RESEARCH ARTICLE

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Analysing The Factors of Economic Growth with Respect to Sector Diversification: A Comparison Between India and China

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Abstract

The understanding of.sectoral dynamics of economic growth is essential for developing efficient development strategies, especially in emerging.markets like China and India. This paper provides a comparative econometric analysis of the contributions of agriculture, industry, and services to GDP growth in these two countries from 1984 to 2023. Despite significant literature on specific countries, there is still a research void in long-term comparison assessments that employ consistent time series approaches. To fill this gap, the current study adopts a structured econometric framework that incorporates Augmented Dickey-Fuller (ADF) unit root testing for stationarity and Ordinary Least Squares (OLS) regression modelling to assess sectoral influences on GDP. The analysis determines that in India, the services sector has the greatest impact on GDP, followed by agriculture and industry, showing a shift toward a service-oriented economic model. In contrast, China's growth pattern represents a more balanced contribution from all three sectors, which is consistent with the country's historically industrial-led development plan. The findings have important policy implications: India should increase service sector productivity and modernize agriculture to enable long-term growth, whereas China should preserve sectoral balance to ensure long-term stability. The study adds empirical insight to the literature, aiding targeted policy decisions in emerging economies.

Keywords: Gdp, Agriculture, Industry, Services, India, China.

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Introduction

India and China, despite both experiencing significant economic growth, have distinct approaches to sector diversification, influencing their overall development paths. They both provide two clear examples of how countries with very different political systems witness economic growth. China is governed by a one-party communist system, where the government has strong control over the economy. Over the past few decades, China has introduced market-oriented reforms while maintaining its political control simultaneously. By focusing on manufacturing, exports, and infrastructure development, China has become the world's second-largest economy. India, on the other hand, is the world's largest democracy. Its economy has grown through a different path, relying more on services, information technology, and private enterprise. Although India's political system is more open and decentralized, it has also achieved rapid growth and is now one of the world's top economies Hussin, Fauzi, and Soo Yoke Yik, 2012). In 2023, China, India, and other South Asian countries together made up 31.2% of the world's total economic output (GDP), and this is expected to grow to 35.8% in the future. In comparison, the group of rich countries known as the G7 had a smaller share — 25.8% in 2023, and it is expected to drop to 23.8%. China alone made up 19% of the world economy in 2023 and is expected to reach 21.9%, while India's share was 9.9%

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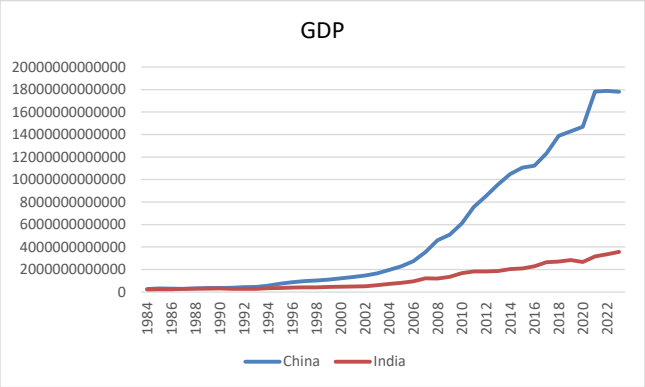
and is expected to grow to 11.5%. This trend shows that economic success doesn't depend on following a fixed political or economic system like democracy, socialism, or communism. Both China and India have found their own ways to grow, proving that real-world progress. South Asia Monitor. (2024, October 28). GDP is a highly subjective indicator of a country's economic health that reflects the sum of its total.production, which includes all purchases of goods and services generated by the country as well as services used by individuals, corporations, outsiders, and governing authorities. It is used as an indicator by the government and economic decision-makers for.planning and policy-making. It indicates whether the economy is contracting or expanding (International Monetary Fund, n.d.). Globalization, structural transformations, and economic expansion are interconnected and have shaped China's and India's economies. Greater global connectivity has been beneficial for both nations, but their paths were different. India expanded mostly through services like IT, while China concentrated on industry and exports (Valli, V., & Saccone, D. (2015). For the larger portion of the years spanning from 1900 to 2000 Economic prosperity was limited to high-income, industrialized nations (which include less than one-fifth of the world's population).. However, since 1980, China and India have experienced a.considerable.reduction in poverty.and fast economic growth. One of the most significant developments in the international economy over the last 25 years has been the ascent of China and India as economic powers, which together now account for more than one-third of the world's population (Bosworth, B., & Collins, S. M., 2008). This paper aims to examine how different economic sectors—such as agriculture, industry, and services—have contributed to the overall economic growth of China and India, and to compare the patterns of sectoral growth in both countries over time. During the last 25 years, one of the most important economic changes has been the rise of China and India as powerful players in the world economy.



