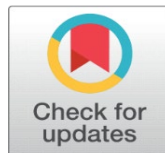
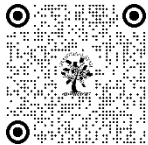


IRREGULAR TIME SERIES: ECONOMIC IMPACT OF COVID-19 ON INDIA AN OVERVIEW

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ABSTRACT

Time series analysis is the process of compiling observations gathered from repeated measurements made over a period of time. To extract useful statistics and other features from the data, time series analysis is performed. One of a time series' four components is irregular or random fluctuation. They are in line with the erratic motions that often occur for brief intervals of time. Irregular deviations are unpredictable and do not fit into any certain paradigm.

An unprecedented worldwide economic catastrophe has been brought on by the COVID-19 epidemic, and it has serious consequences for nations like India. An outline of the Indian economy during the COVID-19 epidemic is given in this research study. This article seeks to analyse the complex issues facing the Indian economy by looking at a number of different factors, including GDP growth, unemployment rates, fiscal policies, and sectoral implications.

This essay also explores how foreign variables, such shifts in commodity prices and interruptions in global supply chains, influenced India's economic development throughout the epidemic. It also looks at how the crisis may affect India's chances for long-term growth, emphasising how important structural changes are to promoting sustainability and resilience.

In conclusion, despite the fact that India's economy has begun to recover among the continuous difficulties brought on by the epidemic, there are still unknowns. It will be essential to address the underlying structural limitations and promote equitable and sustainable growth in order to successfully navigate the post-pandemic economic landscape.

Keywords: Irregular Time series, Economic Impact, COVID-19, GDP Growth, Fiscal Measures, Sustainability

1. INTRODUCTION

To extract useful statistics and other features from the data, time series analysis is performed. The ordering of observations in this method is natural, which sets the "Time Series Analysis" apart from other studies. It differs from previous studies in that the data usually has a geographic component.

Time Series Component:

The factors influencing an observation's value are the time series analysis components. Its elements are:

Time series analysis trends (Secular Trend)::

Over an extended period of time, changes in the data over time indicate the time series analysis trends. Throughout the specified time period, there isn't necessarily a linear trend in the number of observations in the data. The trend is a broad, long-term, and smooth tendency. Trends can be seen in the number of births and deaths per population, the

number of colleges and universities in a region, the number of companies or businesses in a region, etc. Trends can be classified as either linear or non-linear.

Periodic Fluctuations: Periodic fluctuations are variations that recur over a given length of time. Two categories of periodic variations exists.

Seasonal variations: Over a twelve-month period, these variances display the same pattern. In time series analysis, the seasonal data are collected hourly, monthly, daily, quarterly, or yearly.

Cyclical fluctuations: These swings exhibit a consistent pattern over an extended duration of time. The oscillatory movement in time series analysis has an oscillation period longer than a year. Sometimes, cyclic variations are referred to as the "business cycle."

Random or Irregular variation: A variation that is neither strictly random nor regular is referred to as a random or irregular movement. Random motions, such as earthquakes, floods, calamities, etc., are unpredictable or uncontrollable.

There are no published techniques for quantifying this component. However, a little amount of this component can be eliminated by averaging the indices. One way to eliminate a multiplicative model of a time series is to divide all other components by the irregular component. If an additive model exists, it can be eliminated by deducting each component from its normal component.

The COVID-19 pandemic, brought on by a new corona virus, has sparked an unprecedented global catastrophe that is changing communities and economies all over the world. One of the biggest and most populated nations in the world, India, has not been exempt from its economic consequences. This article examines the many difficulties and reactions that have marked this unusual time and offers a thorough assessment of the economic impact of COVID-19 on India. Governments all throughout the world were forced to enact strict measures to stop the spread of the virus after the pandemic breakout in early 2020. Lockdowns around the country were the Indian reaction, causing disruptions to the country's economy in all sectors and regions. The nation entered an unprecedented crisis as a result of the abrupt stoppage of production, company closures, and travel restrictions, which caused a severe decline in economic output.

