The Impact of Covid-19 Outbreak on World GDP

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Abstract - *This paper examines the effects of a pandemic on the gross domestic product. The World Bank, the International Monetary Fund, and the United Nations are just a few of the agencies that establish a country's GDP figures. This research offers important analysis of GDP fluctuation in relation to the global corona virus pandemic. The main purpose of bringing up this outbreak was to illustrate how the global economy is fundamentally regulated. The GDP for the period of 2020 to 2022 has been considered. The primary focus of the study is to examine how the global economic downturn affects the Gross Domestic Product.*

Key Words: Gross Domestic Product, Plotly Express, Streamlit, Data Science, Web scrapping, Web Application

1. INTRODUCTION

In the year 2020, there was an evidence of a new strain of virus in the city of Wuhan, China was initially the source of the SARS-CoV-2 infection, which ultimately resulted in a spike in Covid-19 cases across the globe. Due to international trade and travel the virus spread across the world very quickly. This unexpected outbreak not only posed a serious threat to human health on a global scale, but also substantially worsened the GDP. The fundamental cause of this global recession was the implementation of safety standards that restricted individuals through the quarantine. The bizarre mutations of the new coronavirus known as Covid-19 have impacted the whole world and are contributing to economic collapse in several countries. Numerous countries observed a similar pattern in order to combat this disguised pandemic, which impacted a halt in global economy. The pandemic has had a tremendous impact on the global economy, affecting both developed and emerging nations including the United States, Germany, Italy, Brazil, and India, and most notably, consumers and businesses have changed their purchasing behaviour as a result of unrest conditions.

Pandemics have a short-term budgetary impact in addition to a long-term economic impact on countries all over the world. Efforts to contain the pandemic include enforcing quarantine, preparing medical facilities, isolating infected patients, and tracing contacts, which each require additional health resources, human resources, and implementation costs. In lower-middle-income countries (LMICs), where budgetary constraints are more stringent and tax systems still lack refinement, pandemics can also result in reduced tax receipts and increased spending, which generates fiscal stress. Economic shocks are reminiscent during pandemics because of labour shortages caused by illness, an upsurge in mortality, and fear-induced behaviours. In response to the outbreak, the risk in the global economy has been magnified. This paper is constructed to strictly adhere to the economic transition of various countries based on their GDP growth rate indices altered over the course of corona virus pandemic.
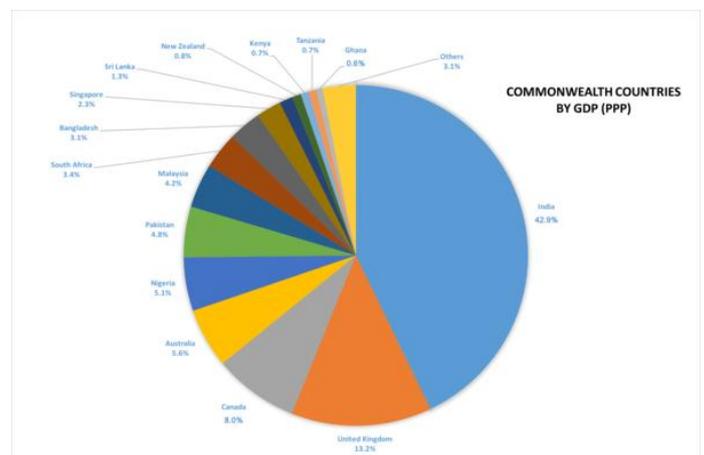

Fig.-1: Commonwealth countries by GDP (PPP)

2. LITERATURE REVIEW

In the year 2020 the global spread of COVID-19 was accelerating. Nearly 206 countries were subject to COVID-19 instances, according to the WHO. With the global GDP dropping by up to 3.9% and developing countries being impacted the worst (4% on average, but some above 6.5%), there was a large potential loss of income in the impacted nations. The affected firms and households required substantial assistance from the governments. Global value chains trade in certain ways based on input/output linkages and presumptions that resemble the tenacity of ties between businesses in value chains. (Maryla Maliszewska, Aaditya Mattoo, Dominique van der Mensbrugghe., 2020)

