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IS INDIA SURPASSING CHINA? - A STUDY ON GDP

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Abstract

"IS INDIA SURPASSING CHINA?" A STUDY ON GDP to study the GDP at the current US dollar, GDP growth, GDP per capita, and the inflation rate of India and China from 2000 to 2024 by employing descriptive statistical tools (mean, standard deviation, regression, etc.)**GDP value** India stood at second position and theChinaoccupied first place during the study period. **GDP per capita**, India stood at second positionagainst the China. The **GDP growth rate** and average growth rate of GDP of India stood at second place when compared to the China. The **inflation** of India stands at second position from low to high when compared to the China. It is hardly required to retain an adjustable balance between inflation and GDP withaccelerated fiscal and monetary policy to achieve targeted GDP in the future by boosting of AI powered manufacturing, Healthcare,Agriculture, Telecom, E-Commerce and other allied industries of GDP constituents,The main conclusions of this study highlight significantly boost in productivity, expand employment possibilities, and drive GDP in rapidly to occupy the India as a second largest economy after America.At present (2024) India stands at 5th largest economy in the world (GDP in US TrillionDollars as followsAmerica 27.7 China, 18.74, Germany 4.56, Japan 4.2 and India 3.91 as per world bank data 2024)

Key words used:GDP, GDP Growth Rate, GDP Per capita, Inflation, Mean, Standard Deviation, Regression

I. INTRODUCTION

A. What is GDP and Its Growth rate

Gross domestic product is the ultimate value of the goods and services produced within the geographic limits of a country in a year. GDP growth rate is an indicator of the economic performance of a country and is a product of P1-P0/P0*100.

P1 = Current Value of GDP

P0 = Previous Value of GDP

B. Inflation (CPI)

Inflation is measured in terms of consumer price index

II. NEED AND IMPORTANCE OF THE STUDY

It is necessary to study the trends of GDP of G20

as they are the most important emerging economies in the world. It is pressing need to know the present status of GDP and Inflation along with GDP projections up to 2050 and what kind of fiscal and monetary policy which is enable with artificial intelligence will lead to achieving the targeted place

III. OBJECTIVES OF THE STUDY

The objectives of the study are:

a) To analyse the GDP of Indiaand China in US billion and trillion dollars

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b) To study the GDP growth of India and China
c) To examine the GDP per capita in US dollars of India and China
d) To examine the inflation trends of India and China
e) To examine the GDP growth rates between India and China
f) To identify the Sectors which need AI enabled to boost the GDP

IV. HYPOTHESES

It is proposed to test the following hypotheses in the study:
H01: There is no significant difference is found in the GDP values of India and China
H02: There is no significant difference in the GDP growth rates of India and China
H03: There is no significant difference in the GDP per capita of India and China.
H04: There is no significant difference in the average inflation rate between the India and China.
H05: There is no significant difference in standard deviation in inflation between India and China
H06: There is no significant change in the GDP projections up to 2050 between India and China

V. RESEARCH METHODOLOGY

a) Data source

The required secondary data has been obtained from the World Bank website. The analysis is made with the help of such descriptive statistics as mean, standard deviation, skewness, etc.

b) Methodology

A. Mean/Average The central tendency is the average value of the series. This is the most commonly stated feature of a series. The formula to compute the mean is given in equation

$$\bar{X}=\frac{\sum X}{N}$$

B. Correlation:

$$r = \frac{\sum(X-\bar{X})(Y-\bar{Y})}{\sqrt{\sum(X-\bar{X})^2}\sqrt{(Y-\bar{Y})^2}}$$

Where, $\bar{X}$ = mean of X variable
$\bar{Y}$ = mean of Y variable

C. Regression- Least Square Method
Y= mx + b

$$m = \frac{n(\Sigma xy)-(\Sigma x)(\Sigma y)}{n(\Sigma x^2)-(\Sigma x)^2} \qquad b = \frac{\Sigma y - m(\Sigma x)}{n}$$

