DATA ANALYSIS

PRACTICAL

EXCEL PROJECT (CH 1 TO 8)

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BA ECONOMICS HONOURS (3rd sem.)

INTRODUCTION

In the next pages, we examine and analyze the development and growth of Indian economy, its performance being a part of BRICS, the policies by the government etc.
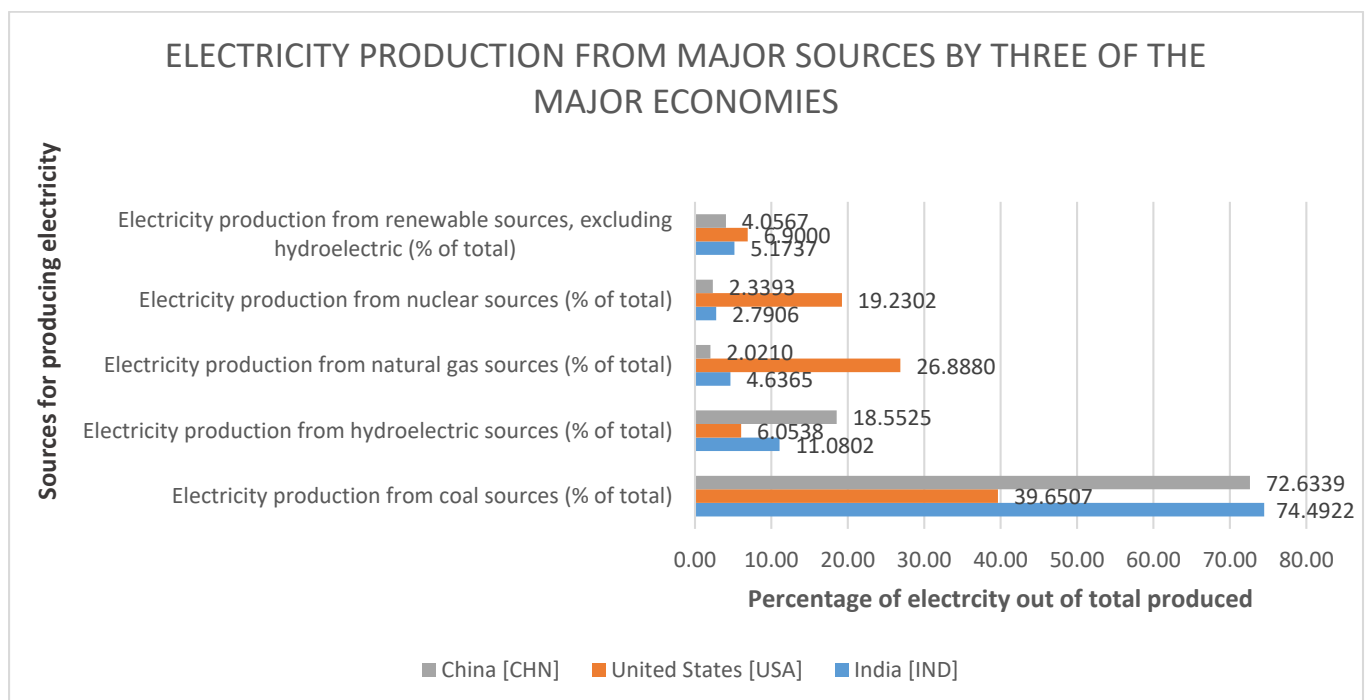
We have collected data from various official sites like World Bank, RBI's official data, National crime records bureau and some other sites.

With the help of Microsoft Excel, we have prepared various charts, tables to analyze the data collected and come up to a conclusion.

ANALYSIS #1

We represent the % of electricity produced from five major sources by the world's top three most polluting countries (India, United States and China), in the year 2014,

With the help of a **Clustered Bar chart**

ELECTRICITY PRODUCTION FROM MAJOR SOURCES BY THREE OF THE MAJOR ECONOMIES

Sources for producing electricity

Electricity production from renewable sources, excluding hydroelectric (% of total)
- 4.0567
- 6.9000
- 5.1737

Electricity production from nuclear sources (% of total)
- 2.3393
- 19.2302
- 2.7906

Electricity production from natural gas sources (% of total)
- 2.0210
- 26.8880
- 4.6365

Electricity production from hydroelectric sources (% of total)
- 18.5525
- 6.0538
- 11.0802

Electricity production from coal sources (% of total)
- 72.6339
- 39.6507
- 74.4922

Percentage of electrcity out of total produced
(0.00, 10.00, 20.00, 30.00, 40.00, 50.00, 60.00, 70.00, 80.00)

■ China [CHN]   ■ United States [USA]   ■ India [IND]
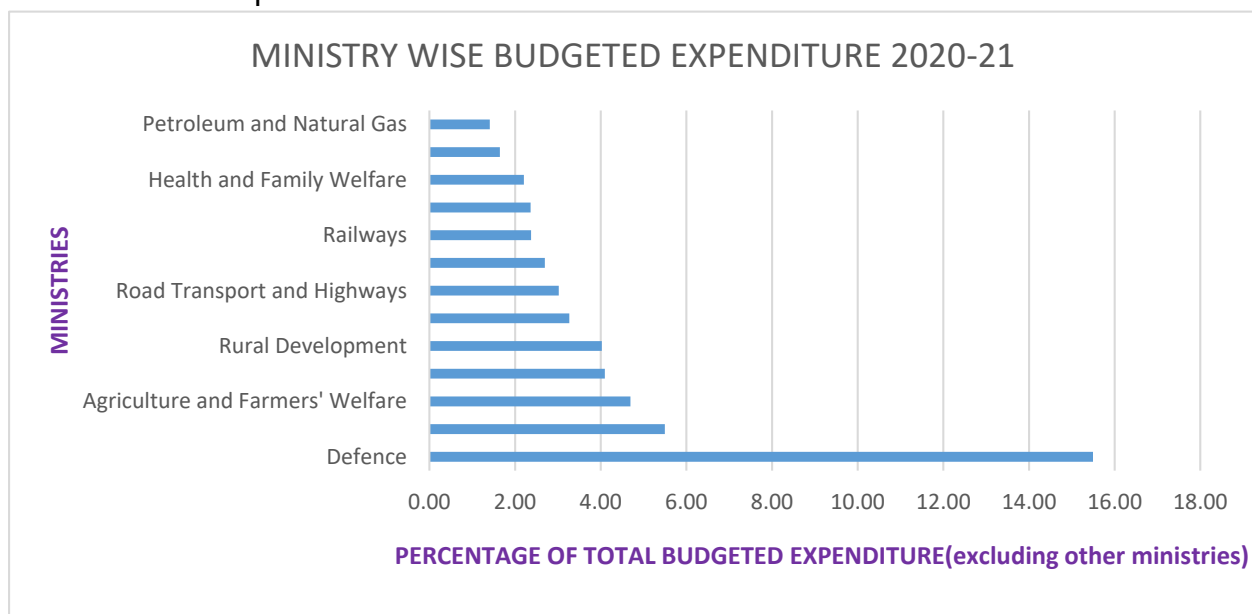
GRAPH #1

