth Edition), 2007:Chapters 10, 11

- Macroeconomics: Dornbusch, Fischer, Startz (Ninth Edition),2004: Chapter 2
- Essentials of Economics: Brue & Mcconnell (TATA MGH Edition), 2007: Chapter 12
- Macroeconomics: Oliver Blanchard (Fourth Edition), 2007:Chapter 2
- Macroeconomics: Mankiw (Fifth Edition), 2005 Chapter 2
- Macroeconomics: Errol D'Souza (First Edition), 2008: Chapter1

# AT A GLANCE

In these sessions, we look for the answers to these questions:

- What is Gross Domestic Product (GDP)?
- What is the difference between GDP and GNP?
- Starting from GDP, how to derive national income of a country?
- What are the components of GDP?
- How is GDP corrected for inflation?
- Does GDP measure society's well-being?

# GROSS DOMESTIC PRODUCT

Definition:

*Gross domestic product is the value of all currently produced final goods and services produced in a country within a given period of time evaluated at market prices.*

Observations:

1. The output under consideration is "gross" because it does not take into account, the capital goods (plants, equipment and residential structures) that wears out during the period.

# GROSS DOMESTIC PRODUCT

2. The output is "domestic" because it is measured within a specified geographical boundary of the country, whether done by its own citizens or by foreigners located here. Thus, in computing India's GDP, it does not matter whether the goods are produced (or incomes generated) by an Indian national or a Korean national, so long as it is produced in India.

3. GDP measures the "value" of all goods and services using the same units (e.g., rupees), rather than "adding apples to oranges".

4. GDP includes only "currently" produced goods and services. Such market transactions as purchase (or exchange) of second-hand cars, houses or even factories reflects the transfer of an asset or ownership, not an addition to nation's income. Thus the sale of "used" goods is not included as part of GDP.

   - The goods offered for sale at a shopping mall are new goods and therefore included in current GDP. In contrast, goods sold through eBay are usually secondhand items and thus not part of current GDP.

# GROSS DOMESTIC PRODUCT

5. Only the production of *"final"* goods and services enters GDP. Final goods are intended for the end user. Intermediate goods are used as components or ingredients in the production of other goods.GDP only includes final goods, as they already embody the value of the intermediate goods used in their production.

Q. Suppose a farmer sells 250 gms. of wheat to Modern Breads for Rs 4.50, and then Modern sells you bread for Rs 8.

# GROSS DOMESTIC PRODUCT

- Suppose a farmer sells 250 gms. of wheat to Modern Breads for Rs 4.50, and then Modern sells you bread for Rs 8.
- GDP includes only the value of final goods. Thus the bread is included in GDP but the wheat is not: GDP increases by Rs 8, not by Rs 12.50. The reason is that the value of intermediate goods is already included as part of the market price of the final goods in which they are used. To add the intermediate goods to the final goods would be double counting – that is, wheat would be counted twice.
- An alternative way of computing the value of all final goods and services is to sum the value added at each stage of production. The value added of a firm equals the value of the firm's output less the value of intermediate goods that the firm purchases. In the case of bread, the value added of the farmer is Rs 4.50 (assuming that the farmer bought no intermediate goods), and the value added of Modern is Rs 8 – Rs 4.50 = Rs 3.50. Total value added is Rs 4.50 + Rs 3.50 = Rs 8.
- For an economy as a whole, the sum of all value added must equal the value of all final goods and services.

# GROSS DOMESTIC PRODUCT

6. GDP includes both tangible *"goods"* (food, clothing, cars) and intangible *"services"* (haircuts, dry-cleaning, lawyer visits). When you buy a CD of Jagjit Singh's Ghazal, you are buying a good, and the purchase value is part of GDP. When you pay to hear Ghazal by the same singer, you are buying a service, and the ticket value is also part of GDP.
7. GDP includes goods and services currently *"produced"*. Thus a refrigerator produced but not sold is part of GDP and is counted as an increase in business inventories, a category of investment. The purchase of Infosys shares traded in the BSE is not a part of GDP, being merely a transfer of ownership from one investor to the other and does represent the production of goods and services.

# GROSS DOMESTIC PRODUCT

Suppose that a bakery hires workers to produce more bread, pay their wages, and then fails to sell the additional bread. How does this transaction affects GDP?

Case 1: Suppose the bread spoils before being brought to the market

- In this case, the firm has paid more wages but has not received any additional revenue, so the firm's profit is *reduced by the* amount that wages are increased. Total expenditure in the economy has not changed, because no one buys bread. Total income has not changed either – although more is distributed as wages and less as profit.
- Since the transaction affects neither income nor expenditure, it does not alter GDP.

# GROSS DOMESTIC PRODUCT

## Case 2: Suppose the bread is put into inventory to be sold later

- In this case, the transaction is treated differently. The owners are assumed to have "purchased" the bread for the firm's inventory, and the firm's profit is *not reduced by the additional* wages it has paid.
- Because the higher wages raise the total income, and greater spending on inventory raises total expenditure, the economy's GDP rises.

# GROSS DOMESTIC PRODUCT

8. GDP measures the value of production that takes place within a *"given period of time"*. Usually, this period is a year or a quarter. GDP measures the economy's flow of income and expenditure during that interval.
9. GDP values goods and services at *"market prices"*. Prices of many goods includes indirect taxes such as sales tax and excise tax and thus the market prices of the goods is not the same thing as the price the sellers receives. The price net of indirect taxes is the factor cost which is the amount received by the factors of production that manufactured the good.

Similarly, when *subsidy* is given to the particular product then the market price of the product does not indicate the true cost of production of the factor. Actually, with the market price if we add subsidies paid by the government, then we shall get the true factor cost of production.

Factor cost = Market price – Indirect Taxes + Subsidies

# GROSS DOMESTIC PRODUCT

Although most goods and services are valued at their market prices when computing GDP, some are not sold in the marketplace and therefore do not have market prices. If GDP is to include the value of these goods and services, we must use an estimate of their value. Such an estimate is called an imputed value.

- Consider the value of housing. A person who rents a house is buying housing services and providing income for the landlord; the rent is part of GDP, both as expenditure by renter and as income for the landlord.
- Many people, however, live in their own homes. Although they do not pay rent to the landlord, they are enjoying housing services similar to those that renters purchase. To take account of the housing services enjoyed by homeowners, GDP includes the "rent" that these homeowners "pay" to themselves. In other words, the national income accounts estimates what the market rent for a house would be if it were rented and includes that imputed rent as part of GDP. The imputed is included both in homeowner's expenditure and the homeowner's income.

# GROSS DOMESTIC PRODUCT

- Police officers, firefighters, defence personnel and government administration provide services to the public. Giving a value to these services is difficult because they are not sold in a marketplace and therefore do not have a market price. The national income accounts include these services in GDP by valuing them at their cost. That is, the wages of these public servants are used as a measure of the value of their output.
- In many cases, an imputation is called for in principle, but to keep things simple, is not made in practice. One might expect GDP to include the imputed rent on cars, coffee machines, TV and other durable goods owned by households. Yet the value of these rental services is left out of GDP.
- In addition, some of the output of the economy is produced and consumed at home and never enters the marketplace. For example, meals cooked at home are similar to meals cooked at a restaurant, yet the value added in meals at home is left out of GDP

# GROSS DOMESTIC PRODUCT

- Finally, no imputation is made for the value of goods and services sold in the *underground economy*. *The underground* economy is the part of the economy that people hide from the government either because they wish to evade taxation or because the activity is illegal. Domestic workers paid "off the books" is one example. The illegal drug trade is another.
- Because the imputations necessary for computing GDP are only approximate, and because the value of many goods and services is left out altogether, GDP is an imperfect measure of economic activity. These imperfections are most problematic when comparing standards of living across countries. The size of the underground economy, for instance, varies from country to country. Yet as long as the magnitude of these imperfections remain constant time GDP is useful for comparing economic activity from year to year

# COMPONENTS OF GDP

- One way of viewing GDP is that it is the total spending / expenditure on goods and services.

- Economists and policy makers care not only about the economy's total output of goods and services but also about the allocation of this output among alternatives. The national income accounts divide GDP into four broad categories:

- Consumption (C)
- Investment (I)
- Government Purchases (G)
- Net Exports (NX)

These components add up to GDP (denoted Y):

$Y = C+I+G+NX$

# CONSUMPTION

Consumption consists of the goods and services bought by households. It is divided into three subcategories: nondurable goods, durable goods and services.

- *Nondurable goods* are goods that last only a short time, such as food and clothing. Durable goods are goods that last a long time, such as cars and TVs. Services include the work done for consumers by individuals and firms, such as haircuts and doctor visits.
- Purchases of new houses is the only type of household spending that is not included in consumption. Instead it is included in residential fixed investment. However, when a consumer (as a tenant) rents a house or apartment, the consumer is buying housing services. These services are considered consumption, so the price paid for these services – the rent – is counted in the "consumption" component of GDP

# INVESTMENT

Investment is the part of spending by private firms that is meant for future use.

- Investment spending may be viewed as the portion of GDP used to increase a nation's stock of capital. Steel and bricks used to build a factory are part of investment spending, as are services provided by a technician who help build business computers.
- Firms' purchases of inventories are also counted in investment spending because carrying inventories is just another way for firms to transfer output from current use to future use.

# INVESTMENT

It is also divided into three subcategories: business fixed investment, residential fixed investment and inventory investment.

- Business fixed investment is the purchase of new plants and equipment by firms.
- Residential fixed investment is the purchase of new housing by households and landlords.
  - ✓ *The term "fixed" implies that these types of investment goods will be around for a long time and thus distinguish them from inventory investment, which is much more temporary.*
- Inventory investment is the change in the stock of inventories held by a business. Inventory investment in a given year = stock of inventories at the end of that year – stock of inventories at the beginning of the year (or end of the previous year).