D. Standard Deviation

$$s = \sqrt{\frac{\sum(X-\bar{x})^2}{n-1}}$$

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VI. LIMITATIONS

1. The analyses are based on secondary data; any limitations pertaining to them would significantly affect the accuracy of the results.
2. Projection of GDP using Regression analysis is subject to changes in the economic, political, fiscal, and monetary policies of that country

VII. PERIOD AND SCOPE OF THE STUDY

The study covers a time frame of 2000–2024, taking around 25 years. The study is restricted to India and China

VIII. DATA ANALYSIS

It analyses the GDP ofIndiaand China, in US billion and trillion dollars, this section discusses the detailed GDP values in current market prices in US dollars, GDP per capita in US dollars, GDP growth rates, and inflation rates in a detailed manner. These macro-economic indicators are described using descriptive statistics like mean,standard deviation and regression

Table-I
GDP of India and China **inTrillion Dollar at current prices**

	INDIA	CHINA
YEAR	GDP IN US $	GDP IN US $
2000	**0.47**	**1.21**
2001	**0.49**	**1.34**
2002	**0.52**	**1.47**
2003	**0.61**	**1.66**
2004	**0.71**	**1.96**
2005	**0.82**	**2.29**
2006	**0.94**	**2.75**
2007	**1.22**	**3.55**
2008	**1.2**	**4.59**
2009	**1.34**	**5.1**
2010	**1.68**	**6.09**
2011	**1.82**	**7.55**
2012	**1.83**	**8.53**
2013	**1.86**	**9.57**
2014	**2.04**	**10.48**
2015	**2.1**	**11.06**
2016	**2.29**	**11.23**
2017	**2.65**	**12.31**
2018	**2.7**	**13.89**
2019	**2.84**	**14.56**
2020	**2.67**	**15**
2021	**3.17**	**18.2**
2022	**3.35**	**18.32**

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2023	**3.64**	**18.27**
2024	**3.91**	**18.74**
Average GDP	**1.87**	**8.79**
Max GDP	**3.91**	**18.74**
Min GDP	**0.47**	**1.21**
Median	**1.83**	**8.53**
Skewness	**0.18**	**0.39**
Standard Dev	**1.02**	**6.01**
Linear Estimation		
2030	4.4	23.6
2040	5.8	32.4
2050	7.3	41.6

Source: World Bank Published Data and compiled using MS Excel

Above table-I represents the GDP values in terms of US Trillion dollars, China reported in steady growth in GDP very beginning it is 1.21 Trillion dollar in the year 2000-01 gradually increasing GDP over 25 years it is reached at around 18.74Trillion Dollar whereas India 0.47 trillion dollar at the beginning 2000 year and Indian economy is entered into 1.2 trillion dollar GDP in the year 2007, India GDP is attained 3.91 Trillion Dollar at 2024,during study period Average GDP in US trillions over 25 years is reported in the above table high to low is China8.79The maximum GDP posted during the study period India (2023) 3.91 US trillion dollars, China18.74(2024), as per the linear estimation of up to 2050 India become 7.1 trillion economy whereas China 41.6 trillion economy, it shows India need growth of 6 times more than China

Table-II

GDP Growth rates of India and China **- Annual percentage Growth rate**

	INDIA	**CHINA**
YEAR	GDP GROWTH RATE	GDP GROWTH RATE
2000	3.8	8.5
2001	4.8	8.3
2002	3.8	9.1
2003	7.9	10
2004	7.9	10.1
2005	7.9	11.4
2006	8.1	12.7
2007	7.7	14.2
2008	3.1	9.7
2009	7.9	9.4
2010	8.5	10.6

2011	5.2	9.6
2012	5.5	7.9
2013	6.4	7.8
2014	7.4	7.4
2015	8	7
2016	8.3	6.8
2017	6.8	6.9
2018	6.5	6.7
2019	3.9	6
2020	-5.8	2.2
2021	9.7	8.4
2022	7.6	3
2023	9.2	5.4
2024	6.5	5
Average GDP GROWTH RATE	**6.26**	**8.16**
Max GDP GROWTH RATE	**9.70**	**14.20**
Min GDP GROWTH RATE	**-5.80**	**2.20**
Median	**7.40**	**8.30**
Skewness	**-2.63**	**-0.08**
Standard Dev	**3.03**	**2.68**

