

# DA332: Data Visualization Project Report

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April 14, 2024

## Abstract

Exports play an important role in any country's business. India is one of these countries that have been exporting many products and raw materials to other countries to earn economic wealth. India is the 19th largest export economy. India's overall export- in 2019-20 was US \$ 313138.5 million, and total import was US \$ 473995.2 million, and trade balance was US \$ 160856.7 million.

## 1 Introduction

India is a developing mixed economy. It is the world's sixth-largest economy by nominal GDP and third-largest by purchasing power parity (PPP). Foreign trade volume is a major component of any economy. India was a closed economy due to an average tariff exceeding 200% and extensive quantitative restrictions on imports before 1991. Foreign investment was strictly restricted to allow India ownership of business areas. In the post-liberalisation period, the Indian Government made foreign trade policy so much more liberal and withdrew the restrictions step by step, improving the position of Indian foreign trade. Nowadays, Indian exports reach to approximately 7500 commodities to about 190 countries. India exported US \$ 313138.5 million and imported US \$ 4,73,995.2 million of commodities in year 2019-20. The top commodities of exports in 2019-20 were gems and jewellery, chemical and related products, machinery, base metals, Agriculture and allied products, Plastic and rubber articles and transport equipment.

## 2 Motivation

Indian export trade partner and dividing order of volume of total trade were the USA, UAE, Hongkong, UK, Singapore, China, Germany, Bangladesh and Belgium in the year 2019-20. Indian targeted import trade partner in descending order of volume of total trade by China, USA, UAE, Switzerland, Indonesia, Korea, Germany, Iraq and Japan in the year 2020. The trend in Indian foreign trade can be observed from the given study. Analysis on following points:

- Change in volume of export
- Change in volume of import
- Change in direction of export
- Change in direction of import.
- Change in composition of foreign trade
- Recent Trends

## 3 Plots, Reasoning and Remarks

### 3.1 Change in Volume of Export

The total value of Indian export goes up from USD 497.90 billion in the year 2020-21 to USD 676.53 billion in the year 2021-22. (Figure 1) Over the period of 5 years (2017-21) the total export has gone up by around 36%.

Here bar plot was chosen as Bar plots are useful for comparing categories or discrete data points. In this case, the years (2017-2022) are discrete categories, and each year's export data is a data point.

