# Evolution of Global Economy

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***Abstract*—The goal of this study is to dig deeper into on movement of global economy across the years and how various socio-political events have impacted trends across the world. We also predict that how many years it might take for the economy to recover from Covid-19.**

## I. Introduction

The project focuses on analysing the economy using macroeconomic parameters like GDP, unemployment, net exports which are basically the major factors affecting the finances of a country.


Fig. 1. World's 80trillion economy

## II. Motivation

Istarted with the same curiosity that how can we implement the knowledge taught to us in the course. Basic understanding of global economics is very important but since we all come from a technical background, we never had an opportunity to properly explore what actually has happened and is happening around the world from the economic point of view. Covid-19 has the been the hot topic for the past 2 years so finding data about economy pre and post covid also turned out to be convenient for us. This project also challenges our problem solving skills as we have to build our own problem statement and work with large codes which will of course demand more debugging.

## III. Datasets

- Data collection was one of the biggest challenges we faced during the project as getting consistent and relatively cleaner data which is large enough for a large analysis to be conducted.
- Datasets of WEO data, population, unemployment, Covid population have been used. Our code follows a trend of using 1 dataset at a time, do extensive EDA on it making analysis using appropriate plots. We look out for irregularities and dig out the reasons for the same.

## IV. Analysis Pipeline

- Analyse the data of variation of GDP , investments, savings, inflation etc. over the years.
- Comparative study of countries which went through similar situations like Iraq and Syria , a country with high human capital like Japan against country with large reserves of natural resources like India.
- Prediction of variation of variation in the coming years and how many years it might take for the nations to recover from large economic setbacks.

## A. GDP

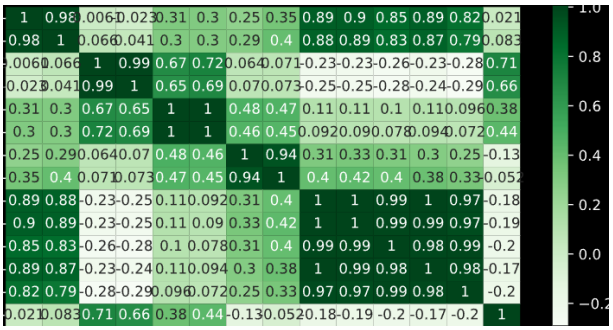

Fig. 2. Heatmap of GDP with different parameters

From the above matrix we can see that GDP on constant prices(Percent Change) is highly correlated with volume of import and export for goods and services.Whereas GDP in current prices is negatively correlated with volume of imports and exports so we plot both of the graphs.

Here we can see the plots of absolute GDP and percent change in GDP of differnet regions alongside that of the whole world,we can see that the percent change of any region drops as the overall world gdp drops also we can see a shift in power from the Advanced Economies in 2000's to Developing and Emerging ecoonomies in 2010's.Each rregion experiences a GDP drop in around 2019 2020's due to covid 19.

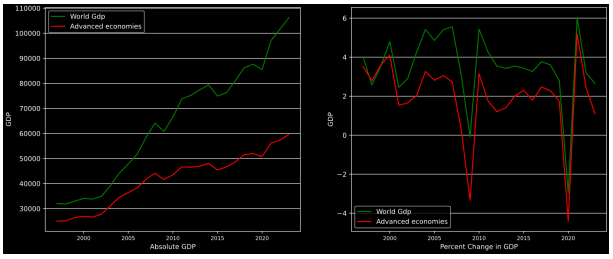


Fig. 3. Contribution of Advanced Economies

We can clearly see the difference between min,max,mean,25 and 75 quantile GDP for all the regions. We also see that the maximum GDP is of the G7 Economies also we see that Emerging and developing countries also provide a large share of GDP.