Since most nations have experienced double-digit negative economic growth, the annualized GDP growth reveals an even greater impact. The greatest economy in the world, the United States, saw a 1.3% decline in GDP growth from the prior quarter from January to April. As a result of the pandemic's intensity, the US economy imposed regional travel restrictions in the middle of March. Mexico faced a similar predicament to the United States, when limitations

were imposed in mid-March and GDP growth declined by 1.6% in the first quarter of 2020. To combat the disease's spread, European countries such as Italy, Spain, Germany, and France, the four largest Euro economies with the highest number of cases instituted a stricter kind of lockdown. In the first quarter of 2020, the stringent lockdown measures led to economic contractions of 5.34%, 5.24%, and 5.31% in France, Spain, and Italy, respectively. Germany, the Eurozone's largest economy, saw a 2.2% GDP drop during the same period. Although the pandemic outbreak curve flattened in European countries by the end of June, the second quarter of 2020 saw a sharp decline in GDP as a result of the complete cessation of economic activity. (Pradyot Ranjan Jena, Ritanjali Majhi, Rajesh Kalli, Shunsuke Managi, Babita Majhi., 2020)

The global economic impact of the Sars-Cov-2 virus has been the subject of numerous factual parallels in both industrialized and developing countries. Despite the abundance of articles discussing the impact of COVID-19 on international trade markets, factual resources about developing or underdeveloped economies are few and far between. My research tries to investigate the effects of the Corona Virus outbreak on the GDP of nations in order to provide insight on this segment. I have created a website application that separates the GDP of nations into sectors and evaluates their effects based on a number of variables. This application is used to improve research on variations in estimated gross product brought on by the pandemic and the imposed lockdown measures undertaken by various countries. This paper tries to understand the impact of COVID-19 on the monetary valuation of Indian assets and global assets because India is one of the dominant countries in the emerging economy. Testing the unpredictability of the global nominal GDP can be usefully done using Streamlit and Plotly. Moreover, there aren't many writings that examine the arrival of the GDP growth/decline factor before and during the COVID-19 situation. Similarly, my assessment has tried to analyse the monetary valuation of national assets while considering the two relevant time periods.

3. ALGORITHM

The analogies we used in our application are discussed in this section. Here, we've provided a detailed explanation of our application workflow throughout the entire procedure.

3.1. GDP of countries(nominal):

The market value of all finished products and services produced by a country in a given year is known as its gross domestic product (GDP). Countries are categorised according to nominal GDP estimates from financial and statistical organisations estimated at market or government official exchange rates. Nominal GDP does not account for variations in living expenses between nations, and the findings might shift significantly from year to year

depending on changes in the value of the country's currency. Despite the fact that these variations frequently have little to no impact on the population's level of living, they might cause country's ranking to shift from one year to the next. In order to account for variations in the cost of living in various nations, comparisons of national wealth are typically performed on the basis of purchasing power parity (PPP). Other measurements, such as nominal GDP per capita and GDP (PPP) per capita, are used to compare country standards of living. Comparing PPP per capita data to nominal GDP per capita data, the disparity is generally smaller. The relative performance of different countries' economy has changed significantly over time; in terms of total output, the United States overtook the British Empire in 1916, which had in turn overtaken the Qing dynasty decades earlier. Since economic liberalisation was put into place in the early 1990s, among other countries, India has also seen its economy flourish.
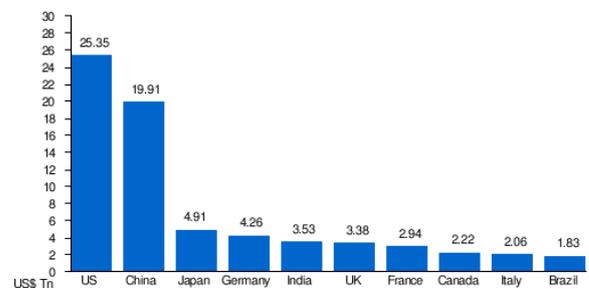

Fig - 2: Largest economies in the world by GDP (Nominal) in 2022 according to International Monetary Fund estimate

3.2. Streamlit Library:

Streamlit is an open-source Python library for creating and sharing beautiful, unique web applications for Artificial Intelligence and Data Science. Here, we used this library to create a web application to analyse the GDP of countries over a specified time frame prior to and following the Corona virus epidemic. This module seamlessly incorporates website functions while supporting Python. The speed of network deployment was accelerated by Streamlit's simplicity of frontend and backend operations.
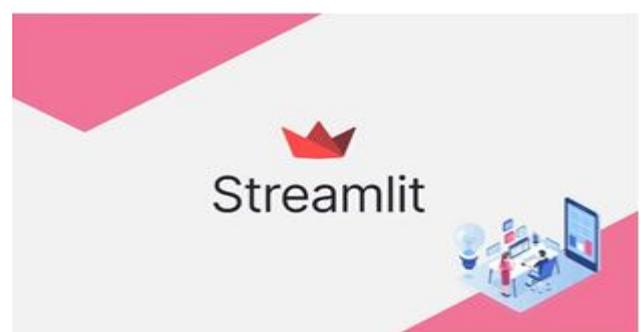