ANALYSIS #2

Our finance minister presents the budget for the coming financial year every month of February.

We evaluate some of the aspects of the budget of financial year 2020-21

MINISTRIES WISE BUDGETED EXPENDITURE OF 2020-21

(in Rs crores)

With the help of another **Clustered bar chart**   **GRAPH #2**

This chart represents the distribution of the budgeted expenditure within the ministries excluding the other ministries (which is 47.22% of the total budgeted expenditure).
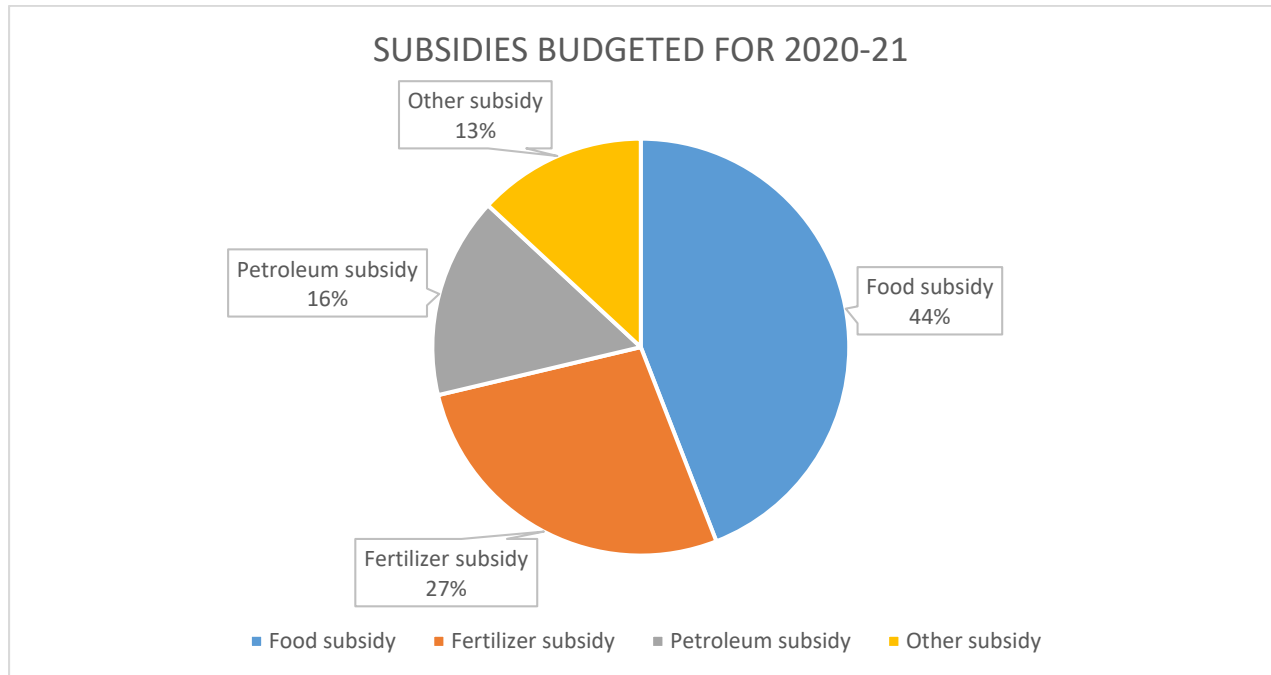
So the division is,

52.78% (ministries mentioned) + 47.22% (other ministries)=100% (total budgeted expenditure

SUBSIDIES IN 2020-21(in Rs crores)

Now we observe the subsidies assigned by the Finance ministry,

With the help of a **Pie chart**

SUBSIDIES BUDGETED FOR 2020-21

Other subsidy 13%

Petroleum subsidy 16%

Food subsidy 44%

Fertilizer subsidy 27%

■ Food subsidy ■ Fertilizer subsidy ■ Petroleum subsidy ■ Other subsidy

Sources: Expenditure Profile, Union Budget 2020-21; PRS.   **GRAPH #3**

ANALYSIS #3

BRICS is the acronym coined to associate five major emerging national economies: Brazil, Russia, India, China, and South Africa. The **BRICS** members are known for their significant influence on regional affairs.

We compare India with the other 4 emerging economies with the help of various charts.