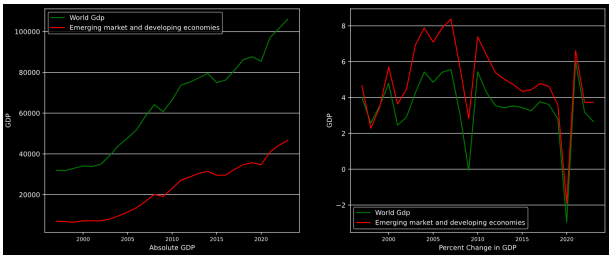


Fig. 4. Contribution of Developing Economies

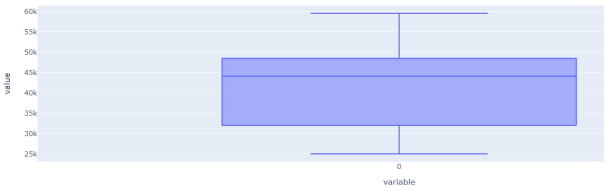


Fig. 5. Contribution of Advanced Economies

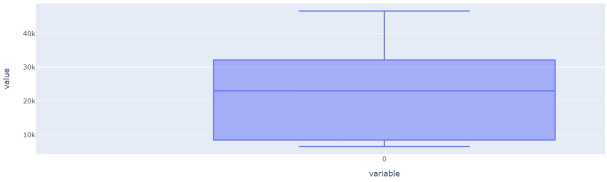


Fig. 6. Contribution of developing Economies

## B. Imports and Exports

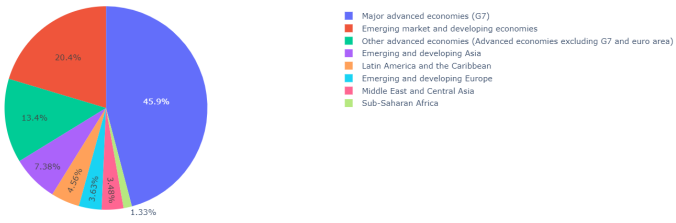


Fig. 7. Exports in 2000

What we observe isn't actually lesser exports by G7 economies but more imports. Due to improvement of technology and collaboration with developed countries, developing economies have been better able to utilise their natural resources and now have a more organised and an efficient supply-chain.From the above two graphs we see that tg epercent import and export both decreased for the advance deconomies and G7 countries also these

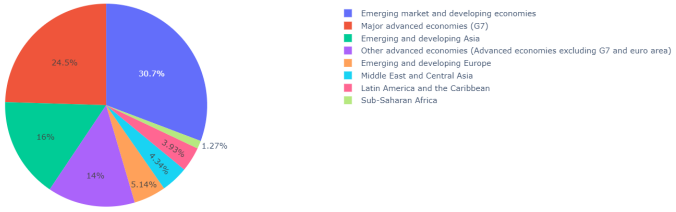


Fig. 8. Exports in 2021


Fig. 9. Imports in 2000

increased for the develloping countries but when we take their net effect into account in Net Export section here we see that net Export by advanced Economies and G7 countries decreases whereas that for developing economies remains positive i.e. the G7 economies are importing more than they import whereas the reverse is true for the developing Ecoonomies this helps us draw some oimportant conclusions that the developing Economies can now choose what to import and they have increased their participation in the international market. Also there is a shift and distribution of the major world trade and is not one sided (export only from advanced economies and import by developing ones) this is a good sign for the overall Global Economy.

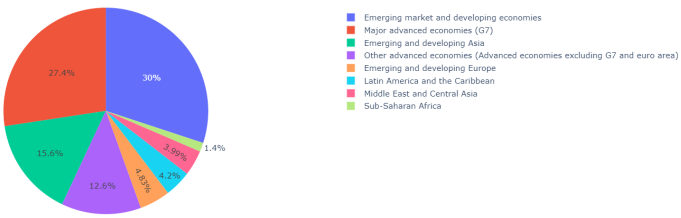


Fig. 10. Imports in 2021

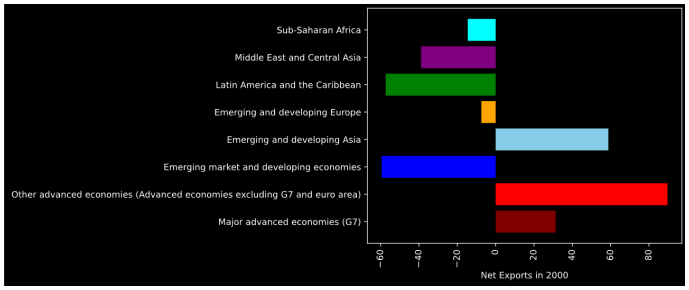


Fig. 11. Net Exports in 2000

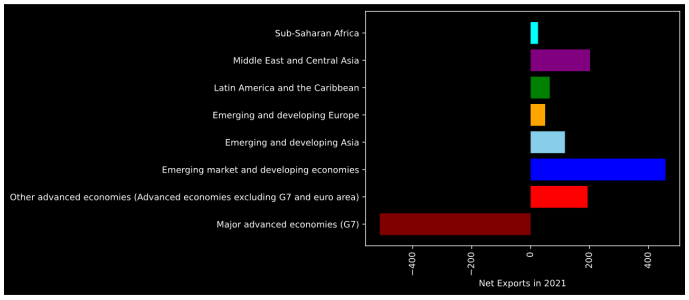


Fig. 12. Net Exports in 2021

## C. GDP of war-affected countries

Iraq's seizure of Kuwait in August,1990 provide a massive boost to its GDP in 1990 as all Kuwaiti oil fields came under Iraq. Subsequent international economic sanctions on Iraq, and damage from military action by an international coalition beginning in January 1991, drastically reduced economic activity and thrased its GDP levels.