# INVESTMENT

Example: When a publisher produces and stores 10,000 copies of a newly printed book in its warehouse, the books are included in GDP as inventory investment. Even though no one has yet purchased the books, they must be counted in GDP, because they have been produced.

- If subsequently you purchase a book directly from the publisher, consumption is up by one book and inventory investment is down by one book. GDP does not change nor should it, since there is no new production.
- When the publisher sells a book to a book store, the publisher's inventory investment is down by one book and the book store's inventory is up by one book. Total inventory investment does not change and neither does GDP.

# INVESTMENT

The rate of economic expansion slowed in US somewhat in late 2006 and whole of 2007 because of a notable contraction in the housing sector that began in the second half of 2005.

- The housing correction has intensified since late 2006 as demand has declined further, inventories of unsold new homes have climbed relative to sales, and house prices have decelerated, with some areas of the country experiencing outright declines in home values. In response to weak demand and bloated inventories, homebuilders have sharply curtailed new construction. The decline in residential investment directly subtracted about 3/4 percentage point from the average pace of U.S. economic growth over the earlier year and a half.
- In its regular reports to Congress, the Federal Reserve Board has highlighted as a downside risk the possibility that housing weakness might spill over to other parts of the economy--for example, by acting as a restraint on consumer spending.

# INVESTMENT

Investment and capital are not the same thing. Capital refers to the stock of capital goods (say) at the beginning of the year. Investment (or capital formation) refers to the net addition to the stock of capital during the year. What *looks like* investment for an individual may not be investment for the economy as a whole. *Investment*, as macroeconomists use, creates *new capital*.

Example 1: Suppose we observe the following two events:

- Rajesh buys for himself a 40-year old house from his colleague Ranjan
- Surabhi builds for herself a brand new contemporary house.

Question: What is total investment here? Two houses, one
h house, or zero?

# INVESTMENT

A macroeconomist seeing these two transactions counts only Surabhi's house as investment. Rajesh's transaction has not created new housing for the economy; it has merely reallocated existing housing. Rajesh's purchase is investment for him, but it is disinvestment for Ranjan selling the house. By contrast, Surabhi has added new housing to the economy; her new house is counted as investment.

Example 2: Consider the following two events:

- Balaji buys Rs 5000 in Infosys shares from Nayak on the Bombay Stock Exchange.
- DLF sells Rs 10 crores in stock to the public and uses the proceeds to build a new shopping-cum-residential complex in Noida.

Question : What is the total Investment here?

# INVESTMENT

- Here investment is Rs 10 crores. In the first transaction, Balaji is investing in Infosys shares, and Nayak is disinvesting; there is no new investment for the economy. By contrast, DLF is using some of the economy's output of goods and services to add to its stock of capital; hence, its new complex is counted as investment.

# INVESTMENT VERSUS CONSUMPTION

If we think of investment more generally as any current activity that increases the economy's ability to produce output in the future, we would include not only physical investment but also what is known as investment in human capital. *Human capital is the knowledge and ability to produce that is* embodied in the labour force. Investment in education can be regarded as investment in human capital, but the official accounts treat personal educational expenditures as consumption and public educational expenditures as government spending.

- From the economic point of view, there is little difference between a household's building up an inventory of Amul butter and a grocery store's doing the same. However, in national income accounts, the individual's purchase is treated as personal consumption expenditure, whereas the store's purchase is treated as inventory investment.

# INVESTMENT *VERSUS* CONSUMPTION

Rule of Thumb:

- Investment is associated with the business sector's adding to the physical stock of capital including inventories.
- All household expenditures (except new housing construction) are counted as consumption spending.

# GOVERNMENT PURCHASES

Government purchases are the goods and services bought by Central, State and Local governments. The goods range from airplanes to office equipments. The services include services provided by government employees.

- Important points to note:
  - Government purchases does not include transfer payments, Transfer payments – direct payments that agents in the economy receive without having to sell anything to the government in return – e.g. welfare payments, subsidies, interest payments on borrowings by government.
  - Transfers are redistributions of income – the government collects taxes from some people and redistributes to others. Transfers do not represent any additional economic production. By counting these we would be counting the incomes earned that were taxed and then redistributed back among citizens. Only expenditure on consumption and investment is included in expenditure by the public sector.

**Quick Thinking:**

What would happen to GDP if the government hires unemployed workers, who had been receiving an amount of Rs. 100 in unemployment benefits, government employees in Indian Railways.

# NET EXPORTS

- International trade transactions are a significant item in determining GDP. Exports represent foreign spending on economy's goods and services. Imports are the portions of C, I and G that are spent on goods and services produced abroad.

- Important points to note:
  - GDP records all spending on goods and services produced in India, including spending on Indian output by people abroad. So we must include the value of exports when we are adding up expenditures to determine GDP.

  - At the same time, Indians spend a great deal of money on imports – goods and services produced abroad. That spending shows up in other nation's GDP, failing to subtract them would cause GDP to measure not just the value of goods produced domestically, but also goods produced abroad and imported.

# NET EXPORTS

Case 1:

Indian citizen purchases goods worth INR 100 from another Indian citizen,

then

| Indian income | Indian expenditure |
| --- | --- |
| INR 100 | INR 100 |

# NET EXPORTS

Case 2:

Indian citizen spends INR 75 on Indian goods and spends INR 25 on foreign goods (imports), then

| Indian income | Indian expenditure |
| --- | --- |
| INR 75 | INR 100 |

To maintain equality between income and expenditure total expenditure by Indian citizens should be reduced by the value of imports

# NET EXPORTS

Case 3:

Some goods worth INR 15 produced by Indian business are sold abroad to foreigners or exported, then

| Indian income | Indian expenditure |
| --- | --- |
| INR 15 | INR 0 |

To maintain equality between exports and imports we must add the value of exports to expenditure.

For any country then we must add the value of exports and subtract the value of imports – exports less imports – to the domestic expenditure to obtain equality between aggregate income and expenditure.

# QUICK ACTIVITY - 1

In each of the following cases, determine how much GDP and each of its components is affected (if at all).

- Suranjana spends Rs. 2000 to buy her husband dinner at the finest restaurant in Bhubaneswar
- Sanjoy spends Rs 48,000 on a new laptop to use in his publishing business. The laptop was built in China.
- Jetendra spends Rs. 42,000 on a computer to use in his editing business. He got last year's model on sale for a great price from his friend.
- MUL builds Rs 500 crores worth of cars, but consumers only buy Rs 470 crores worth of them

# QUICK ACTIVITY - 1

Hints:

- Consumption and GDP rises by Rs 2000
- Investment rises by Rs 48,000, net exports fall by Rs 48,000; GDP is unchanged
- Current GDP and investment do not change, because the computer was built last year.
- Consumption rises by Rs 470 crores, inventory investment rises by Rs 30 crores, and GDP rises by Rs 500 crores

# QUICK ACTIVITY 2

What is the immediate direct effect on national product of the following transactions?

- Mr. X buys a new car for Rs. 5,00,000;
- Mr. Y buys a new car for Rs. 5,00,000, which he finances partly by selling his old car for Rs. 3,00,000;
- Mr. Z buys a cheaper new car for Rs. 2,50,000 and spends an equal amount to buy shares;
- Mr. Z changes his mind and instead of buying shares (in the last example), Mr. Z, who still buys the Rs.2,50,000 new car, gives the other Rs. 2,50,000 to his wife. She spends Rs. 50,000 of this on a new a fur coat and the remaining Rs. 2,00,000 on a piece of antique furniture;
- Mrs. Q sells her house for Rs. 10,00,000, has a new house built at a cost of Rs.8,00,000 and gives Rs. 2,00,000 to her son. He spends Rs. 80,000 of it on food, drink, cigarettes, clothes and books and the remainder goes to buy shares.

# GROSS NATIONAL PRODUCT

Gross National Product (GNP) is the value of current goods and services produced by the domestically owned factors of production (i.e., by a nation's permanent residents) within a given period, evaluated at market prices.

- The output under consideration is "national" because the boundary of the gross national product is defined in terms of the nations of a country and their property, rather than their geography.

# GDP VERSUS GNP

The Difference: Difference between GDP and GNP arises because some of the output produced within a given country is made by factors of production owned abroad.

- Example 1: Part of India's GDP corresponds to the profits earned by Honda from its Indian manufacturing unit. These profits are part of Japanese GNP because they are part of Japanese owned capital.
- Example 2: The income of an Indian citizen working in the USA is a part of India's GNP, but it is not part of India's GDP, because it is not earned in India.
- Example 3: If a Japanese resident owns an apartment building in New Delhi, the rental income he earns is part of India's GDP because it is earned in India. But because this rental income is a factor payment to abroad, it is not part of India's GNP, but part of Japan's GNP.
- Relationship: When GDP exceeds GNP, Indians are earning less abroad than foreigners are earning in India. On the other hand, if GNP exceeds GDP, Indians are earning more abroad than foreigners are earning in India.

- GNP = GDP + (income earned by domestically owned factors abroad – income earned by foreign owned factors at home)

  = GDP + net factor income from abroad

# QUICK ACTIVITY - 3

Which of the following would contribute to a country's GDP and which to GNP?

- An Indian worker is hired to work in an Orissa car factory
- A Japanese worker is hired to work in Reliance Petrochemicals
- An Indian professor is hired to teach economics in Leeds University

# NET NATIONAL PRODUCT

Net National Product (NNP) is the total income of a nation's residents (GNP) minus losses from depreciation.

- Depreciation is the wear and tear on the country's stock of equipment and structures, such as rusting in machines and computers becoming obsolete. In national income accounts, depreciation is called the "consumption of fixed capital" or "capital consumption allowance".

- Because depreciation of capital is a cost of producing the output of the economy, subtracting depreciation shows the net result of the economic activity.

- NNP = GNP – Depreciation
  = GNP – (Gross Investment – Net Investment)

Depreciation is roughly 11% of GNP; so that NNP = 89% of GNP.