GDP COMPARISON

With the help of a **clustered column chart**   GRAPH #4

COMPARING GDP OF BRICS THROUGH COLUMN CHART
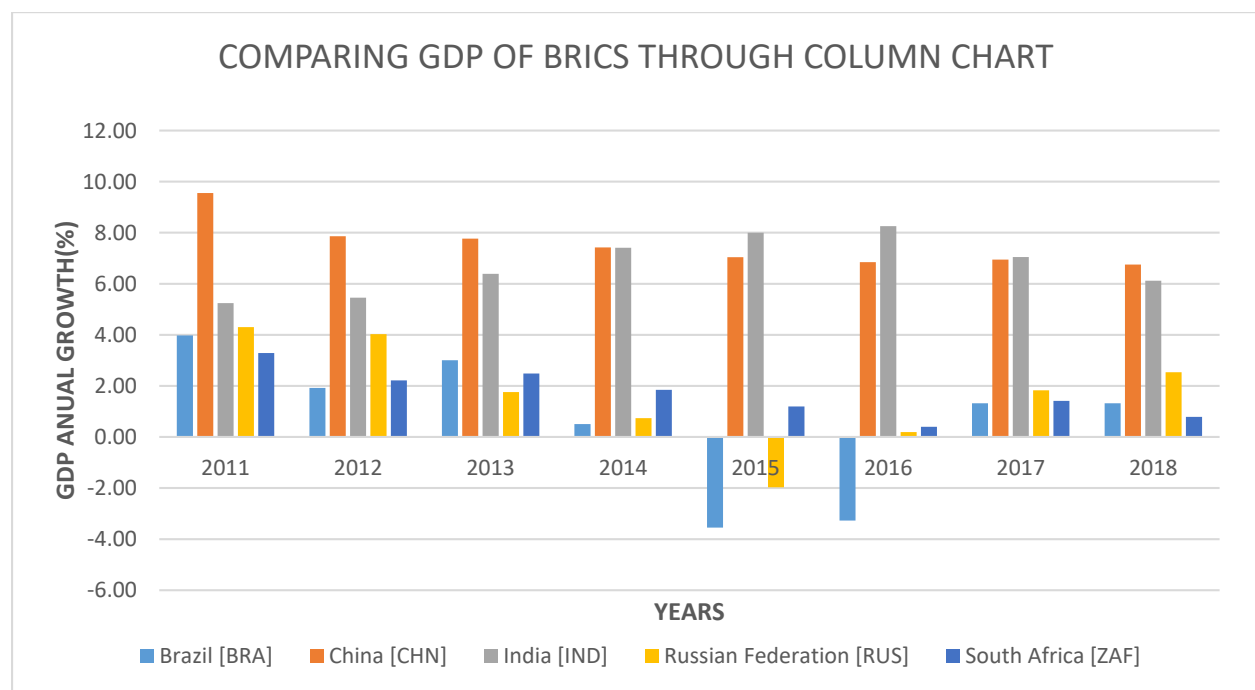
We have seen India to be one of the fastest developing country in terms of GDP as well. India's performance in graph #4 is comparatively better than Brazil, Russia and South Africa

Manufacturing and service sectors have been a lot contributing to the India economy

MANUFACTURING, VALUE ADDED (%OF GDP) 2011-19

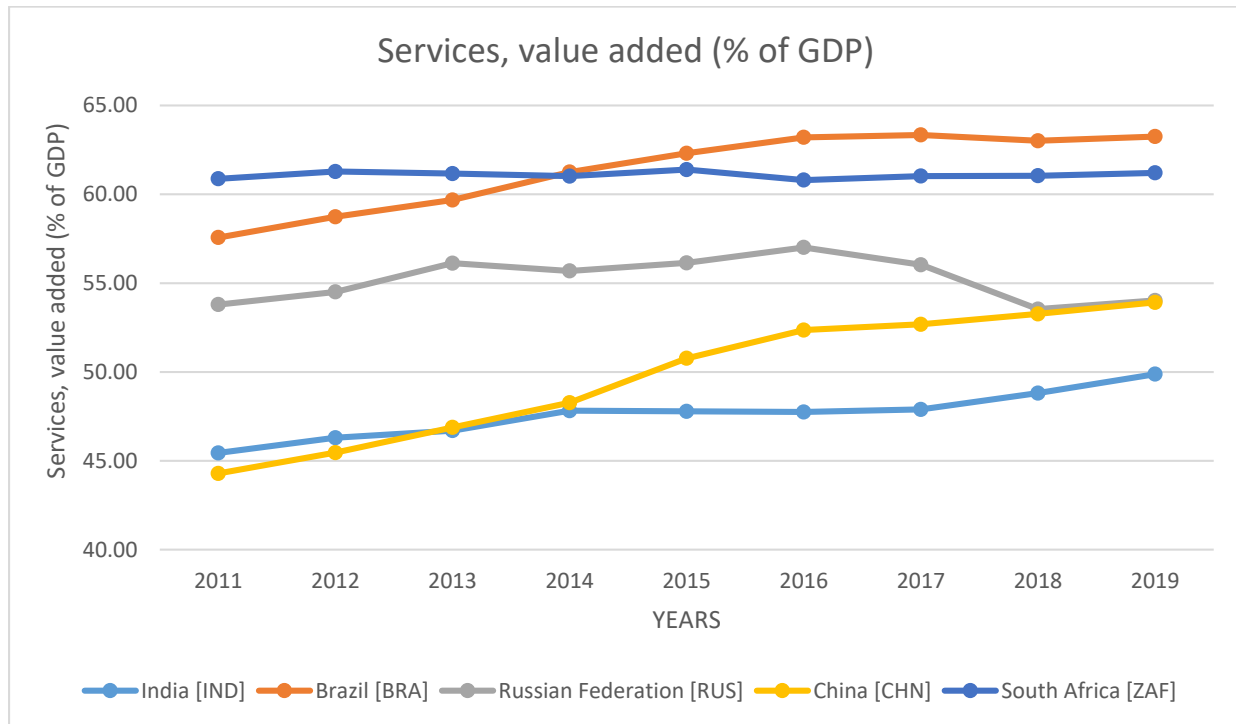With the help of a **line chart (with markers)**