The drop in GDP in 2001 was largely the result of the global economic slowdown and lower oil prices. The removal of sanctions on 24 May 2003 and rising oil prices in the mid-to-late 2000s led to a doubling in oil production. Furthermore, reduced inflation since 2007 have translated to real increases in living standards for Iraqis and economic boost.

Syrian economic slump in 1988 was same as that of India in 1991, with larger govermnement debts and high inflation. The bounceback over the next 15 years was the result of economic reforms, foreign investment and increase in the oil prices with oil being the major source of income for syria at that point.

The massively insane drop in GDP in 2011 was because of the initiation of civil war in the country. During that time, inflation was again high. People

had less money, and were increasingly frustrated of the high foreign dominance in the market.

Both the Iraq and Syria charts explain the social and political scenarios of the countries.

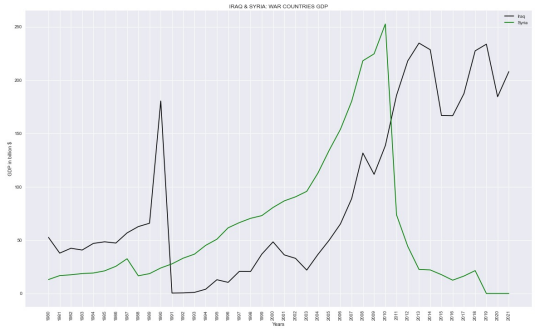


Fig. 13. GDP of Iraq and Seria

## D. Comparative Studies of Japan With India

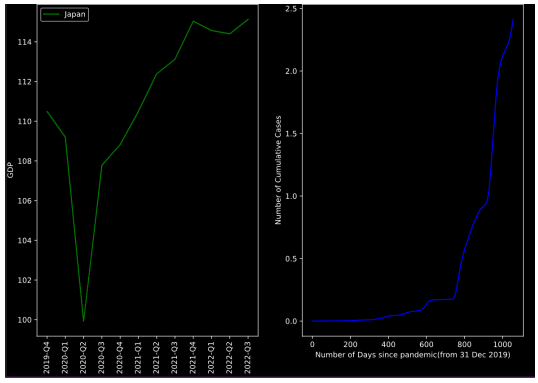


Fig. 14. GDP vs Covid cases in Japan

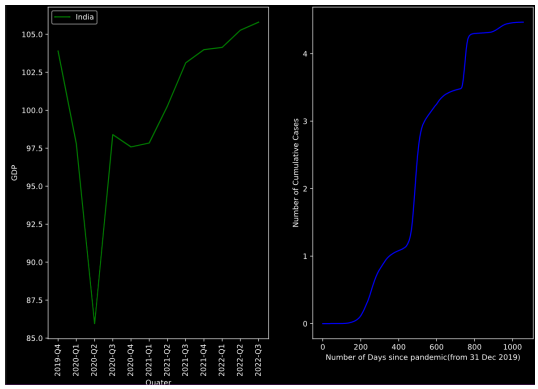


Fig. 15. GDP vs Covid cases in India

Japan's economy stagnated in the 1990s after its stock market and property bubbles burst. Companies focused on cutting debt and shifting manufacturing overseas. Wages stagnated and consumers reined in spending.

Once deflation set in consumers started to expect prices to fall and they delayed spending for as long as possible in order to save money. That perpetuated the problem and continued the cycle.

Japan's ageing population is now making the problem even worse. By 2019 the country lost around 600,000 people a year. Getting growth from an ageing, shrinking society is difficult.

All these factors make Japanese unstable and thus result in a very abnomral pattern of highs and lows in GDP.