An immediate effect of the lockdowns was to exacerbate structural weaknesses that were already present in the Indian economy. Millions of migrant workers faced job losses and unstable living situations as a result of the crisis, which mostly affected the informal sector, which employs a large percentage of the workforce. The epidemic exposed the shortcomings of India's social safety nets and healthcare system, highlighting the pressing need for changes and funding in these vital sectors.

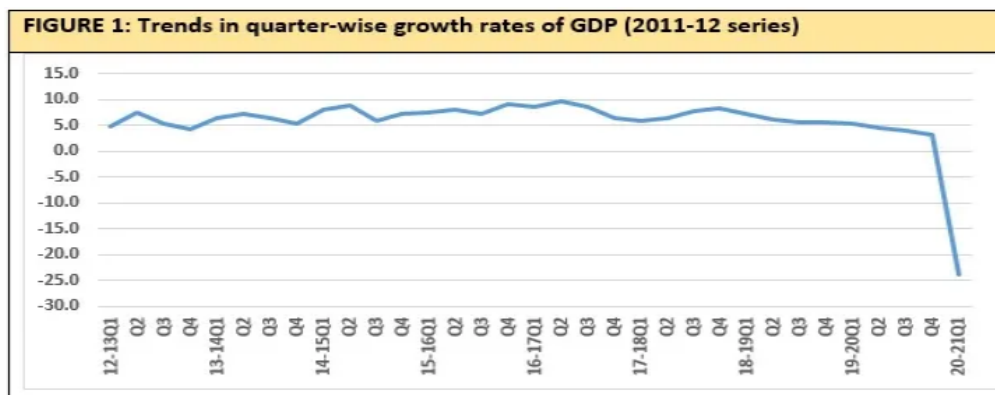


Figure 1 Data Source (Ministry of Statistics and Programme Implementation)

From the above graph one can find a downfall in economy in the first quarter of 2020 and reason is sudden lockdown due to spread of Corona virus.

The Indian government implemented many fiscal stimulus packages and policy actions to protect disadvantaged groups and lessen the burden of the epidemic in response to the economic consequences. Concerns over the measures' implementation and targeting have raised questions about their effectiveness and sufficiency.

In addition, the pandemic sped up developments like remote work and digital adoption by igniting revolutionary shifts in consumer behaviour and corporate procedures. These changes provide chances for efficiency improvements and innovation, but they also provide difficulties for established sectors and job patterns.

Amidst these difficulties, several industries showed resiliency and flexibility, most notably the agriculture industry, which was vital in maintaining lives and guaranteeing food security during the crisis. Still, there are a lot of unknowns on the road to recovery, which are made worse by external variables like changes in commodity prices and supply chain disruptions on a worldwide scale.

With the future in mind, the COVID-19 epidemic highlights how critical it is for India to solve underlying structural limitations and promote equitable, sustainable growth. Investing in healthcare and education, bolstering social safety nets, and improving competitiveness via structural changes will be essential to fostering resilience and successfully navigating the post-pandemic economic environment.

COVID-19 has had a catastrophic effect on public health systems and economies worldwide, upending commerce, business, and financial markets. The epidemic has had far-reaching economic effects on India as well, affecting many different industries and leading to a large loss of life as well as earnings and livelihoods.

The three survey rounds, which included around 5,000 homes in a partial panel design, were carried out in May 2020 (during the lockdown), July 2020 (after the lockdown), and September 2020 (the latest round). The surveys were examined to determine the changing effects of the crisis. The survey report, which was primarily distributed throughout six Indian states—Rajasthan, Uttar Pradesh, Bihar, Jharkhand, Madhya Pradesh, and Andhra Pradesh—covered modules on labour and income, agriculture, migration, consumption, and access to relief. It also included information on respondents' health-seeking behaviors and their awareness of COVID-19-related symptoms and preventative measures. The survey's key findings indicate that increased food insecurity and employment losses have had the most effects on rural households.

Towards the end of the lockdown, there has been a noticeable increase in local job options as well as access to welfare and food security programmes. In the short- and medium-term, however, the effects of worker return migration on employment and income will persist to be noteworthy. Despite the generally depressing results, the agriculture industry did not suffer as much as was anticipated before to the shutdown.