Source: World Bank Published data and compiled using MS Excel

From the above table II reported that a series of GDP growth rates of China and India over a span of 24 years from 2000 to 2024the average growth rates of Chinaand India are reported as India 6.26 and China8.16. It is not a good sing that India had reported the lowest average growth rate of 9.7 compared to the China that of 14.20, India occupies 2ndplace, where as in the year 2023 and 2024 showing higher growth rate compare to the same period with China, this is the way to achieve the strongest economy in the future to come. During the study period of 25 years minimum growth rate with respect to India -5.8 and China is 2.20 positive

Table-III

GDP per Capital at Current US Dollar of India and CHINA

	INDIA	**CHINA**
YEAR	GDP PER CAPITA IN US $	GDP PER CAPITA IN US $
2000	442	959
2001	450	1053
2002	469	1148
2003	544	1288

2004	624	1508
2005	710	1753
2006	802	2099
2007	1022	2694
2008	993	3468
2009	1097	3832
2010	1350	4550
2011	1449	5614
2012	1431	6300
2013	1438	7020
2014	1560	7636
2015	1590	8016
2016	1714	8094
2017	1958	8817
2018	1974	9905
2019	2050	10143
2020	1913	10408
2021	2238	12617
2022	2388	12720
2023	2530	12951
2024	2697	13303
Average PER CAPITA	**1417**	**6316**
Max PER CAPITA	**2697**	**13303**
Min PER CAPITA	**442**	**959**
Median	**1431**	**5614**
Skewness	**0**	**0**
Standard Dev	**675**	**4164**

Table-IV
GDP Per Capita Estimation of India and China

Estimation using linear regression	**INDIA**	**CHINA**
YEAR	GDP PER CAPITA IN US $	GDP PER CAPITA IN US $
2030	3086	16599
2040	4049	22312
2050	5021	28026

Source: World Bank published data in the website and compiled using MS Excel

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From the above Table-III is depicted GDP per capita in US Dollar. During the period from 2000 to 2024 it is observed that the highest average per capita reported by China over 25 years term is 6316 US Dollar and followed by India 1417 US Dollar. Max per capita is reported by Chinain terms of US Dollars 13303(2024), India 2697 (2024). Min per capita is reported by China in terms of US Dollars 959 (2000), followed by India 442 (2000). GDP per capita is estimated using regression least square method is reported in the above table IV as follows India 5021 up to 2050 in US Dollar China is to be reported as 28026, it is very difficult to surpass India over Chinawith the same growth rate continue in the future, it is need to multify the growth rate every year by year

Table-V- CPI Inflation

	INDIA	CHINA
YEAR	CPI INFLATION	CPI INFLATION
2000	4	0.3
2001	4	1
2002	4.3	-1
2003	4	1.1
2004	4	4
2005	4.2	2
2006	6	2
2007	6.4	5
2008	8.3	6
2009	11	-1
2010	12	3.2
2011	9	6
2012	10	3
2013	10	3
2014	7	2
2015	5	1.4
2016	5	2
2017	3.3	2
2018	4	2.1
2019	4	3
2020	7	2.4
2021	5.1	1
2022	6.6	2
2023	5.6	0.2
2024	5	0.2
Average CPI INFLATION	**6.19**	**2.12**

MaxCPI INFLATION	**12.00**	**6.00**
Min CPI INFLATION	**3.30**	**-1.00**
Median	**5.10**	**2.00**
Skewness	**0.99**	**0.50**
Standard Dev	**2.45**	**1.79**