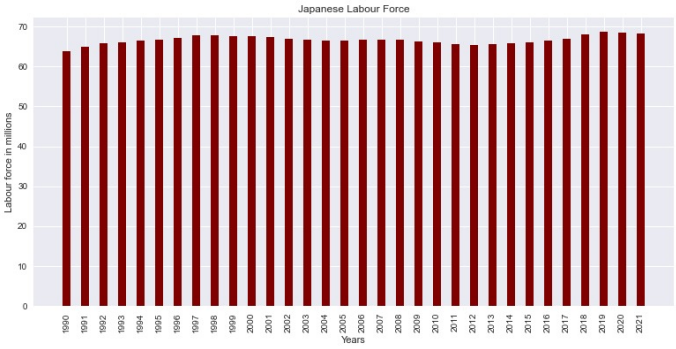


Fig. 16. Labour force in Japan across the years

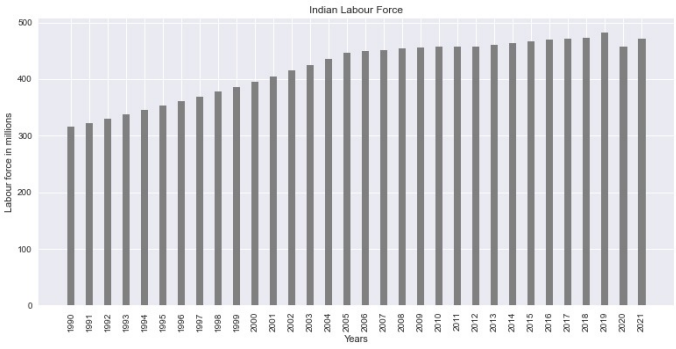


Fig. 17. Labour force in India across the years

### E. Prediction using ML algorithms

In our whole project, we treated GDP as main entity of observation and we did basic prediction of the same using LSTM and GRU networks.

By Deep Learning we are trying to predict how the GDP would grow over the year.

We used an api called FredApi to fetch the data of GDP. We use the standardized method to test our Model, by dividing our Data into training and testing segments. Firstly we predicted the GDP of the following years by not taking into account the COVID-era and hence we do-not see a strong gradient during those years. By this we plotted how the GDP would have looked if the Global Pandemic-COVID 19 didnt happen. Then we took into account the COVID 19 era and predicted the GDP of the following years. By the end we can see how the GDP would have looked like with and without the unfortunate COVID times All of the above have been done by two Neural Network models:- 1)LSTM-Long short-term memory 2)GRU-Gated Recurrent Model

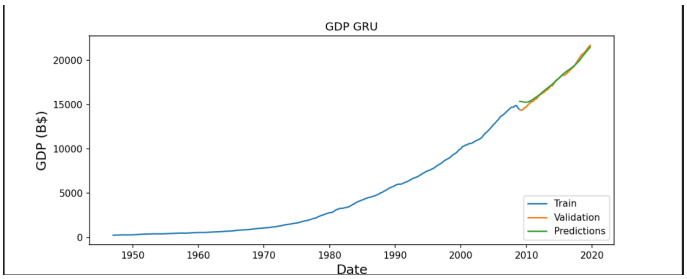


Fig. 18. Prediction using GRU

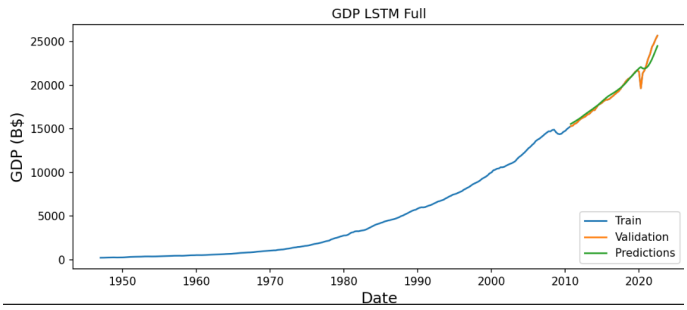


Fig. 19. Prediction using full LSTM network

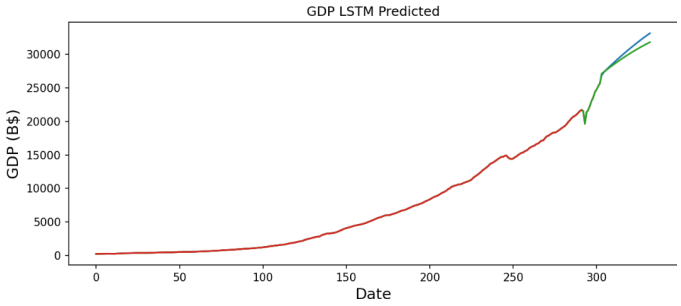


Fig. 20. Final Prediction of GDP

## V. Conclusions

Evolution of Global Economy helped us understand how powerful global economies vary over the years. The project analyzes the major factors affecting the GDP levels and how sometimes seemingly insignificant factors completely twist the fate of a country's economy. Trade was terribly hit and exports-imports achieved an all time low. The project then moves forward in an attempt to estimate the permanent damage and the path to recovery of the entire world. Few Machine Learning and Deep Learning models were implemented to approximate the time of complete revival and comprehend what lies ahead for the world as a whole.

Though, the impact of such global circumstances affect each country differently and its exceedingly hard to simulate and secure the future for a particular country. Yet there are crucial similarities in the behaviour of all economies and necessary actions can be taken in the future to prevent such catastrophe

## VI. Our Experience and Takeaways

This project was indeed really helpful for our team as we got hands-on-experience of how an actual real-world problem statement is analysed and what are the different methods using which we can make our data speak for itself. It was very insightful as we even got to research about impact of wars, pandemics, irresponsible govt decisions on the economy of not only that country, but can even affect the economies across the globe. And of course we cant forget to mention how working in a team was a really fun but a great learning experience.

## VII. References


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