# THE NATIONAL INCOME

Two items need to be adjusted from NNP at market price to get NNP at factor cost.

- The first item is the indirect business taxes (IBT), such as sales tax. These taxes place a wedge between the price that consumers pay for a good and the price that firms receive. Because firms never receive this tax wedge, it is not a part of their income. Thus IBT must be deducted from NNP at market price to get NNP at factor cost.

# THE NATIONAL INCOME

The second item is the subsidy paid by the government for productive activity. Viewed as negative tax payments, subsidies must be added to NNP at market price to get NNP at factor cost.

NNP at factor cost = NNP at market price – IBT
+ Subsidies
= NNP at market price – Net Indirect Taxes

This NNP at factor cost is the national income

# THE NATIONAL INCOME

National income measures how much everyone in the economy has earned. The national income by factor shares can be broken down into five components:

- Compensation of employees – The wages and fringe benefits earned by workers
- Rental income – The income that landlords receive including imputed rent that homeowners "pay" to themselves, less expenses, such as depreciation
- Net interest – The interest domestic businesses pay minus the interest they receive
- Corporate profits – The income of corporations after payments to their workers and creditors (corporate profits equal corporate profit tax + undistributed corporate profits / retained earnings + dividends)
- Proprietors' income – The income of non-corporate businesses, such as small farms, and law partnerships.

# REAL VERSUS NOMINAL GDP

Recall: GDP measures the total spending on goods and services in all markets in the economy.

- If GDP (i.e., total spending) rises from one year to the next, one of the three things must be true:
  1) The economy is producing a larger output of goods and services; or
  2) Goods and services are being sold at higher prices; or
  3) A combination of both.
- To judge the economic progress of a nation, economists want a measure of the total quantity of goods and services the economy is producing, that is *not affected by the changes in the* prices of those goods and services.

# REAL VERSUS NOMINAL GDP

Because price changes (inflation) can distort economic variables like GDP, so we have two versions of GDP: one is corrected (adjusted) for inflation, the other is not

- Nominal GDP values output using current prices. It is not corrected for inflation
- Real GDP values output using constant prices, i.e., the prices of a *base year*. *Real GDP is corrected for* inflation

# REAL VERSUS NOMINAL GDP

| | Apple | | Banana | |
|---|---|---|---|---|
| year | ***P*** | ***Q*** | ***P*** | ***Q*** |
| 2004 | Rs.10 | 400 | Rs.2.00 | 1000 |
| 2005 | Rs.11 | 500 | Rs.2.50 | 1100 |
| 2006 | Rs.12 | 600 | Rs.3.00 | 1200 |

Compute nominal GDP in each year:

*Increase:*

2004: Rs.10 x 400 + Rs.2.00 x 1000 = Rs.6,000

2005: Rs.11 x 500 + Rs.2.50 x 1100 = Rs.8,250 — 37.5%

2006: Rs.12 x 600 + Rs.3.00 x 1200 = Rs.10,800 — 30.9%

# REAL VERSUS NOMINAL GDP

In this example, nominal GDP grows for two reasons: prices are rising, and the economy is producing a larger quantity of goods.

- Thinking of nominal GDP as total income, the increases in income will overstate the increases in society's well-being, because part of these increases are due to inflation.
- We need a way to take out the effects of inflation, to see how much people's incomes are growing in purchasing power terms. That is the job of real GDP.

# REAL VERSUS NOMINAL GDP

| | Apple | | Banana | |
|---|---|---|---|---|
| year | *P* | *Q* | *P* | *Q* |
| 2004 | Rs.10 | 400 | Rs.2.00 | 1000 |
| 2005 | Rs.11 | 500 | Rs.2.50 | 1100 |
| 2006 | Rs.12 | 600 | Rs.3.00 | 1200 |

Compute real GDP in each year, using 2004 as the base year:

*Increase:*

2004: Rs.10 x 400 + Rs.2 x 1000 = Rs.6,000

2005: Rs.10 x 500 + Rs.2 x 1100 = Rs.7,200 — 20.0%

2006: Rs.10 x 600 + Rs.2 x 1200 = Rs.8,400 — 16.7%

# REAL VERSUS NOMINAL GDP

Summing Up:

- The change in nominal GDP reflects changes in both prices and quantities
- The change in real GDP is the amount that GDP would change if prices were constant at base-year levels (*i.e., if zero inflation)*, real GDP reflects only the quantities produced.
- Hence, real GDP is corrected for inflation.
- The growth rate of real GDP from one year to the next is the answer to this question: "How much would GDP (and hence everyone's income) have grown if there had been zero inflation?"

# PRACTICE PROBLEM , PART 1

| | 2006 | | 2007 | | 2008 | |
|---|---|---|---|---|---|---|
| | P | Q | P | Q | P | Q |
| good A | $30 | 900 | $31 | 1,000 | $36 | 1,050 |
| good B | $100 | 192 | $102 | 200 | $100 | 205 |

- Compute nominal GDP in each year.
- Compute real GDP in each year using 2006 as the base year.

# ANSWERS TO PRACTICE PROBLEM 1

nominal GDP *multiply Ps & Qs from same year*

2006: $46,200 = $30 × 900 + $100 × 192

2007: $51,400

2008: $58,300

real GDP *multiply each year's Qs by 2006 Ps*

2006: $46,200

2007: $50,000

2008: $52,000 = $30 × 1050 + $100 × 205

# THE GDP DEFLATOR

From nominal and real GDP we can compute a third statistic: the GDP deflator.

$$\text{GDP deflator} = 100 \times \frac{\text{nominal GDP}}{\text{real GDP}}$$

The GDP deflator reflects what's happening to the overall level of prices in the economy.

# THE GDP DEFLATOR

Consider an economy that produces only one good, bread. If P is the price of bread and Q is the quantity sold, then nominal GDP is the total number of rupees spent on bread in that year, P x Q

- Real GDP is the number of loaves of bread in some base year, $P_{Base}$ x Q.
- The GDP deflator is the price of bread in that year relative to the price of bread in the base year, $P/P_{Base}$
- Thus the GDP deflator measures the current price of output relative to its price in the base year.

# THE GDP DEFLATOR

| year | Nominal GDP | Real GDP | GDP Deflator | |
|---|---|---|---|---|
| 2004 | Rs 6000 | Rs 6000 | 100 | 14.6% |
| 2005 | Rs 8250 | Rs 7200 | 114.6 | 12.2% |
| 2006 | Rs 10,800 | Rs 8400 | 128.6 | |

Because the GDP deflator rose in year 2005 from 100 to 114.6, we can say that the price level increased by 14.6%. This percentage increase in the price level is the rate of inflation

# PRACTICE PROBLEM, PART 2

| | Nom. GDP | Real GDP | GDP deflator | Inflation rate |
|---|---|---|---|---|
| 2006 | $46,200 | $46,200 | | *n.a.* |
| 2007 | 51,400 | 50,000 | | |
| 2008 | 58,300 | 52,000 | | |

- Compute the GDP deflator in each year.
- Use GDP deflator to compute the inflation rate from 2006 to 2007, and from 2007 to 2008.

# ANSWERS TO PRACTICE PROBLEM, PART 2

| | Nominal GDP | Real GDP | GDP deflator | Inflation rate |
|---|---|---|---|---|
| 2006 | $46,200 | $46,200 | 100.0 | *n.a.* |
| 2007 | 51,400 | 50,000 | 102.8 | 2.8% |
| 2008 | 58,300 | 52,000 | 112.1 | 9.1% |

# THE GDP DEFLATOR

Quick Activity :

- Assume real GDP in1999 was Rs.7,000 billion, nominal GDP in 2006 was Rs.8,316 billion, and the GDP-deflator has increased from 100 to 110 from 1999 to 2006. What is the average annual growth rate of real GDP from 1999 to 2006? Do you think the welfare of all people in India has increased during that time? Why or why not?

# CPI & WPI

GDP Deflator is the only measure of inflation that takes into account the inflation in all the goods and services produced in the economy.

- Consumer Price Index is a weighted sum of prices of a standard basket of goods and services consumed by a typical domestic consumer.
- Wholesale Price Index is a price index of goods and services that are sold by producers. The WPI measures price changes from the perspective of the seller.
- If producers are receiving higher prices from their sales to wholesalers we can expect that retailers would have to charge higher prices soon that gets reflected in a higher CPI.

# CPI & WPI

To account for differences in consumption patterns across households the CPI is compiled for industrial workers (IW), urban non-manual employees (UNME), rural labourers (RL) and agricultural labourers (AL). Of these CPI (IW) is most popular as the Central Government employees' wage compensation (dearness allowance) is calculated on the basis of movement in this index.

- The CSO publishes CPI(UNME), whereas the other three CPIs are brought out by the Labour Bureau. Wholesale Price index (WPI) is compiled and released on weekly basis at national level by the Ministry of Industry.
- Both the CPI and the WPI are measured using base year quantities as weights. Price indices that do this are called Laspeyres indices. The weight of each good is its share in the budget of the representative consumer (in the base year). The shares are calculated using data from consumer expenditure surveys. In India the surveys are conducted by the National Sample Survey Organization (NSSO).

# CPI & WPI

The Wholesale Price Index (WPI) is the most widely used price index in India, and is an indicator of the movement in wholesale prices of 435 commodities in all trade and transactions. WPI is the only price index in India, which is available on a weekly basis with the shortest time lag of two weeks. The base year taken is 2011-12 = 100.

- A better idea of the change in cost of living caused by price change is given by the Consumer Price Index (CPI). It is computed monthly with a lag of one month, on the basis of the consumer price (retail price) of goods and services covering 260 items of consumption. Currently base year is take as 2011-12.From January 2006, the base is 2001=100. Earlier 1982 was taken as base year.

# CPI & WPI

The weights given to different commodity groups are different under the WPI and the CPI (IW).

- While food gets the maximum weight of 57% in the CPI (IW) series, food articles in the primary group and food products in the manufactured group in he WPI series have a weight of only 27%.