MANUFACTURING,VALUE ADDED(% OF GDP)
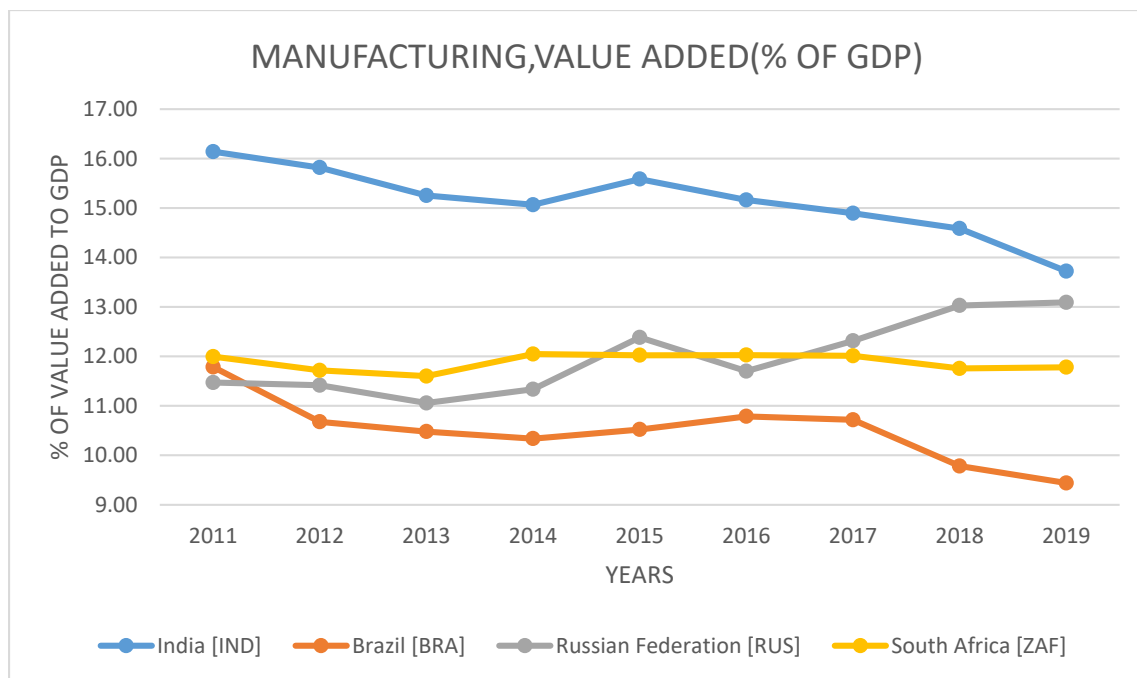
GRAPH #5

We see India's manufacturing sector contributes to its GDP more than the other 4 countries

SERVICE, VALUE ADDED (% OF GDP) 2011-19

With the help of a **line chart (with markers)**

Services, value added (% of GDP)

A line chart titled "Services, value added (% of GDP)" with the y-axis labeled "Services, value added (% of GDP)" ranging from 40.00 to 65.00, and the x-axis labeled "YEARS" from 2011 to 2019. It shows five lines: India [IND], Brazil [BRA], Russian Federation [RUS], China [CHN], and South Africa [ZAF].

GRAPH #6

The service sector still doesn't contribute to the economy of India as compared to Brazil, South Africa, and Russia

The value added is still increasing through the years slowly (2011-19)

COMPARING EASE OF DOING BUSINESS SCORE

Through years 2015-19

With the help of **sparklines**

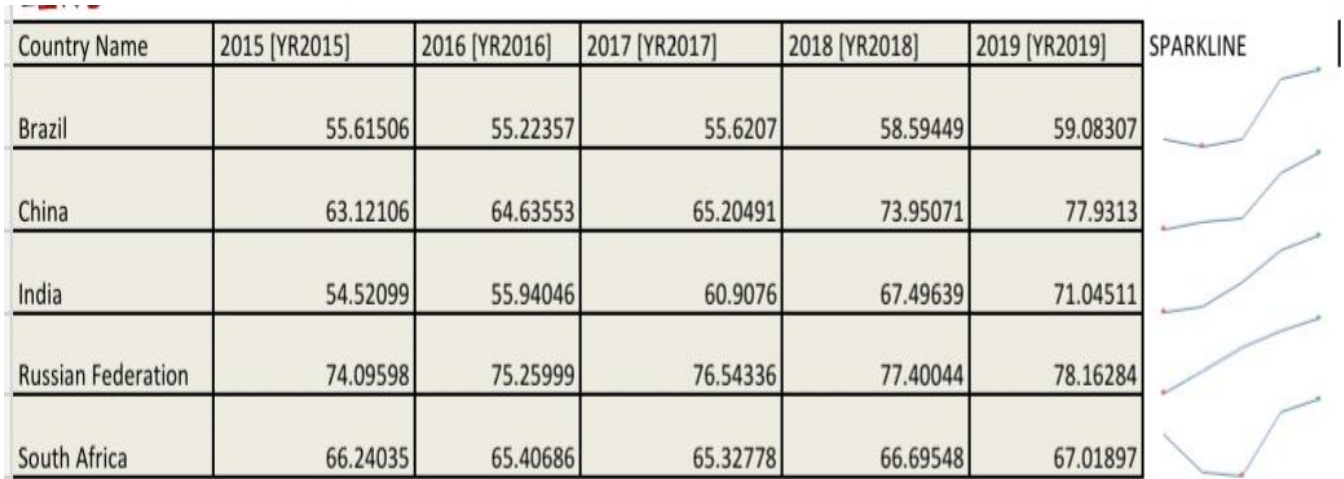| Country Name	2015 [YR2015]	2016 [YR2016]	2017 [YR2017]	2018 [YR2018]	2019 [YR2019]	SPARKLINE
Brazil	55.61506	55.22357	55.6207	58.59449	59.08307	
China	63.12106	64.63553	65.20491	73.95071	77.9313	
India	54.52099	55.94046	60.9076	67.49639	71.04511	
Russian Federation	74.09598	75.25999	76.54336	77.40044	78.16284	
South Africa	66.24035	65.40686	65.32778	66.69548	67.01897	