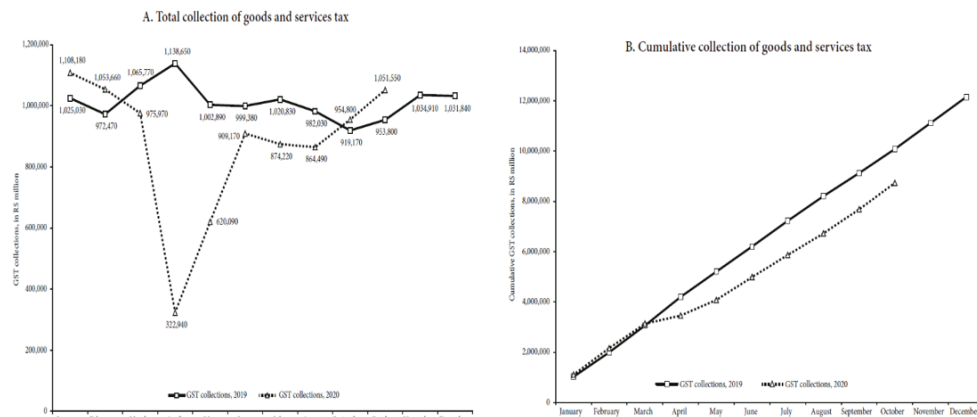


Figure 2 Total collection of GST, India, monthly, nominal figures, 2019 and 2020 (Rs million)

Data Source: Centre for Monitoring Indian Economy

We found here, three more indirect measures of economic activity presently. First, between February and April 2020, India's overall Goods and Services Tax (GST) receipts fell by one-third (see Figure 2). In comparison to March through October 2019, there was a cumulative deficit of US\$ 20,251 million in GST revenues between March and October 2020. The difference between March and October 2019 GST revenues was around 19%.

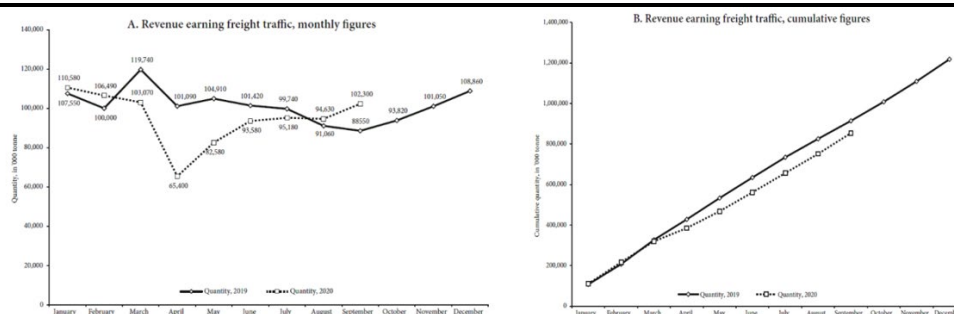


Figure 3 Revenue earning freight traffic of major commodities through Indian Railways, monthly, 2019 and 2020 ('000 tonnes)

Data Source: Centre for Monitoring Indian Economy.

As seen in Figure 3, India's exports decreased after February 2020. From \$27,742 million in February 2020 to \$10,153 million in April 2020—and then rising to \$27,585 million in September 2020—the value of exports decreased. However, when comparing the March–September 2020 period to the March–September 2019 period, the total value of exports decreased by \$45,191 million, or almost 24%.

Instead, households in the agricultural sector have had some success expanding their operations. Convergence of the assistance initiatives accessible to rural households and increased government payments have shown to be helpful in meeting vulnerable households' immediate needs during the epidemic, which is another significant conclusion. This is encouraging for efforts aimed at creating institutions, which over time have developed systems and procedures to distribute resources to farmers, women, and rural households more efficiently.

In conclusion, COVID-19 has had a significant and wide-ranging economic influence on India, changing the structure of both the nation's economy and society. In order to provide light on the difficulties, solutions, and possibilities that have arisen as a result of this extraordinary crisis, this study aims to explore the nuances of its influence.