Fig.-3: Streamlit Application Integration

3.3. Ploty Express:

Plotly Express, or PX, is the name given to the plotly.express module, which is typically imported as px and has functions that can produce whole figures at once. Plotly Express is a built-in component of the plotly library and is the suggested starting point for constructing most common figures. Each Plotly Express method returns a plotly.graph objects and internally uses a graph object. As an illustration. The Plotly Express method of constructing figures can be found at the top of any page that applies in the plotly manual, followed by instructions on how to use graph objects to create comparable figures. Any figure produced by Plotly Express in a single function call could be produced using only graph objects, but this would need 5 to 100 times as much code. For the creation of various types of figures, Plotly Express offers more than 30 functionalities. It is simple to move between a scatter plot, a bar chart, a histogram, and a sunburst chart during a data exploration session since the API for these functions was deliberately created to be as consistent and simple to understand as possible.

3.4. Website Scrapping:

The term "web scraping" refers to the process of using a computer or piece of code to extract and manage a lot of data from the internet. We used the popular Python package "pandas" in this study since it is well known for handling structured data in a variety of formats, including arrays, lists, URLs, CSV files, and more. This library provides data extraction for html retrieval using URL from open servers like Wikipedia, data mart, etc. In a similar manner, we used an html table scraping technique using proper indexing and a python data frame to implement the GDP of countries (nominal) database from Wikipedia for this research.

Fig.-4: Website Scrapping from Wikipedia

```
import streamlit as st
import pandas as pd
import plotly express as px

@st.cache
def load_data():
    url = "https://en.wikipedia.org/wiki/List_of_countries_by_GDP_(nominal)"
    html = pd.read_html(url, header = 0)
    df = html[2]
    return df
df = load_data()
```

Fig.-5: Website Scrapping Algorithm

Website Application:

A web application is defined as an application programme that is required for a web server, as opposed to PC-based algorithmic applications that are run locally on the machine's operating system (OS). The client implements web applications using an internet browser and a working network association. In a similar way, we have set up our exploratory data analysis website application on Streamlit server hosted on local host during prototype version and subsequently deployed to Heroku for setting up the website application functions such as scroll side bars, visualization plots, x and y axis parameter selection database integration, and many more.
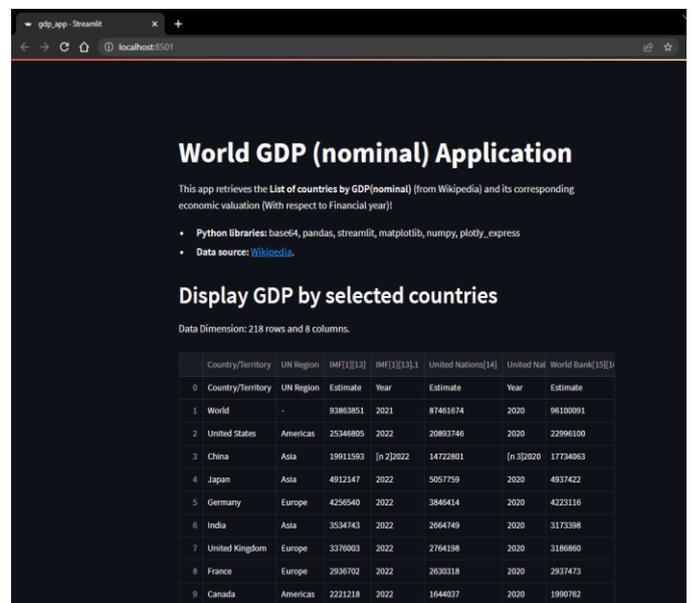

Fig.-6: Website Application hosted on Local Host

4. CONCLUSIONS

The COVID-19 epidemic shows few indications of being contained, but its negative effects on the nation's economic growth are expected to be severe. The United Nations warns