FIGURE #7

We see India's score has been on an increase from year 2015-19

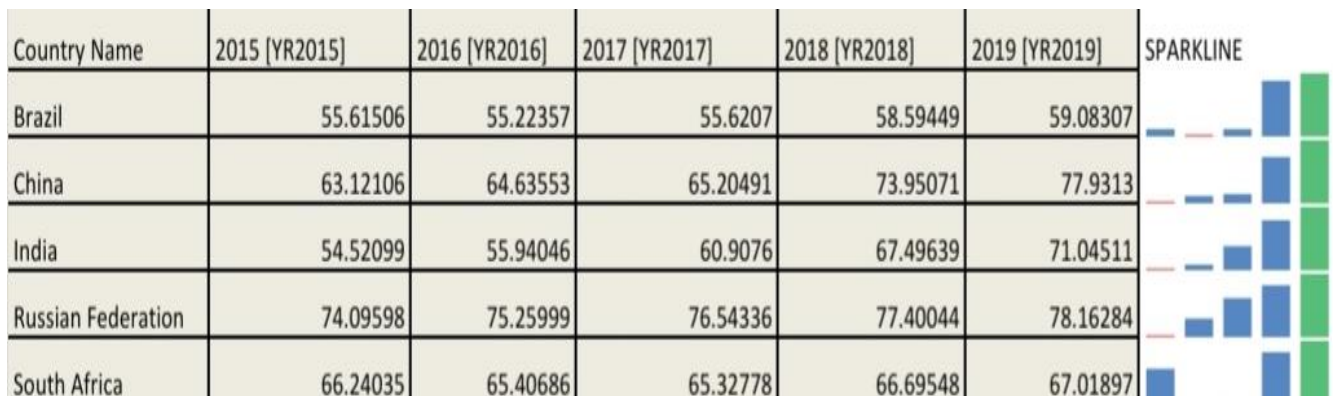To compare the minimum and maximum scores of the BRICS, we prepare **column sparklines**

| Country Name	2015 [YR2015]	2016 [YR2016]	2017 [YR2017]	2018 [YR2018]	2019 [YR2019]	SPARKLINE
Brazil	55.61506	55.22357	55.6207	58.59449	59.08307	
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Russian Federation	74.09598	75.25999	76.54336	77.40044	78.16284	
South Africa	66.24035	65.40686	65.32778	66.69548	67.01897	

FIGURE #8

ANALYSIS #4

In economics, **inflation** is a general rise in the price level in an economy over a period of time, resulting in a sustained drop in the purchasing power of money.

We observe the trend of inflation in India through the years 2006-2019.

With the help of Excel Data Analysis tool box, we analyze the average inflation in India through 2006-19

Time	India [IND]
2006	5.7965
2007	6.3729
2008	8.3493
2009	10.8824
2010	11.9894
2011	8.8584
2012	9.3124
2013	10.9076
2014	6.3532
2015	5.8724
2016	4.9410
2017	2.4909
2018	4.8607
2019	7.6597

VARIANCE INFLATION	7.3705
AVERAGE inflation in past 14 years (%)	7.4748

MAXIMUM inflation in past 14 years (%)	11.9894
MINIMUM inflation in past 14 years (%)	2.4909

Inflation, consumer prices (annual %)
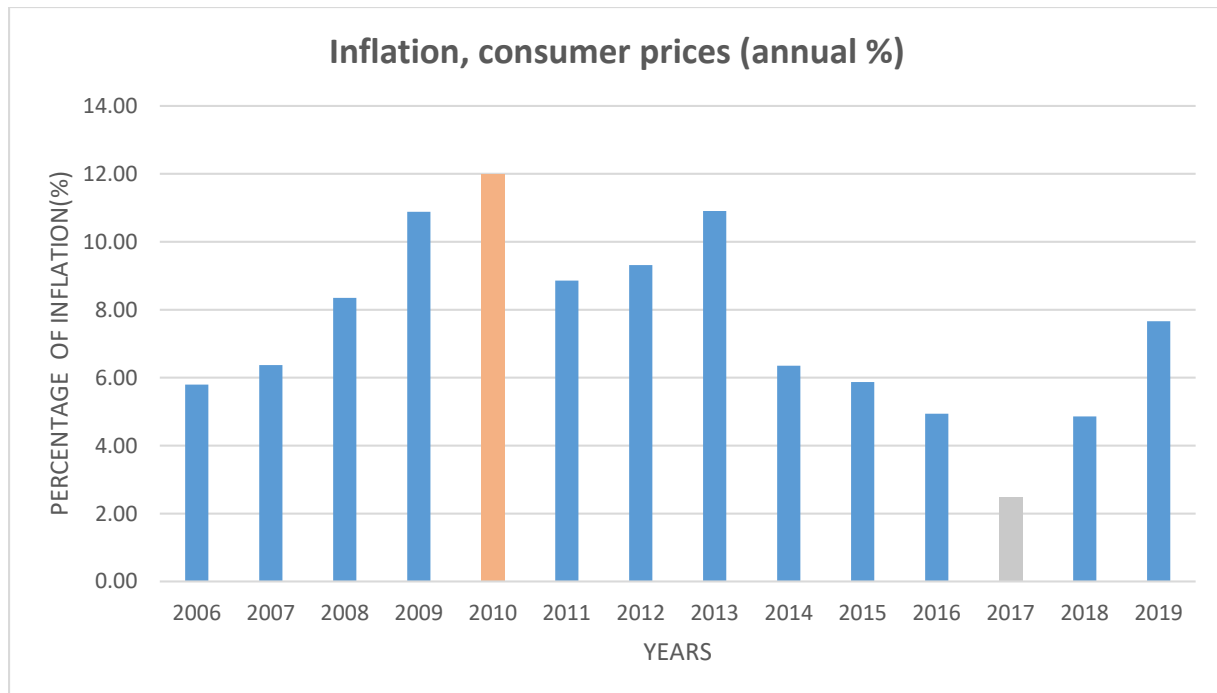
GRAPH #9

We observe India faced maximum inflation (of period 2006-19) in the year 2010, and minimum in year 2017.

We see, Inflation in a country is affected by various factors.