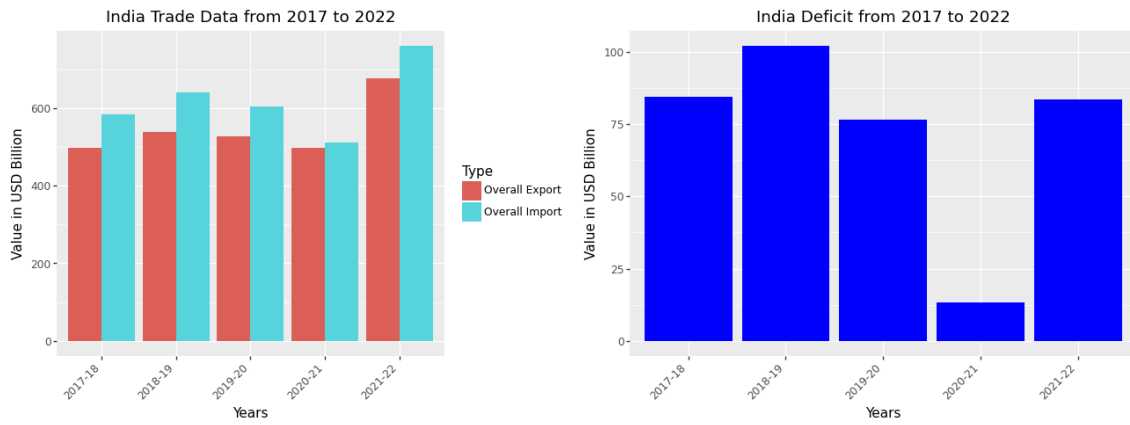


Figure 1: India Export Import Data 2017-22

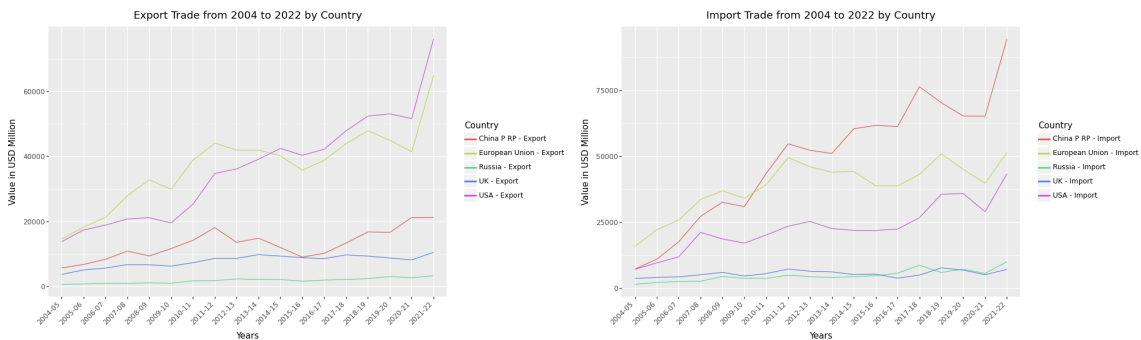


Figure 2: Country wise Export Import Data 2004-22

### 3.2 Change in Volume of Import

The Import data of India also follows a similar trend, a dip in imports in the from USD 602.98 billion in year 2019-20 to USD 511.12 billion in year 2020-21 and rise to 760.06 billion in year 2021-22. In the period of 5 years (2017-2022) the Overall imports grew by 30.3%.

The trade deficit (Figure 1) was highest in the year 2018-19 and lowest in the year 2020-21 but again rose to significant levels in the latter year.

### 3.3 Change in the direction of Export

The direction of foreign trade means the countries with which we have trade relationships. It shows our trade relationship with the countries it whom the export and from whom the import our requirement, here we will look at the trade statistics between India and the following countries, China, European Union, Russia, UK, USA

Till year 2013-14 India was the largest exporter of goods to European Union amongst the coun-tries. (Figure 2) From 2014-15 USA was the largest Importer of Indian goods. China, Russia and UK remain relatively low on the Export scale, with Russia being the least. The exports to USA increased by a total of 5 times in the time span of 18 years. Similarly, the exports to European union increased by almost 3.5 times. The exports to China increased by 4 times whereas the other countries was relatively similar (Russia: 5 times, UK: 3 times)

Here, we have used a line chart to easily compare the temporal changes between several cate-gorical variables (Countries). You can see if certain categories tend to move together, diverge, or exhibit opposite trends. Also to easily visualize how the values of each categorical variable change across the time points. This clarifies if a category increases, decreases, or remains stable over time.