1.1. OBJECTIVES

- 1) To assess the magnitude and scope of the economic impact of the COVID-19 pandemic on India, including its effects on GDP growth, unemployment rates, and sectoral performance.
- 2) To study irregular trend of time series taking period of economy during COVID-19.
- 3) To examine the effectiveness and adequacy of the policy responses implemented by the Indian government to mitigate the economic fallout of the pandemic, including fiscal stimulus packages and social welfare measures.
- 4) To analyze the specific challenges faced by vulnerable populations, such as migrant workers and those employed in the informal sector, and evaluate the efficacy of targeted interventions in addressing their needs.

Scope

The scope for the paper titled "Irregular Time Series: Economic Impact of COVID-19 on India an overview" encompasses a comprehensive examination of various aspects related to the economic repercussions of the COVID-19 pandemic on India

2. RESEARCH METHODOLOGY

This paper is theoretical in nature. The study's foundation is secondary data. Information has been gathered from a number of sources, including journals, studies that have been published, news items, The study's scope is restricted to India's economical condition during COVID-19.

Limitations

This paper is a conceptual paper, based on economic situation during COVID-19 in India, Considering the Impact of COVID-19 only. There are different areas and variables to Economic Impact of COVID-19 on India on which more study can be done.

3. LITERATURE REVIEW

The COVID-19 pandemic has had profound implications for economies worldwide, including India, where the economic impact has been significant and multifaceted. This literature review provides an overview of key studies and research findings on the economic impact of COVID-19 on India, highlighting various dimensions of the crisis and responses undertaken.

- **GDP Growth and Economic Contraction:** A number of studies have shown that India's GDP growth saw an unparalleled downturn when the epidemic began. India's GDP shrank by 23.9% in the April–June 2020 quarter, according to the Reserve Bank of India (RBI), which reflected the significant economic disruptions brought on by the countrywide lockdown measures (RBI, 2020). Variable degrees of contraction were also observed in the following quarters, indicating the uneven and prolonged character of India's economic recovery (CMIE, 2021).
- **Unemployment and Labor Market Dynamics:** The lockdowns prompted by the epidemic caused a large number of job losses and labor market disruptions in India, especially hurting vulnerable groups like migrant workers and those working in the unorganized sector. Millions of workers may have been displaced during the lockdown era, according to estimations, since studies have shown a dramatic increase in unemployment rates and decreases in labour force participation (Azim Premji University, 2020).
- **Sectoral Impacts and Resilience:** Different sectors of the Indian economy have been affected differently by the epidemic; although some have shown resilience, others have encountered significant difficulties.

Thanks to strong increase in agricultural output and stable farm incomes brought about by a favorable monsoon and government measures, agriculture emerged as a bright light throughout the crisis (NCAER, 2020). However, there were notable disruptions in industries including manufacturing, services, and tourism, which was indicative of the pandemic's wider economic effects (ICRIER, 2020).

- **Stimulus measures and policy responses:** In response to the pandemic's economic effects, the Indian government implemented a number of fiscal stimulus plans and policy changes meant to assist impacted people and companies. To boost demand and aid with the recovery, these strategies included income assistance programmes, loan guarantees, and liquidity injections (NITI Aayog, 2020). But there has been disagreement about these measures' efficacy and targeting, with questions raised concerning their sufficiency and difficulties in implementation. (IMF, 2020).
- **Public Health Spending and Healthcare Infrastructure:** The pandemic brought to light the weaknesses in India's healthcare system and emphasised the need for strong public health systems to effectively handle medical crises. Research has highlighted the necessity of augmenting public health expenditures, allocating resources towards healthcare infrastructure, and fortifying healthcare delivery systems to improve readiness and adaptability against upcoming pandemics (PHFI, 2020).
- **Digital Transformation and Innovation:** The pandemic sped up trends like digital adoption, e-commerce, and remote work by igniting revolutionary shifts in consumer behavior and corporate processes. Research has indicated that digital technologies have a crucial role in promoting innovation in response to the crisis, allowing access to key services, and ensuring business continuity (Mckinsey & Company, 2020).
- **Long-Term Consequences and Policy Difficulties:** It is anticipated that COVID-19 would have a long-term impact on India's economic structure, development prospects, and policy agendas. Research has shown that in order to promote an equitable and robust recovery, structural changes, human capital investments, and sustainable development policies are necessary (World Bank, 2020).