The CPI (IW) series is therefore more sensitive to changes in food prices.

- The fuel groups on the other hand gets a much higher weight in the WPI series (14%) than in the CPI (IW) series (6%). International price movements of crude oil would therefore have a greater bearing on the WPI series than on the CPI (IW) series in terms of their direct impact.

- Again, essential services like housing, transport, health and education are assigned high weights in CPI but are not considered in the WPI. Differences in inflation rate in the two series could therefore also be on account of price movement in the services sector, which gets captured in the CPI (IW) based inflation rate.

# How the BLS Constructs the CPI

1. Survey consumers to determine composition of the typical consumer's "basket" of goods.
2. Every month, collect data on prices of all items in the basket; compute cost of basket
3. CPI in any month equals

$$100 \times \frac{\text{Cost of basket in that month}}{\text{Cost of basket in base period}}$$

# EXERCISE: *COMPUTE THE CPI*

Basket contains 20 pizzas and 10 compact discs.

prices:

| | pizza | CDs |
|---|---|---|
| 2002 | $10 | $15 |
| 2003 | $11 | $15 |
| 2004 | $12 | $16 |
| 2005 | $13 | $15 |

For each year, compute

- the cost of the basket
- the CPI (use 2002 as the base year)
- the inflation rate from the preceding year

# ANSWERS:

| | Cost of basket | CPI | Inflation rate |
|---|---|---|---|
| 2002 | $350 | 100.0 | *n.a.* |
| 2003 | 370 | 105.7 | 5.7% |
| 2004 | 400 | 114.3 | 8.1% |
| 2005 | 410 | 117.1 | |

# Problems with CPI: Substitution Bias

Over time, some prices rise faster than others

- Consumers substitute toward goods that become relatively cheaper

- The CPI misses this substitution because it uses a fixed basket of goods

- Thus, the CPI overstates increases in the cost of living

# PROBLEMS WITH CPI: INTRODUCTION OF NEW GOODS

When new goods become available, variety increases, allowing consumers to find products that more closely meet their needs

- This has the effect of making each rupee more valuable.
- The CPI misses this effect because it uses a fixed basket of goods.
- Thus, the CPI overstates increases in the cost of living.

# CPI & WPI

## How good is WPI in India?

1.It is clearly a second best alternative. The WPI first deals with at the wholesale level. Haven't you sometimes felt that the price rise of common household items has grown more than what the inflation rate is? If we used the CPI, that issue would have been eliminated.

2.The other issue is that the WPI doesn't have any services in it. That clearly makes it a faulty index because we do spend a good amount of money on services, such as rent, etc. If one actually looks at the CPI basket in the US, rent has a fairly high weight.

# CPI VS. GDP DEFLATOR

GDP deflator measures the prices of all goods and services produced, whereas the CPI measures the price of only the goods and services bought by consumers. Thus, an increase in the price of goods bought by firms or the government will show up in the GDP deflator but not in the CPI.

- The second difference is that the GDP deflator includes only those goods produced domestically. Imported goods are not part of GDP and do not show up in GDP deflator. Hence, an increase in the price of wheat grown in Argentina and sold in India affects the CPI, because the wheat is bought by consumers, but it does not affect the GDP deflator.

# CPI VS. GDP DEFLATOR

The third and most subtle difference results from the way the two measures aggregate the many prices in the economy. The CPI compares the price of a fixed basket of goods and services to the price of the basket in the base year. By contrast, 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.

- Example: Suppose that major cyclone destroys the nation's mango crop in the current year. The quantity of mangoes produced falls to zero, and the price of the few mangoes produced last season and that remain on grocers' shelves is driven sky-high. Because mangoes are no longer part of GDP, the increase in the price of mangoes does not show up in the GDP deflator. But because the CPI is computed with a fixed basket of goods that includes mangoes, the increase in the price of mangoes cause a substantial rise in the CPI.

# CPI VS. GDP DEFLATOR

Imported consumer goods:

- included in CPI
- excluded from GDP deflator

Capital goods:

- excluded from CPI
- included in GDP deflator (if produced domestically)

The basket:

- CPI uses fixed basket
- GDP deflator uses basket of currently produced goods & services

# EXERCISE

2010: CPI = 90

Average starting salary for MBA graduates = Rs. 2,40,000

2021: CPI = 180

Average starting salary for MBA graduates = Rs.5,00,000

*Are MBA graduates better off today or in 1990?*

# SOLUTION

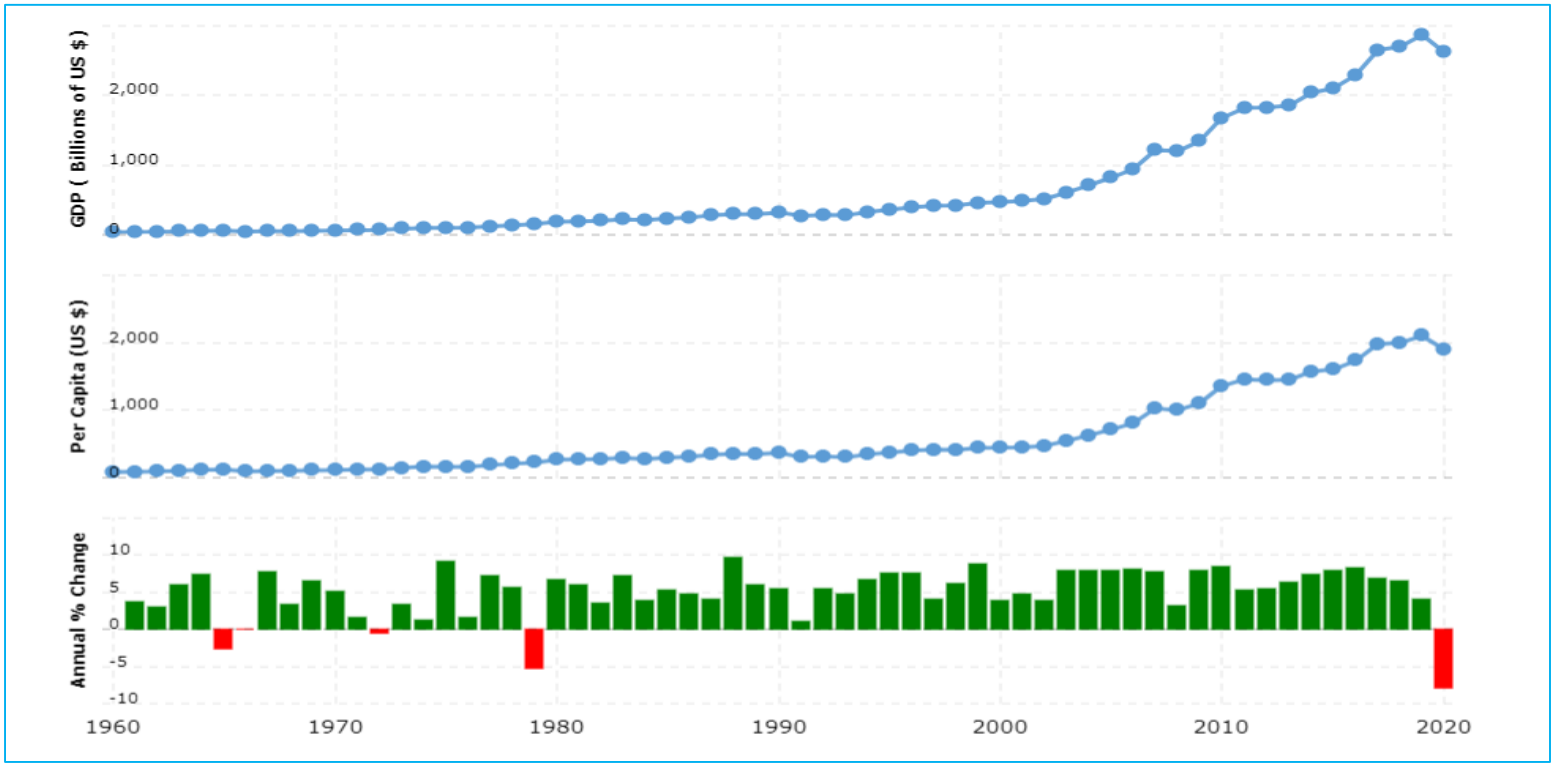
All you need is to express the 2010 salaries in "today's rupees", i.e., what salary in 2021 would have been paid if the cost of living were to remain the same then as in 2021.