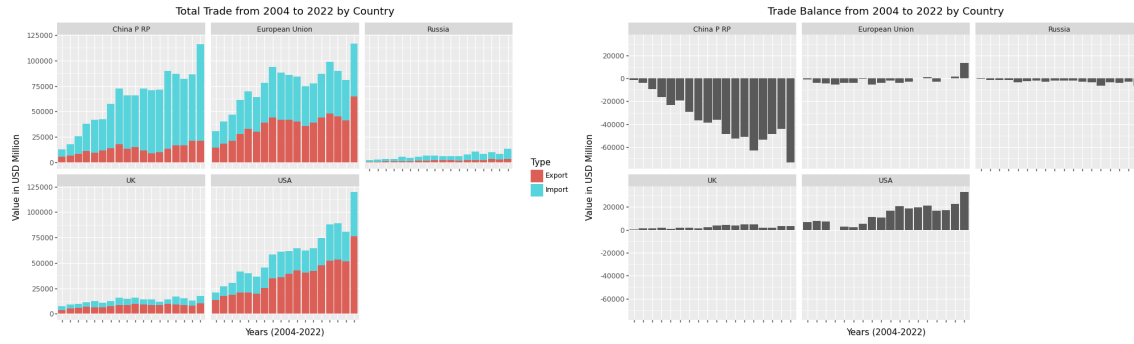


Figure 3: Country wise total trade composition and trade balance 2004-22

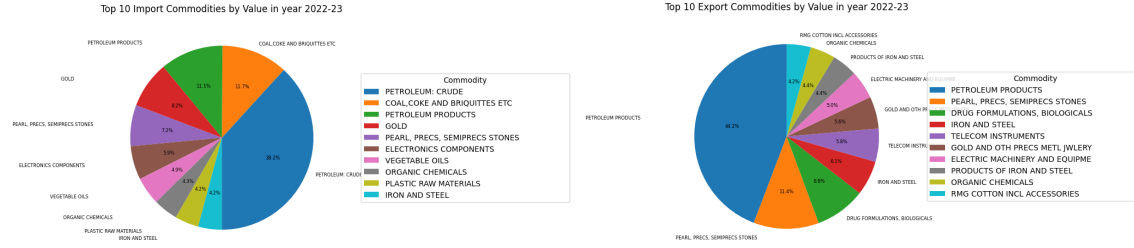


Figure 4: Composition of the top 10 commodities traded by India in the year 2022-23

### 3.4 Change in direction of Import

India's imported goods mainly came from the European Union until the year 2009-10, later the lead was taken and held by China. Recently, the imports from EU and USA are close. Imports from Russia and UK remain relatively low over the time span.

The total trade (Import + Export) and its individual composition can be found in Figure 3. The total trade looks similar from China, the European Union and USA. On the contrary, the total trade with Russia and UK remains relatively less.

Looking at the trade balance, we are mostly in a trade deficit with China, and in trade surplus with USA. The balance between the rest of the countries remains mostly stable.

Here, we've used a stacked bar graph along with faceting to show the composition of the total trade with different countries. A Diverging bar chart was used to show the trade balance as it can also accommodate negative values and helps to visualize it better.

### 3.5 Composition of Trade

India's total trade constituted 162 unique items, but for the sake of simplicity of visualisation and inference, only the top 10 items by value were chosen (Figure 4).

Here, we chose a pie chart to represent the composition of the trade by items because, It makes it easy to see, at a glance, the relative sizes of different categories compared to the total.

#### 3.5.1 Import

India imported crude petroleum products worth USD 162205.15 million in the year 2022-23, which constituted the major chunk of the imported goods. It also imports major quantities of products like coal, coke, etc. This shows that most of our import needs are to fulfil our energy requirements. The other major import items are precious metals, gems, pearls, etc. The rest of the major import commodities consist of various raw materials, edible oils, electronics, and chemicals.

#### 3.5.2 Export

Most of India's exports are refined petroleum products, constituting USD 97468.45 million. This is because in the year 22-23, India imported most of its crude oil from Russia, refined it, and exported it to various European Countries due to the dispute between Russia and the EU. The

second most exported commodity is precious stones and gold. The import and export of precious items also suggest the huge stone-cutting and trading market in India. The third most exported item is pharmaceutical items; even after COVID-19 is over, India still maintains its lead as a pharmaceutical hub of the world.

## 4 Conclusion

India was restrictive of trading for a long time but has become progressively more open to international trade. The value of exports decreases by 5.13% in the year 2019-20 way, the imports decreased by 7.7% in the year 2019-20. The unprecedented fall in the value of imports and exports in 2020 due to the global economic crisis following the outbreak of the COVID-19 pandemic. Indian exports mainly depend upon the USA, UK, Russia, China and EU. The country has recently signed free trade agreement with South Korea and Asian and has entered agreement with several parts, which boost the exports in the near future. Indian mainly export petroleum products, gems and Jewellery, engineering goods, cotton yarn, etc and import vegetable oil, crude oil, Iron and steel, machinery, Transport Equipment etc. India can increase the export by an understanding of dynamic global trend and little investment in market research and product development. Exporters should focus their attention on leveraging the provision of free trade agreement and, most importantly, seize opportunities which are present in the market

## 5 Code

The code for the plots and the dataset can be found on my GitHub linked below  
[Code Link](#)