that the coronavirus pandemic is predicted to have a substantial negative impact on the world economy, with India's GDP growth for the current economy projected to fall to 4.8% as of 2020 (United Nation 2020). Similar to this, the UN's Economic and Social Survey of Asia and the Pacific (ESCAP) 2020 reported that COVID-19 will have significant socioeconomic effects in the region with a surge in cross-border activity in the fields of tourism, trade, and financial linkages. (Shankar Das, P. R. Sodani, Monika Chaudhary., 2020). The COVID-19 epidemic has shattered the foundation of the global economy. The countries should implement the proper policy measures in order to support the GDP. The emergency would have been far worse if no extraordinary measures had been taken. Estimates of the liquidity infusion need to be made appropriately.
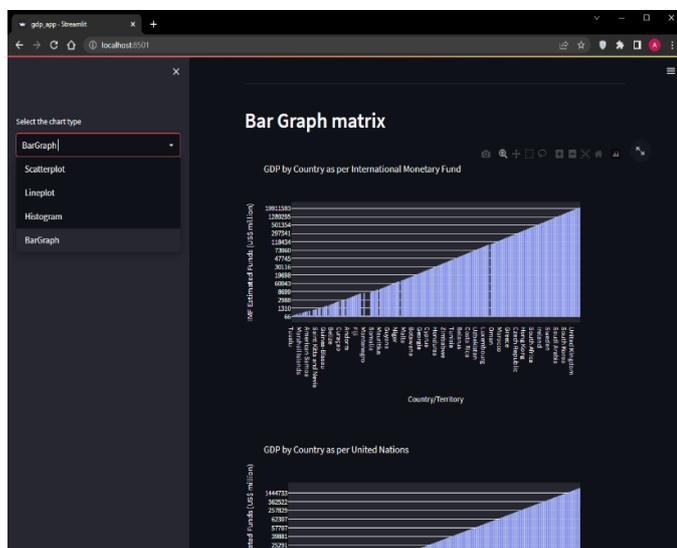

Fig.-7: Plot and Axis Selection Functionality

In a recent revision, the Reserve Bank of India reduced its earlier estimate of the growth rate of the gross domestic product for 2021 from a minus 9.5 percent to a negative 7.5%. This is a more optimistic forecast since, in the RBI's opinion, India's economic recovery has accelerated after the festive season. The current consumer price index inflation has already above the Reserve Bank of India's tolerance ceiling of 4%, hence these assumptions may not prove to be reliable. According to data from October 2020, headline inflation is significantly higher than 7% and food and beverage inflation is significantly higher than 11%. Since the rate of inflation exceeded its declared maximum limit of tolerance, which is set at 6%, the RBI was forced to suspend its attempts to reduce the cost of credit beyond these enabling facilities. If inflation continues to rise, the central bank may be forced to boost policy rates. A significant area of ambiguity still exists, and the immediate future is unknown.
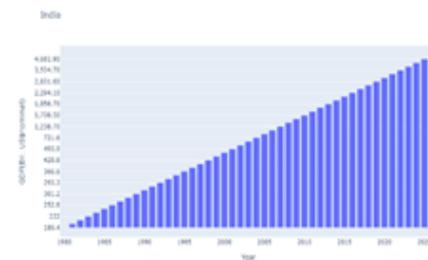
Fig.-8: EDA on GDP growth of India
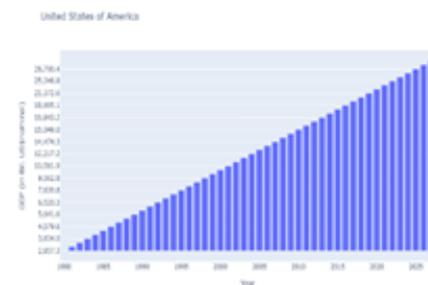
Fig.-9: EDA on GDP growth of USA
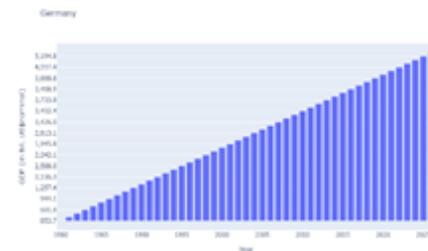
Fig.-10: EDA on GDP growth of Germany

While using this online approach for exploratory data analysis, we will typically obtain accurate results, there is a chance that in some GDP scenarios, specifically the negative effects of GDP, may not have been caught. However, the majority of the time we will see a clear trend. There is a risk of 5% ambiguity when our application scrapes region-based relevant data for uncertainty in GDP over various regions of the world. We shall demonstrate a convincing trend in gross valuation over time using cutting-edge visualization tools. The only issue is that a small number of countries' GDP valuations contain erroneous frames, and it is possible to identify those frames, which makes it difficult to draw firm conclusions. There is a minor risk, in favour of odd, that plotly won't deliver an appropriate plot for data analysis on raw data without any further alteration. This tool might serve as a development sandbox for investigating economic downturns and their effects on the countries with the highest GDPs.

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