- Amount in today's rupees = Amount in year T dollars x (Price level of today)/(Price level in year T)

= Rs. 2,40,000 x (180/90) = Rs. 4,80,000

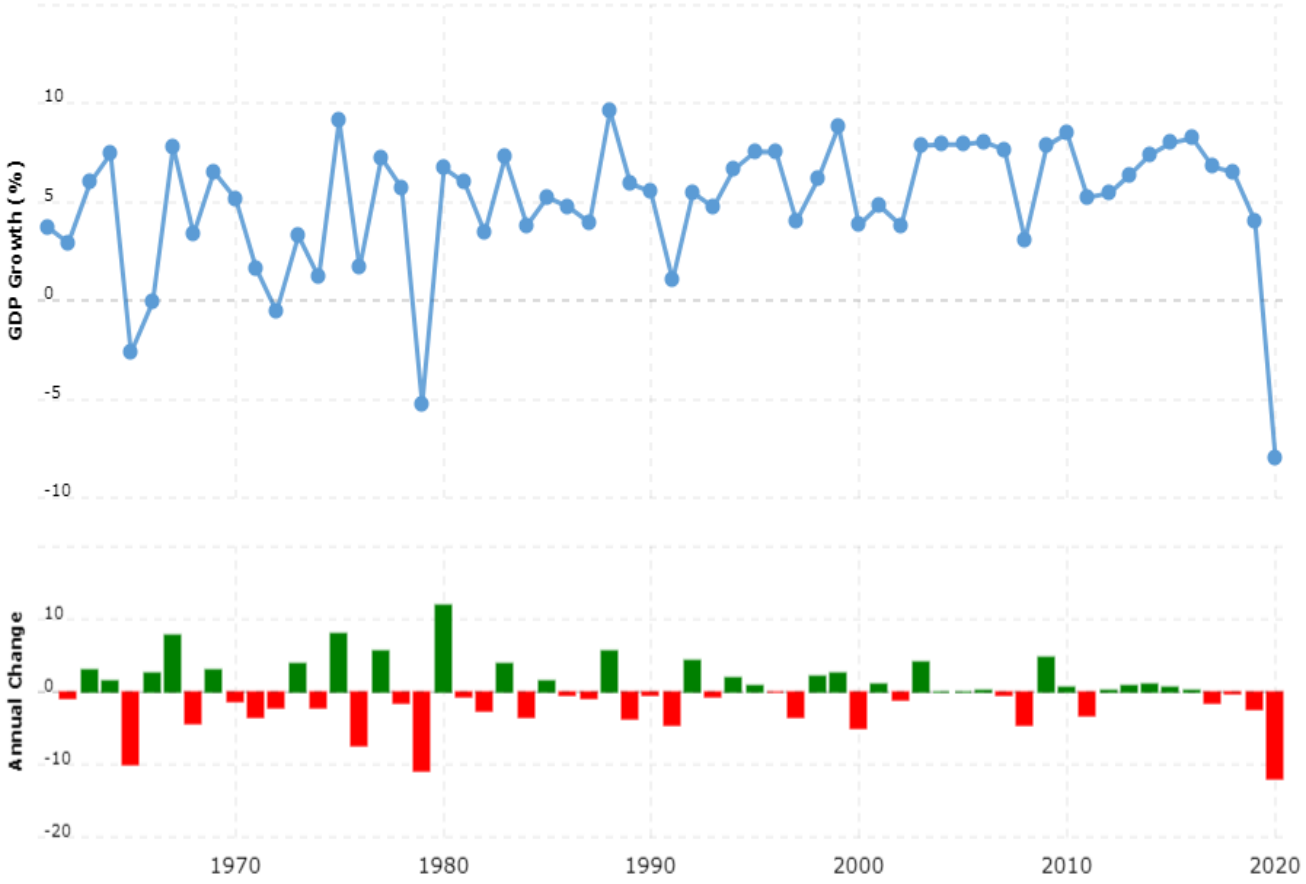
After adjusting for inflation, salary is higher today than in 2010.