In summary, the research on COVID-19's economic implications on India emphasises the complexity of the problem and the necessity of well-coordinated governmental measures to lessen its effects and increase future resilience. Even while the epidemic has brought out hitherto unheard-of difficulties, it has also offered chances for creativity, change, and a reinvention of India's and other countries' economic interests.

4. CONCLUSION

The effect of the COVID-19 epidemic on the Indian economy was the topic of this essay. In addition to the health catastrophe, there has been an unparalleled economic crisis, with supply and demand declining simultaneously and independently while also negatively reinforcing one another through feedback loops. The fact that the Indian economy was contracting more than 10 years before the epidemic added to the severity of the situation. As a result, in March 2020, India's ability to combat the epidemic was significantly reduced.

The COVID-19 epidemic has had a profound impact on the Indian economy, presenting both new and unanticipated obstacles as well as chances for resilience and change. The pandemic's economic effects have been extensive and varied, including a decline in GDP, a large loss of jobs, sectoral disruptions, and pressure on the healthcare system. India has, nonetheless, shown incredible adaptation and resilience in the face of these difficulties, with certain businesses, like the digital and agricultural sectors, displaying ingenuity and perseverance in the face of hardship.

In an effort to lessen the effects on the economy and assist impacted people and companies, the Indian government responded to the crisis with a number of fiscal stimulus plans and policy changes. Although many people received vital lifelines from these initiatives, concerns regarding their efficacy, targeting, and long-term viability still exist.

To meet these problems and negotiate the uncertain path ahead, more cooperation, creativity, and Adaptive policies will be needed.

It is anticipated that COVID-19's economic effects on India would have a long-term effect on the nation's economic development and policy agendas. To promote an inclusive and robust recovery, structural changes, expenditures in healthcare, education, and digital infrastructure, as well as sustainable development plans, will be crucial. In addition, the epidemic has shown how crucial international collaboration, solidarity, and readiness are to tackling common problems and creating a more resilient and sustainable future.

In conclusion, COVID-19 has had a significant and wide-ranging economic impact on India, but it has also created chances for innovation, change, and a reevaluation of the country's economic goals.

Finally, we understood that these fluctuations don't follow any specific pattern and don't occur at regular intervals. These are unintentional, totally random, or unanticipated alterations. Economy of India was following an upward trend but due to the pandemic a deep fall without any prior information was observed which in statistical language is known as irregular variation or white noise.

India may emerge from the epidemic stronger and more resilient, laying the groundwork for a more equitable, sustainable, and successful future for all, by taking the lessons learned from it and using its assets and talents.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

REFERENCES

- Reserve Bank of India. (2020). Monetary Policy Report, October 2020.
- Azim Premji University. (2020). State of Working India 2021: One Year of Covid-19.
- National Council of Applied Economic Research. (2020). The Quarterly Review of the Economy: Q4 March 2020.
- Indian Council for Research on International Economic Relations. (2020). COVID-19 and the Indian Economy: Navigating through Perilous Times.
- NITI Aayog. (2020). COVID-19 - Impact on MSMEs and Suggestions for Policy Response.
- International Monetary Fund. (2020). World Economic Outlook, October 2020: A Long and Difficult Ascent.
- Public Health Foundation of India. (2020). Financing Healthcare during COVID-19 and Beyond: Strategies for India
- McKinsey & Company. (2020). India: From \$15 billion to \$30 billion: The digital economy's coming of age.
- World Bank. (2020). South Asia Economic Focus, Fall 2020: Beaten or Broken? Informality and COVID-19.

- Baldwin, R., and Tomiura, E. (2020). Thinking ahead about the trade impact of COVID-19. In: Economics in the Time of COVID-19. [E-book] London: Centre for Economic Policy Research Press.
- Chandrasekhar, C.P., and Ghosh, J. (2002). The Market that Failed. New Delhi: Leftword Books.
- FICCI (2020). Impact of Corona virus on Indian Businesses. Federation of Indian Chambers of Commerce and Industry, New Delhi.