Source: World Bank published data in the website and compiled using MS Excel

During the study period, over 25 years since 2000 to 2024 India and China reported inflation rates in Table V above are taken from World Bank published data. Inflation always triggers the GDP of a country; as inflation grows, the growth rate obviously tends to fall as a result of tightening monetary policy to control inflation. It is a natural phenomenon between GDP and inflation, even though in certain circumstances maybe they are positively related. The above table shows average inflation over the 25 years of span the India and China reported: India stood at 6.19 and China at 2.12. The highest inflation rate has been reported by India during study period is 12 percent in the year 2010, and the China is6 percent during 2008 and 2011. The lowest inflation rate during the study period is reported by India at 3.30 in 2017, and the China -1 during the 2009. Standard deviation in inflation rates are shown in the above table V, as higher the standard deviation is higher the risk of variance associated with inflation rates, and lower the standard deviation is lower the risk of variance associated with inflation rates. Standard deviation of India is reported 2.45 is higher than China it is 1.79 reported

IX. FINDINGS

H01:

It is found that the null hypothesis 01 is rejected as there is a significant difference is found in the GDP values during the study period of 25 years between India and China. It might depend on the fiscal and monetary policy of that country as well as the GDP contributors of household consumption, private investment, government expenditure, and net exports of that country, which may vary, resulting in a huge difference in respect of all the

H02:

Rejected the null hypothesis: in respect of growth rates, there is a significant difference in the average growth rates of India and China due to economic and political policies as well as the economic cycles of those, which may lead to a difference in the growth rates of GDP over the China and India

H03:

The null hypothesis is rejected with respect to India and China as there is a significant difference is found between the India and China with respect to per capita GDP in the US dollar.

H04:

The null hypothesis is rejected, as there is a significant difference is found between India and China in respect of average inflation rate

H05:

The null hypothesis is rejected, as there is a significant difference is found between India and China in respect of standard deviation in inflation rate

H06:

It was found that there is a significant change in the GDP projections up to 2050 between the India and China. Hence, the null hypothesis is rejected and the alternative hypothesis is accepted, as huge differences are found between India and China

X. Conclusion

As GDP increases, it is perceived to be good for the economy, and as it decreases, it is bad to the economy, GDP value is also depending on the fiscal and monetary policies of a country. It is concluded that the GDP value (2023) in US dollar at current prices, India reported lower when compare toChina, China occupied first place in all the macro parameters, whereas average GDP value over 25 years in US dollar at current prices, India stood at again second position when compare to China. It is concluded that the GDP per capita of India stood at second position when compare to China, whereas average per capita of India also stood at second in position, the reason behind this is population, it is hardly need to control population in order to enhance per capita.

It is concluded that GDP growth of India (2024) stood at 1st place when compare toChina, average GDP growth rate over 25 years India stood at 2nd in place followed by China, the speed of growth rate is very high with respect to India in recent past when compare to China. It is concluded that, inflation (2024) of India is stood at second position from low to high when compare to China, whereas average inflation rate around 25 years from low to high India stood at again second place compare to China, **The IMF** estimated the global average inflation rate for the year 2025 to be 4.3 per cent. It is mandatory to maintain a balance between GDP and inflation, and fueling to various sectors by initiating strong fiscal and monetary policy enabled with artificial intelligence a head to achieve targeted GDP volume in the future to take India first while compare to China

India is far better in the growth rate reported during recent past when compare to the IMF estimated GDP growth rate of 3 per cent 2025, India stood at 10 trillion US dollars to be attained in 2030. It is possible only when implementing artificial intelligence rapidly wherever necessary to increase the share of GDP contributors like C+I+G+ Net Exports, as well as the standard fiscal and monetary policy of the government, are led to achieve the estimated target of 10 trillion US dollars in the economy. It is necessary to achieve a higher real growth rate every year by year; it's only the way to achieve the IMF and other agencies expected growth, fiscal policy measures to support vulnerable groups, especially it is need to improve exports rather than imports, the industries which are boosting exports like textile, spice, petroleum products, tea, jewelry, dairy products, emerging industries like pharmaceutical, automobile, renewable energy, In tackling front-loaded monetary policy tightening to address elevated inflation also a big challenge in front to take India a largest economy in the world

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