# India's GDP from 1960-2020



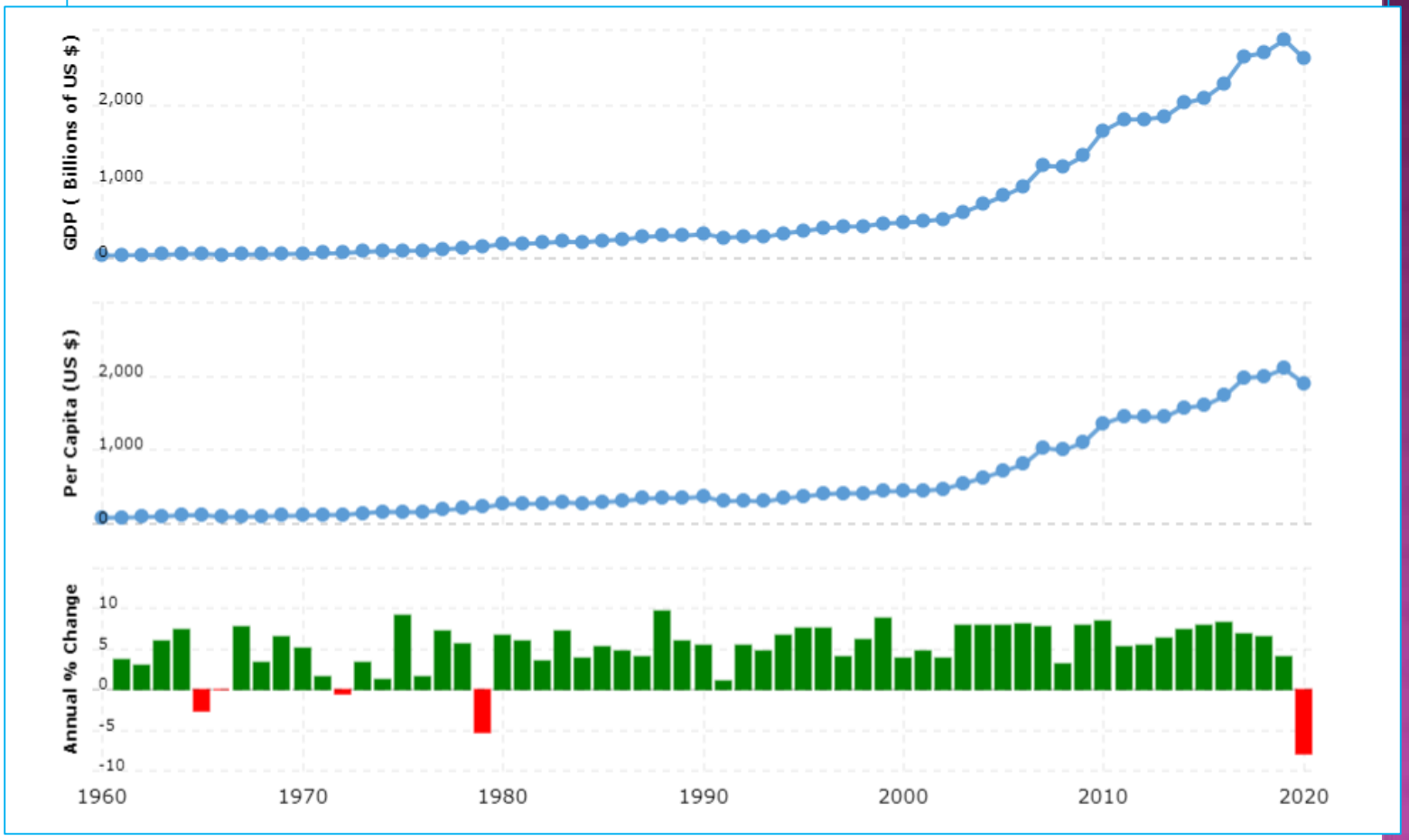

*Source : World Bank*

# India GDP Growth Rate 1961-2021



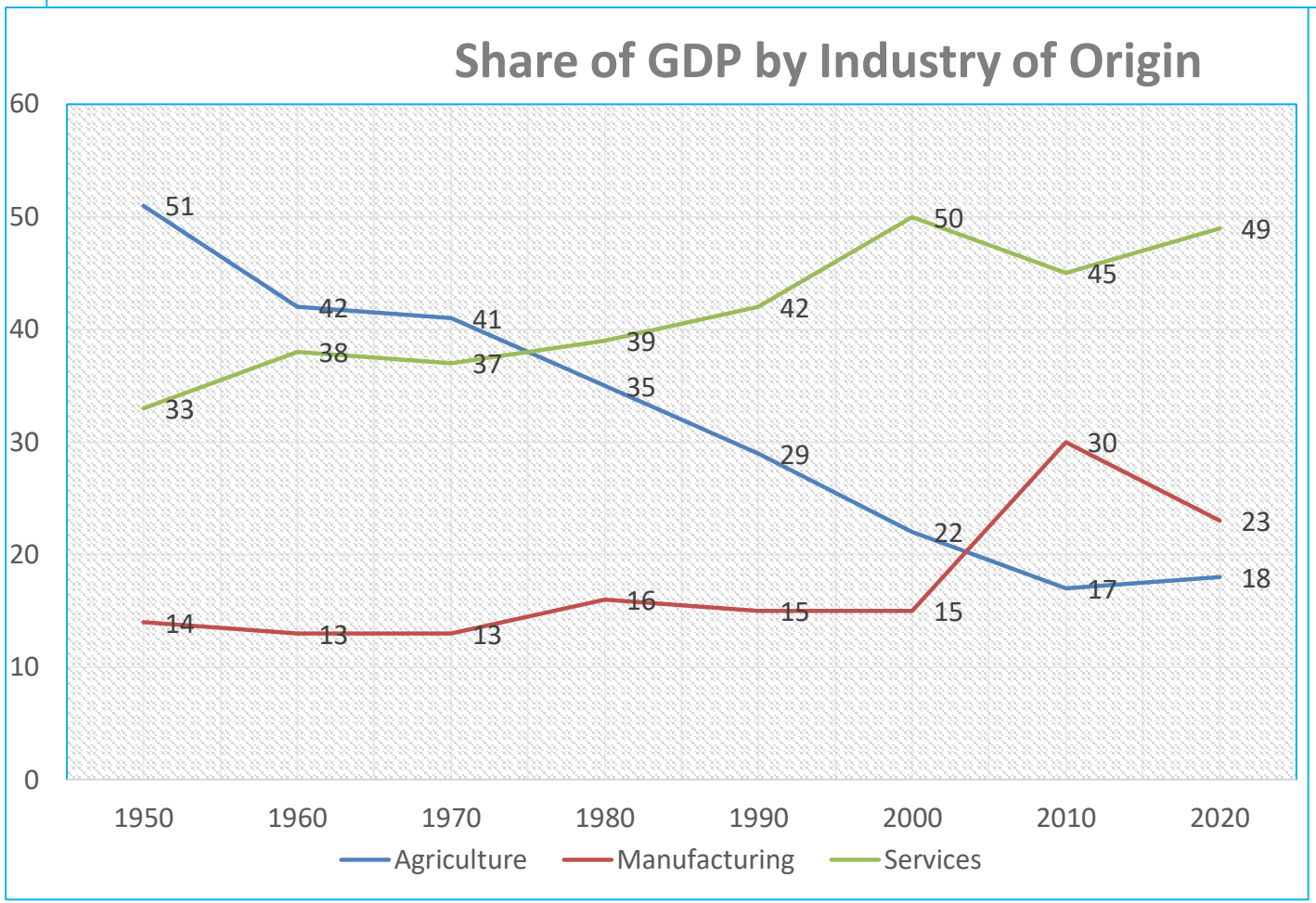

 *Source : World Bank*

# India GDP Per Capita 1960-2021



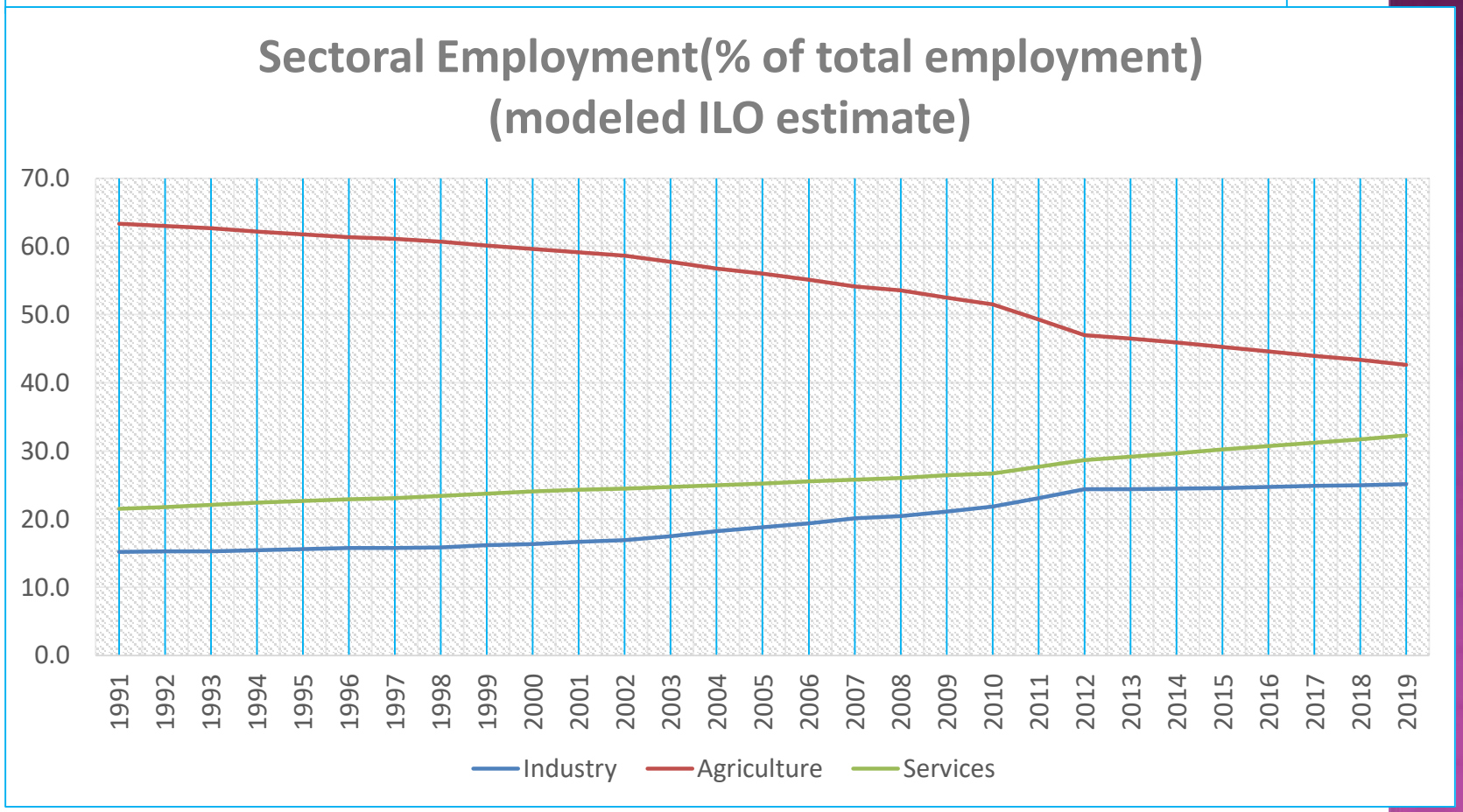

*Source : World Bank*

# Share of GDP by Industry of Origin




*Source : World Bank*

# Sectoral Employment (% of total employment)




*Source : World Bank*

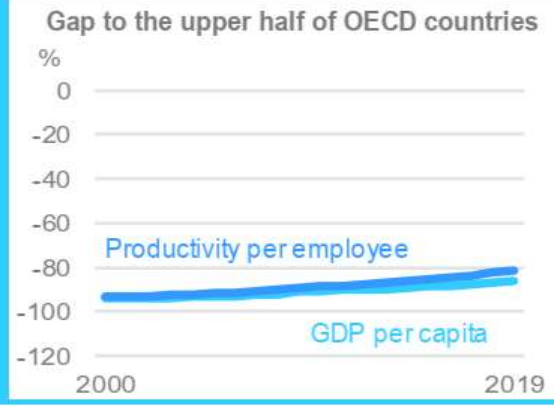
## Performance prior to the COVID-19 crisis

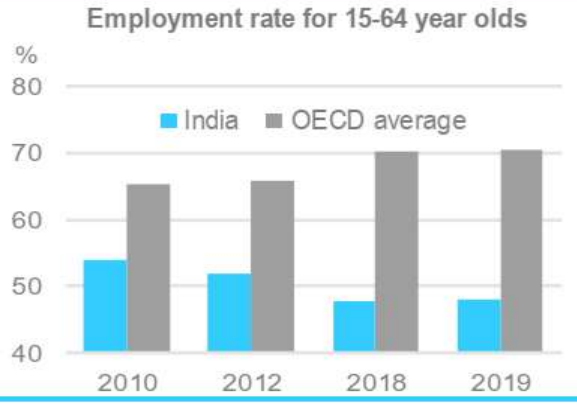
### Economy

GDP per capita is 86% lower than OECD best performers.

Productivity is 82% lower than OECD best performers.

Employment rate is low and was falling before the 2020 crisis.

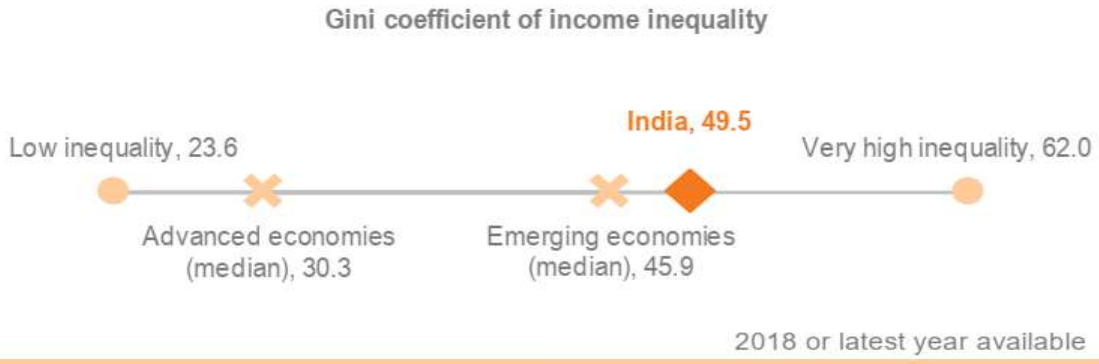



### Inequality

Inequality is higher than in most advanced economies.

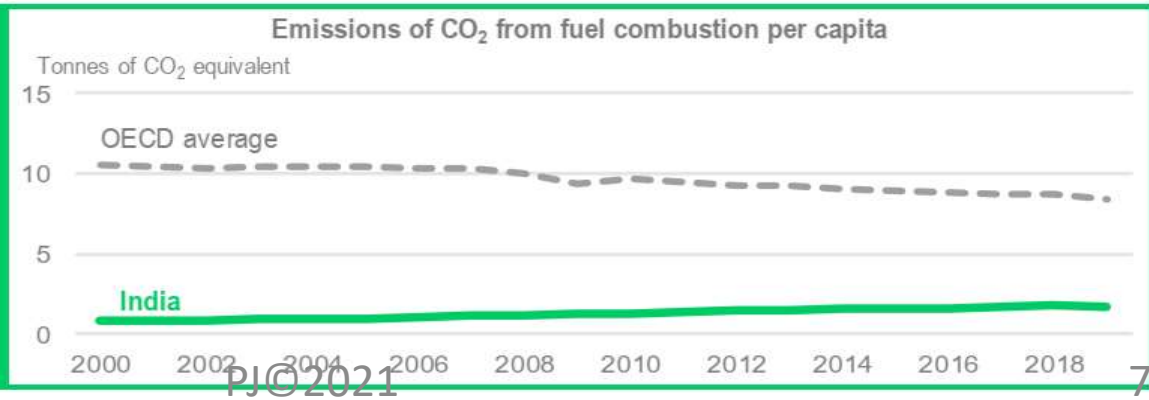
The poorest 20% of households earn 4.1% of total income.