We analyze its correlation with the real interest rates in the period 2001-19; how it changes through years in India with changes in real interest rate

➢ RELATION BETWEEN INFLATION AND REAL RATES OF INTEREST RATES IN INDIA (2001-19)

~ COVARIANCE BETWEEN INFLATION AND REAL RATE OF INTEREST

Time	Real interest rate (%)	Inflation, consumer prices (annual %)
2001	8.5914	3.7793
2002	7.9072	4.2972
2003	7.3079	3.8059
2004	4.9101	3.7673
2005	4.8551	4.2463
2006	2.5706	5.7965
2007	5.6818	6.3729
2008	3.7718	8.3493
2009	4.8086	10.8824
2011	1.3180	8.8584
2012	2.4735	9.3124
2013	3.8660	10.9076
2014	6.6952	6.3532
2015	7.5565	5.8724
2016	6.2327	4.9410
2017	5.5216	2.4909
2018	4.6852	4.8607
2019	6.9937	7.6597

	Real interest rate (%)	Inflation, consumer prices (annual %)
Real interest rate (%)	3.849116246	
Inflation, consumer prices (annual %)	-2.53970122	6.108189957

FIGURE #10

We know covariance between two variables just informs us about a negative or a positive relation between them

Clearly as

$$Covariance = -2.5397 \text{ (approx.)}$$

We see there is a negative relation between inflation and real rate of interest, but we don't see the strength of this relation. For that we observe the Coefficient of Correlation.

~ COEFFICIENT OF CORRELATION BETWEEN INFLATION AND REAL RATES INTEREST (2001-19) IN INDIA

With the help of a **scatter plot** and the **Data analysis** tool pack, we depict the relationship between the inflation and real rate of interests in India.

SCATTER PLOT FOR INFLATION AND INTEREST RATES IN INDIA
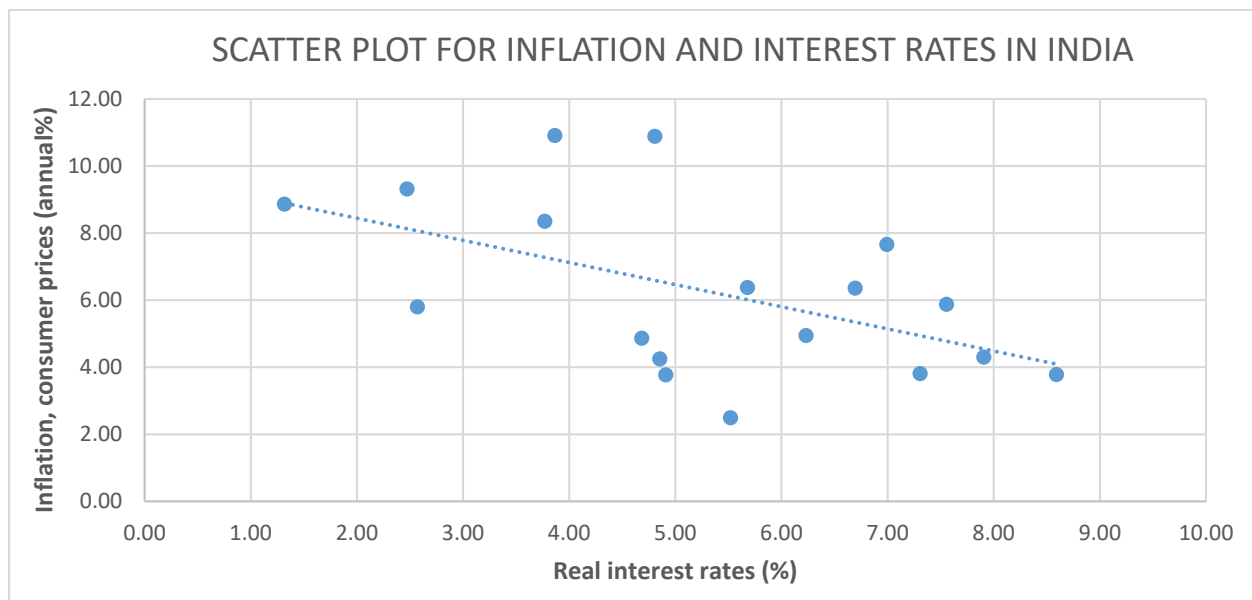
We see the linear line is negatively sloped through the period 2001-19

COEFFICIENT OF CORRELATION:

With the help of the data analysis tool pack we see

CORRELATION BETWEEN INFLATION AND REAL INTEREST RATES

	Real interest rate (%)	Inflation, consumer prices (annual %)
Real interest rate (%)	1	
Inflation, consumer prices (annual %)	-0.523776304	1

FIGURE #12

Coefficient of correlation between Inflation and real interest rate is -0.524(approx.)

Which is

$$-1 < -0.524 < 0$$

This shows the strength of correlation between the two variables is strong enough but not very strong.

And the two are related inversely.

ANALYSIS #5

CRIMES IN INDIA (2017) STATE WISE
OFFENCES AFFECTING HUMAN BODY

Row Labels	Sum of Murder (Sec.302 IPC)	Sum of Dowry Deaths (Sec.304-B IPC)	Sum of Kidnapping and Abduction	Sum of Rape (Sec.376 IPC)	Sum of Offences Affecting the Human Body (Total)
Total All India	230	19	340	38	2974
Bihar	21	2	34	1	583
Maharashtra	9	3	63	3	393
Haryana	43	4	49	4	278
Uttar Pradesh	21	1	56	3	277
West Bengal	33	1	15	3	208
Madhya Pradesh	8	2	20	9	199
Grand Total	365	32	577	61	4912

The pivot table depicts Bihar witnessed the most number of offences affecting the human body in year 2017 followed by Maharashtra and Haryana

The pivot table includes four major crimes affecting the human body in the country

We prepare a pivot table using data from the National crime records bureau, and analyze the crimes relating to affecting human bodies.

We narrow down to the top 6 states of India in terms of highest number of offences against human body in 2017

In total India has witnessed 2974 cases of offences affecting human bodies

Source: National crime records bureau, India

EXPORTS AND IMPORTS IN INDIA IN THE YEAR 2018 FROM THE REST OF THE WORLD

We observe the goods that are exported the most from our country to the world in the year 2018 using a pivot table. We have filtered the table to:

EXPORTS AND IMPORTS OF INDIA BY THE REST OF THE WORLD
Various products

FIGURE #14

Sum of 2018	Column Labels	
Row Labels	**Export**	**Grand Total**
Consumer goods	144804.61	144804.61
Intermediate goods	104973.72	104973.72
Capital goods	48395.35	48395.35
Chemicals	44577.52	44577.52
Stone and Glass	43134.73	43134.73
Grand Total	**385885.93**	**385885.93**

We prepare the pivot table for the exports and imports in the country to the world
We sort the data according to the top five products which are exported to the rest of the world

We see consumer goods are the most exported to the rest of the world from India in the year 2018.

Source:
https://wits.worldbank.org/CountryProfile/en/Country/IND/Year/LTST/Summary

If we compare this observation to the data available for 2017, using a pivot chart and rearranging the previous pivot table.

FIGURE#15

| Row Labels | Column Labels | | Total Sum of 2018 | Total Sum of 2017 |
| | Export | | | |
	Sum of 2018	Sum of 2017		
Consumer goods	144804.61	129636.71	144804.61	129636.71
Intermediate goods	104973.72	97756.82	104973.72	97756.82
Capital goods	48395.35	40584.14	48395.35	40584.14
Chemicals	44577.52	37160.65	44577.52	37160.65
Stone and Glass	43134.73	44463.97	43134.73	44463.97
Grand Total	385885.93	349602.29	385885.93	349602.29

GRAPH #16

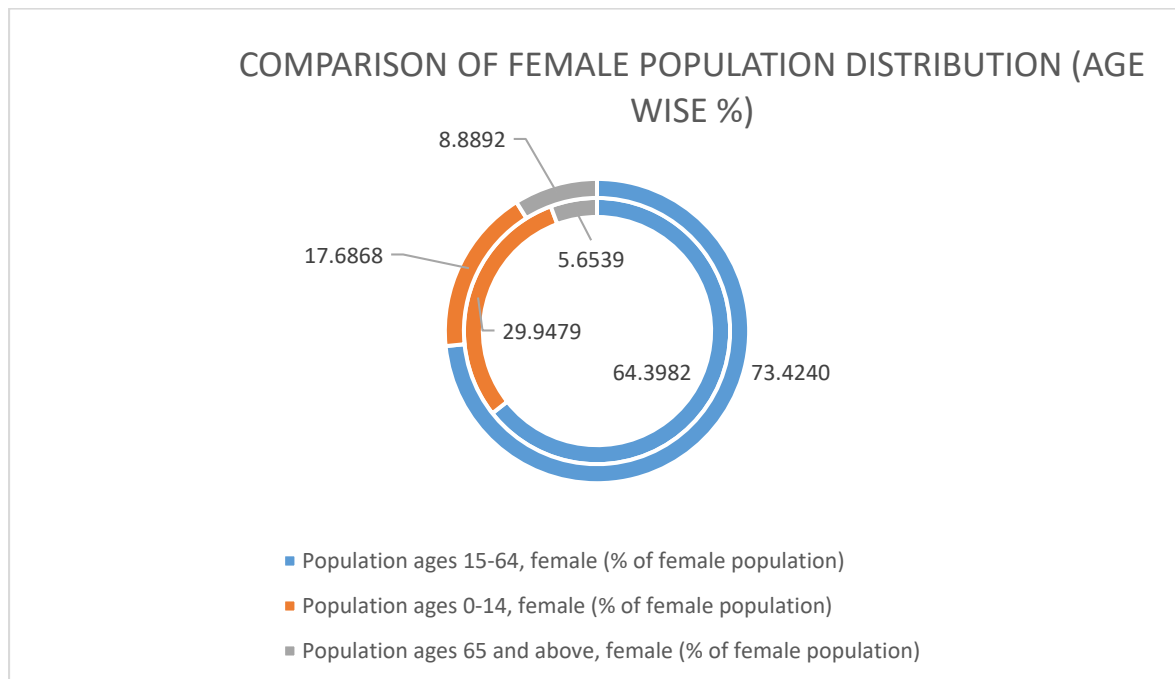PIVOT CHART FOR EXPORTS AND IMPORTS IN INDIA (2017-18)
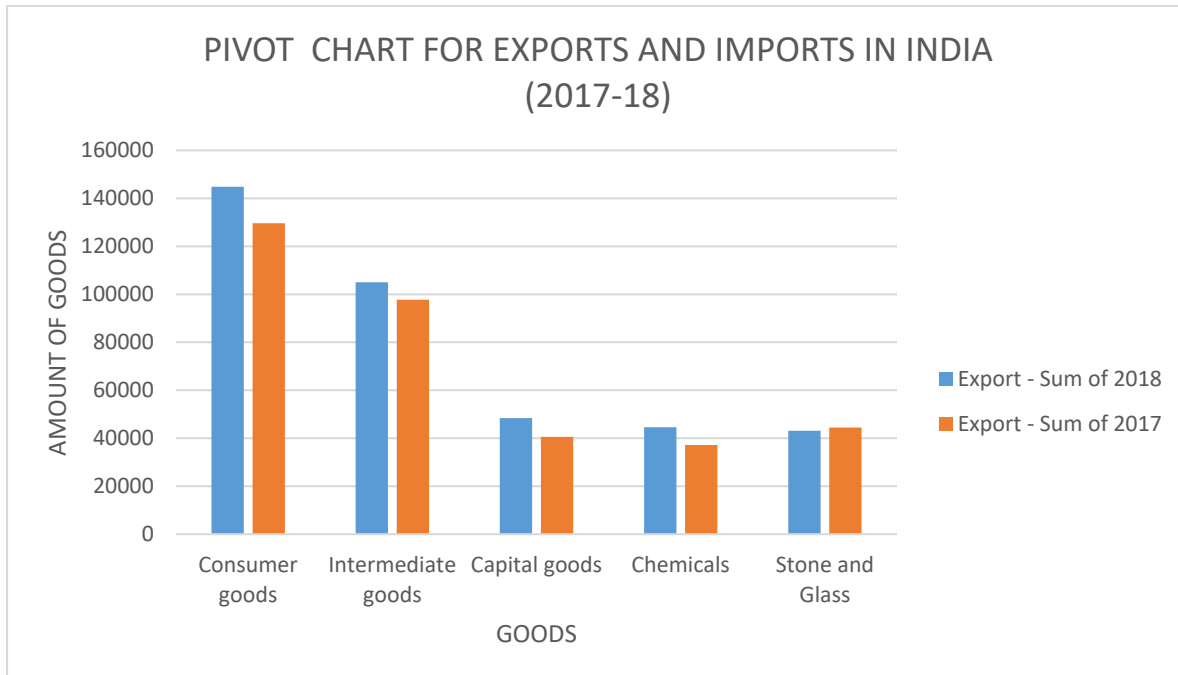
We conclude the graphs in the Conclusion section.