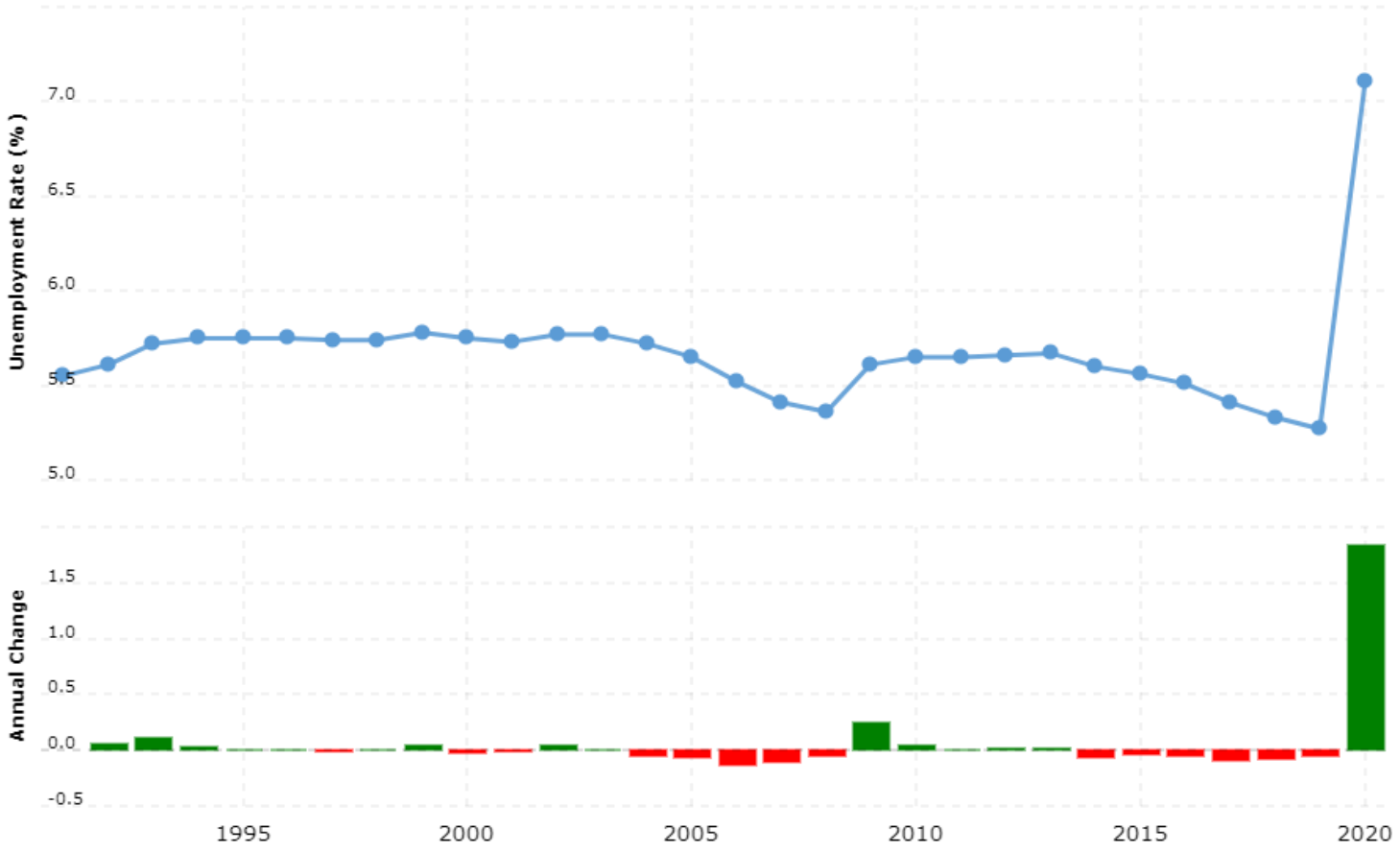

### Environment

More than 3/4 of the population is exposed to harmful levels of air pollution.

Carbon dioxide emissions have been stable in recent years.