ANALYSIS #6

We compare the two of the most populated countries India and China's female population distribution (age wise) from the census of 2011

COMPARISON OF FEMALE POPULATION DISTRIBUTION (AGE WISE %)

8.8892

17.6868

5.6539

29.9479

64.3982   73.4240

- Population ages 15-64, female (% of female population)
- Population ages 0-14, female (% of female population)
- Population ages 65 and above, female (% of female population)

The outer doughnut represents China's female population division
The inner doughnut represents the India's female population division

ANALYSIS #7

With the help of box plot we prepare a five number summary for the inflation rates between two neighboring countries; India and Pakistan (years 2014-18)

Using Google sheets

Time	India [IND]	Pakistan [PAK]
2014	6.353	7.189
2015	5.872	2.529
2016	4.941	3.765
2017	2.491	4.085
2018	4.861	5.078

	MIN	Q1	MEDIAN	Q3	MAX
INDIA	2.491	4.861	4.941	5.872	6.353
PAKISTAN	2.529	3.765	4.085	5.078	7.189

https://docs.google.com/spreadsheets/d/1jFmX164-RuCB_-4YzoFoaGvwjUy3W4FdyGofsHFlFW8/edit?usp=sharing

 The above link contains the box plot depicting the five number summary

➢ CONCLUSION

ANALYSIS #1

We used a clustered bar chart to represent the different sources of electricity used.

It can be observed that all the three economies use coal sources the most for the production of electricity;

And so does **India with 74.49% of its electricity produced by the coal sources**

We know using coal for production of electricity is not environment friendly and causes a lot of Greenhouse gases emissions. India needs to shift its production to a more eco-friendly source and so does USA and China.

ANALYSIS #2

We observed the budget of financial year 2020-21 using the clustered bar chart and the pie chart

The clustered bar chart clearly shows that the most of the budgeted expenditure has been assigned to the defense ministry (15.49%) and the home affairs ministry (5.5%)

The pie chart represented the distribution of the budgeted subsidies in the year 2020-21

It can be observed that subsidies are assigned the most for Food (44%) and Fertilizers (27%)

ANALYSIS #3

We compared the BRICS i.e. Brazil, Russia, India, China, South Africa, which are the emerging economies, in terms of their GDPs, and the Ease of doing business scores.

> The clustered column chart shows **India's better performance in terms of GDP than Russia, Brazil, and South Africa.**

India's GDP has been on an increase from year 2011-16, and then faced some decline but is still performing better than other three BRICS members (expect China)

> The first line chart (with markers) shows the share of manufacturing sector in the GDP (%).We have seen the manufacturing sector is the largest part in the development of Indian economy. We observe, if we compare the BRICS, **India's manufacturing % in its GDP is much more than the other BRICS members.**

The second line chart represents the share of service industry in the country's GDP. The service sector is the most significant industry in India, as majority of the population of India works in this sector. **But as compared to other BRICS members, India's service sector doesn't contribute much to the GDP.** But it's on an increasing pattern.

➤ We observed the Ease of doing business score using the Sparkline.

The Sparkline shows ,all BRICS nations have been improving their ease of
doing business but South Africa has had a
fluctuating U shaped Sparkline
**India 's lowest score was in 2015 , with 54.52099,
but the pattern is increasing through the years
(2015-19)**

➤ The column Sparkline shows,

Here we see Russian Federation had
better points for Ease
of doing business for the last three years (2017-19)
than other BRICS countries
**India's performance has been improving but is still not up to the
Russia and China in some years.**

ANALYSIS #4

We analyzed the pattern of inflation in India through
the period 2001-19

➤ With the help of a column chart , we see through
the years 2001-19, the maximum inflation rate

experienced by Indian economy was in 2010 (11.98%) and minimum in 2017(2.49%)

Average inflation in India from year 2006 to 2019 has been
7.4748% with a range of 9.4985% (MAX-MIN) which implies the largest difference between two inflation values in years

> We compare relation between inflation and real interest rates using the covariance, coefficient of correlation and the scatter plot.

COVARIANCE = -2.539
Which shows through the years, inflation and real rates of interest have a negative relation

COEFFICIENT OF CORRELATION= -0.523
Which shows the strength of the correlation between inflation and real interest rate is **quite strong**

> **The scatter plot also shows a linear negative relation between the two variables.**

ANALYSIS # 5

➤ We analyzed the crime records for offences affecting the human body in the year 2017 in the first pivot table,

And it's clear that the **maximum amount of offences committed were in the states of Bihar, Maharashtra and Haryana in India.**

➤ The second pivot table represents the exports of India in the year 2017 and 2018 to the world

It's is concluded that the consumer goods are the goods that were exported the most in the year 2018 (144804 units) and 2017(129636 units) followed by chemicals sector.

➤ The pivot chart that we prepared for exports in year 2017-18 show us **all the goods exported the most increased in the year 2018 except stone and glass.**

ANALYSIS #6

We prepared a doughnut chart to analyze the female population distribution (age wise) of the two most populated countries India and China.

We observe the 15-64 age group of China was much more
than India even though the difference between population of the two countries
is not that much
But the age group of 0-14 was more in India.

ANALYSIS #7

We use the Google sheets to depict the box plot for five number summary of inflation (years 2014-19) of India and Pakistan

	MIN	Q1	MEDIAN	Q3	MAX
INDIA	2.491	4.861	4.941	5.872	6.353
PAKISTAN	2.529	3.765	4.085	5.078	7.189

Here, **Maximum inflation of Pakistan is greater than that of India,**
And minimum of India is also better than that of Pakistan.
Both the countries got independence together and are culturally the same.