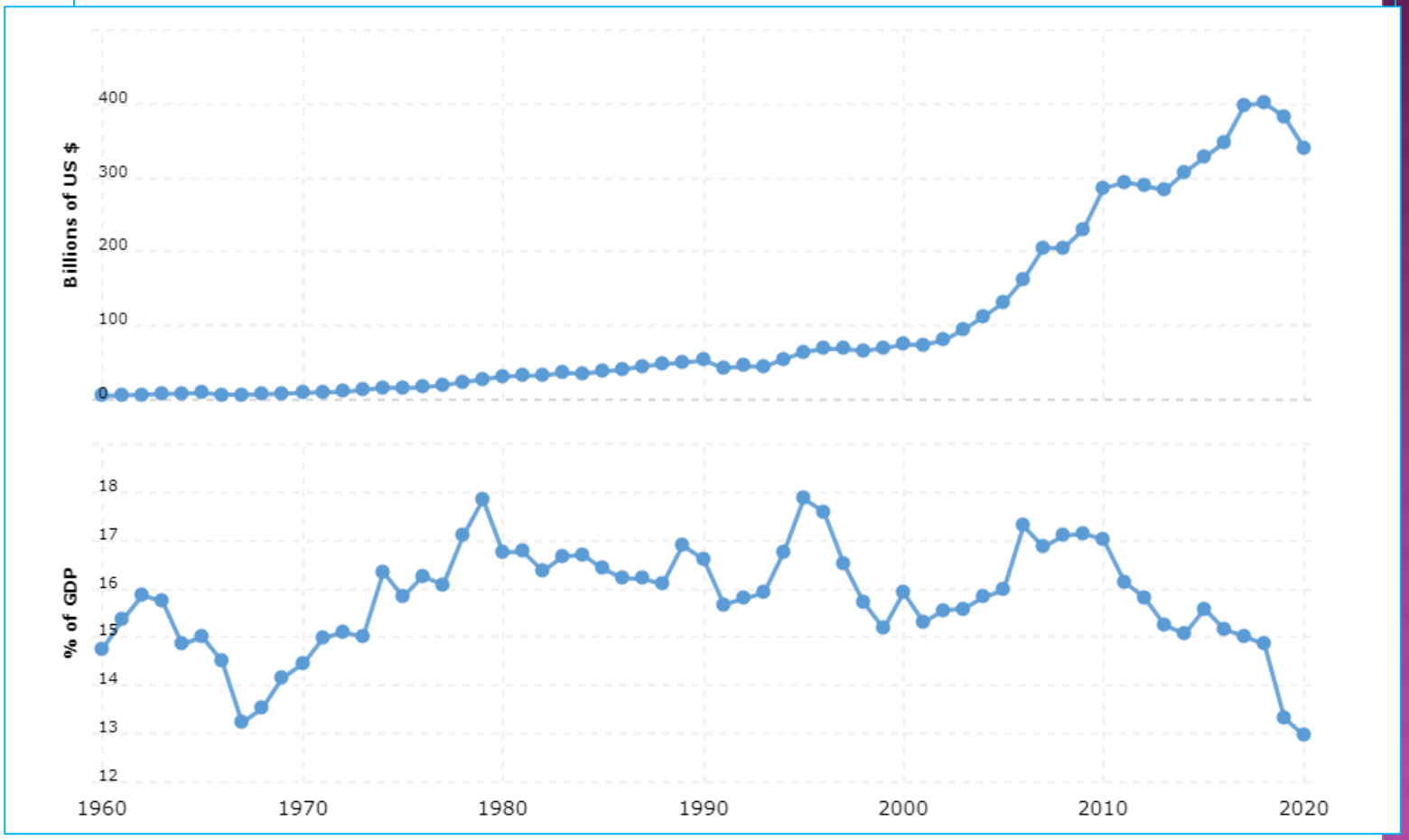


# India Unemployment Rate 1991-2021

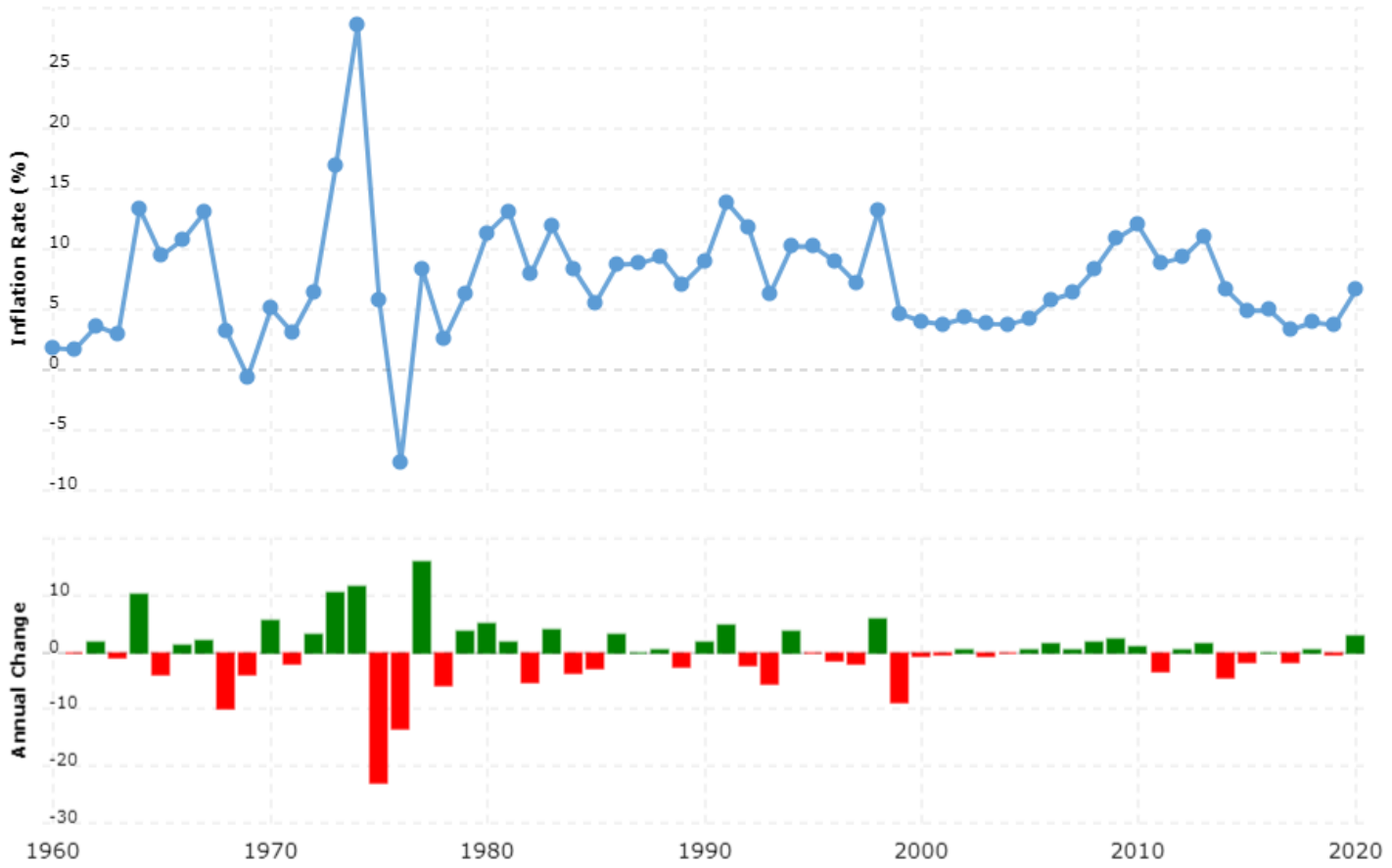



Source : World Bank

# India Manufacturing Output 1960-2021



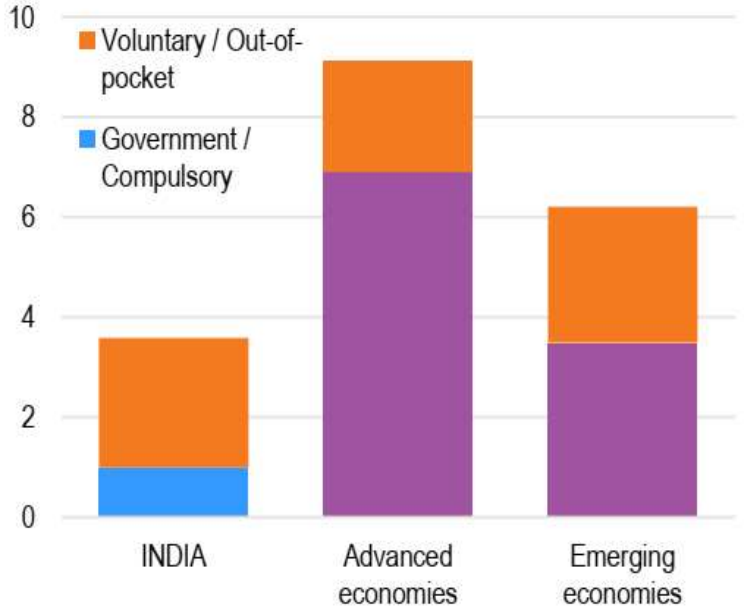
# India Inflation Rate 1960-2021



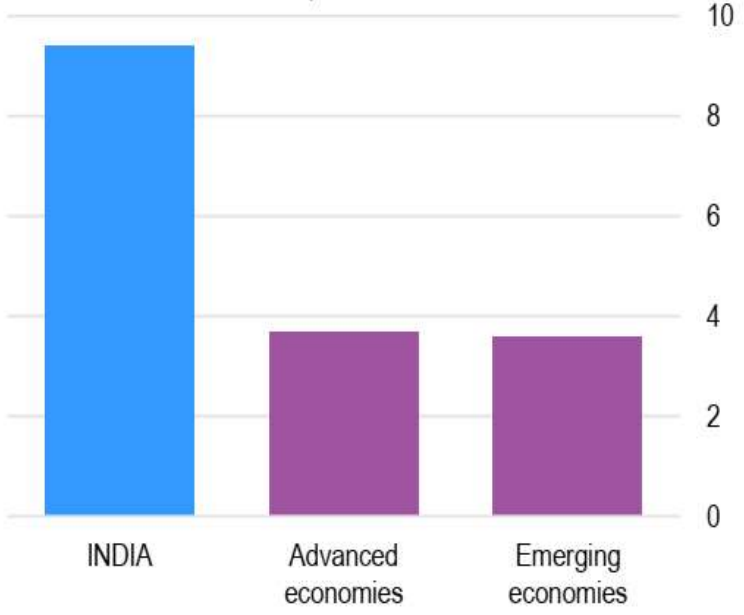

*Source : World Bank*

## Vulnerabilities and areas for reform

**A. Public expenditure on health is low**
Percentage of GDP, 2019[1]




**B. Non-performing loans weigh on the banking sector**
Percentage of non-performing loans in total gross loans,[2] average of quarterly observations since 2018Q1 to latest available




1. For India, the latest year available is 2017.
2. Non-performing loans (NPLs) are loans which ceased to generate income for the bank. Although classified according to a common definition, cross-country data comparability of non-performing loans can be affected by varying degree of stringency across national supervisory practices. For India, latest data refer to 2020q2.

*Source*: Panel A: OECD, Health Database; Panel B: International Monetary Fund (IMF), Financial Soundness Indicators Database.

# GDP AND ECONOMIC WELL-BEING

Real GDP per capita is the main indicator of the average person's standard of living.

- But GDP is not a perfect measure of well-being.

  - ✓ non-market activity, such as the child care a parent provides his or her child at home
  - ✓ underground economy
  - ✓ an equitable distribution of income
  - ✓ the quality of the environment

# GDP AND ECONOMIC WELL-BEING

"... does not allow for the health of our children, the quality of their education, or the joy of their play.

It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate or the integrity of our public officials.

It measures neither our courage, nor our wisdom, nor our devotion to our country.

It measures everything, in short, except that which makes life worthwhile, and it can tell us everything about America except why we are proud that we are Americans."

- ***Senator Robert Kennedy, 1968***

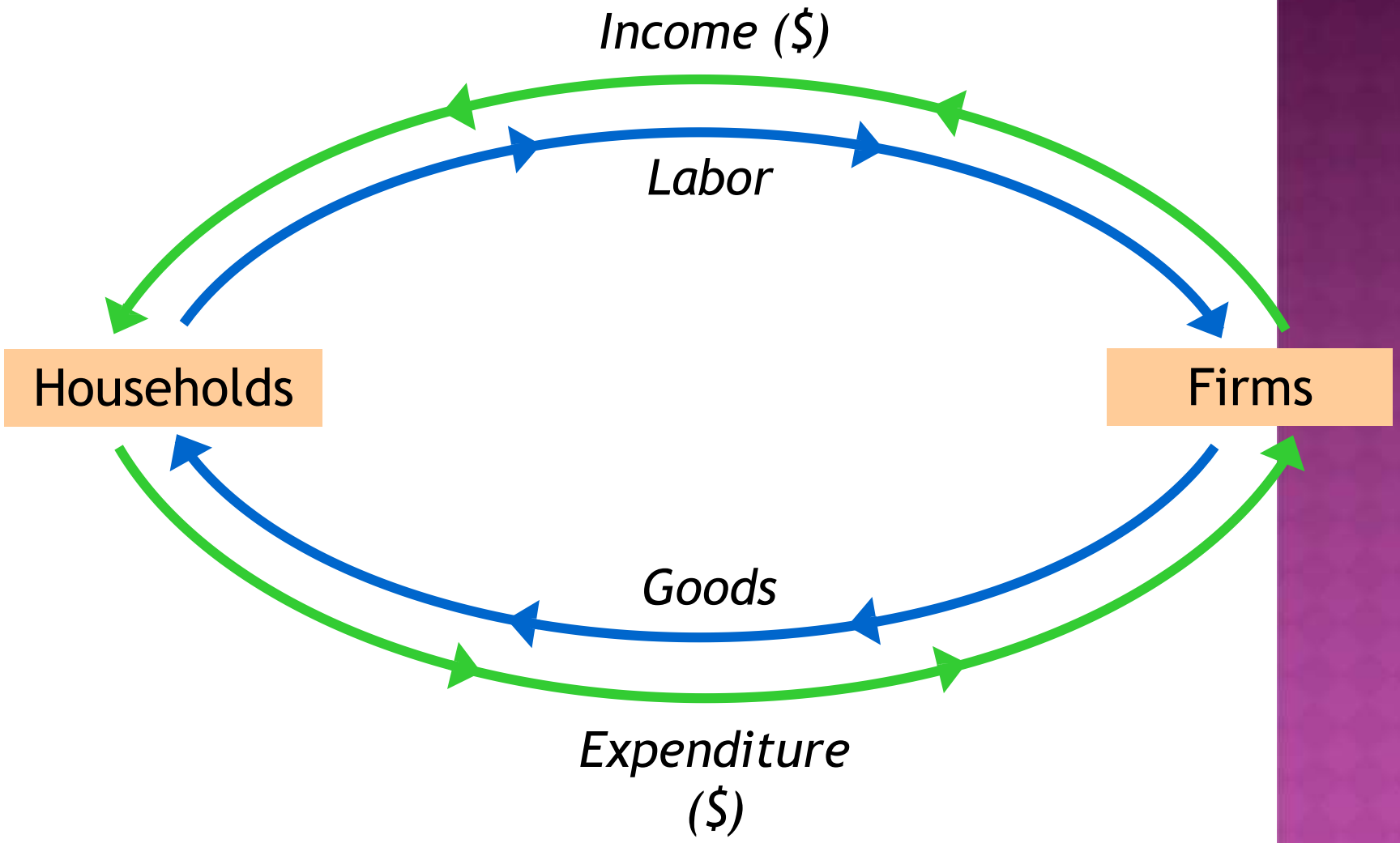
# GROSS DOMESTIC PRODUCT: EXPENDITURE AND INCOME

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



# SUMMARY

1. Gross Domestic Product (GDP) measures both total income and total expenditure on the economy's output of goods & services.

2. Nominal GDP values output at current prices; real GDP values output at constant prices. Changes in output affect both measures, but changes in prices only affect nominal GDP.

3. GDP is the sum of consumption, investment, government purchases, and net exports.

# SUMMARY

4. The overall level of prices can be measured by either
   - the Consumer Price Index (CPI), the price of a fixed basket of goods purchased by the typical consumer, or
   - the GDP deflator, the ratio of nominal to real GDP