(source: World Bank (2024), World Development Indicators)

Figure 1: GDP of India and China

Comparative Analysis

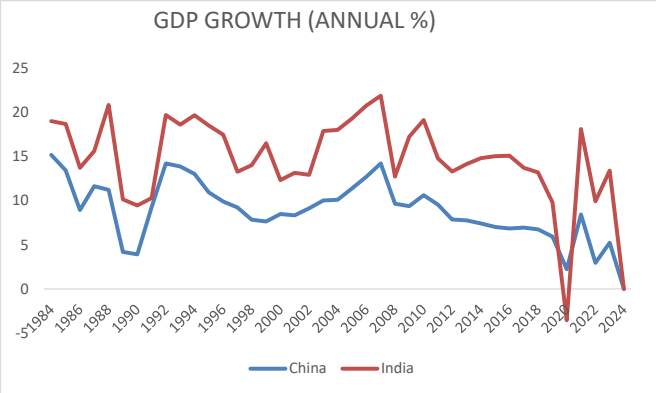
Comparative Analysis Of India And China's Gdp From 1984 To 2023

In the early years, from 1984 to the mid-1990s, both countries had similar GDP levels. However, starting in the late 1990s, China's GDP began to rise much more rapidly than India's. This acceleration became particularly noticeable around 2001–2002, coinciding with China's entry into the World Trade Organization. This move opened China's economy to global markets and led to a significant boost in industrial production and exports. The country's economic rise has lifted millions out of poverty, not only within China but also in China's trading partners across the developing world. As a result, China's GDP grew at an exponential rate, reaching close to 20 trillion USD by 2022. World Trade Organization (n.d.)

In contrast, India's GDP followed a more gradual and linear upward trend. Although India also experienced steady growth, especially after economic reforms in the 1990s, the rate of increase was much slower than that of China. By 2022, India's GDP had reached around 3 to 4 trillion USD, far below China's level. The gap between the two economies widened significantly after 2005 and continued to grow in the following years. Even during the COVID-19 period (2019–2022), China maintained a sharp rise in GDP, while India's growth remained relatively steady without major surges. Overall, the graph reflects how China's aggressive industrialization, export-led policies, and infrastructure development led to rapid economic expansion, whereas India's progress has been slower and more gradual due to different developmental approaches. The graph shows the GDP growth of China and India from 1984 to 2022, highlighting a clear difference in the pace and scale of economic development between the two countries.

Comparison Analysis Of India And China's Gdp Growth (Annual%) From 1984 To 2023

China's growth rate has remained stable for many years, averaging between 8% and 14% until around 2010. Following that, it steadily began to fall, reaching around 5-6% in recent years. India's growth rate has been unpredictable. India grew faster than China at times,



(source: World Bank (2024), World Development Indicators)

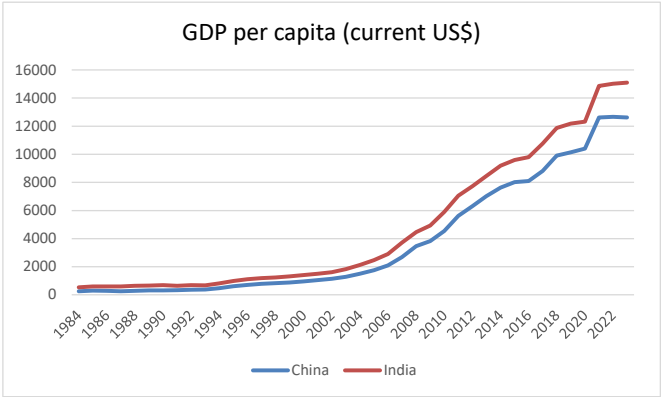
Figure 2: GDP Growth of India and China

particularly in the mid-2000s and early 2010s, although it also saw more dramatic drops. The COVID-19 pandemic resulted in a substantial drop around 2020. After 2020, both countries witnessed rapid variations in growth, but India's were more extreme, with large jumps and drops, whereas China's were smaller and more stable.

This graph depicts how the economies of China and India have expanded year after year from the 1980s to 2024. In short, China has experienced more consistent and stable growth throughout time, whereas India's growth has been more unpredictable, with larger ups and downs.

Comparison Analysis Of India And China's Gdp Per Capita (Current Us$) From 1984 To 2023

In the initial years, both countries had relatively low and similar levels of income per person, with little significant growth until the early 2000s. Around 2004, both nations began to experience more rapid economic growth, with China showing a slightly faster increase in GDP per capita than India. This trend continued until around 2016, during which China consistently maintained a higher income per person.



(source: World Bank (2024), World Development Indicators)

Figure 3: GDP Per Capita of India and China

However, from 2017 onwards, India's GDP per capita began to rise more sharply, eventually surpassing China's. By 2022, India had a slightly higher GDP per capita of approximately $15,000, compared to China's $13,000. The graph highlights the impressive economic progress made by both countries over the past few decades, while also showing that India has recently gained a lead in terms of income per person.

A comparative analysis of GDP, GDP growth rate, and GDP per capita between India and China from 1984 to 2023 reveals clear differences in their economic trajectories. In terms of total GDP, both countries started at similar levels in the 1980s, but China surged ahead from the late 1990s, especially after joining the WTO in 2001. Its focused strategy on industrialization, exports, and infrastructure helped it achieve an exponential rise, reaching nearly $20 trillion by 2022, whereas India's more gradual approach brought it to about $3–4 trillion. When comparing GDP growth rates, China showed stable and high growth (8–14%) for decades, gradually slowing to 5–6% in recent years. India's growth was more volatile, with periods of rapid expansion, particularly in the mid-2000s and early 2010s, but also sharper declines, especially during shocks like the COVID-19 pandemic. As for GDP per capita, both countries had low and comparable levels until the early 2000s. China maintained a higher per capita income for most of the period. However, India's per capita GDP rose more sharply after 2017, reportedly surpassing China's by 2022, indicating recent improvements in income distribution and living standards.

In a nutshell, China has outpaced India in overall economic size and consistent growth, while India has recently shown gains in per capita income. The comparison highlights how differing policy choices and development models have shaped the unique economic journeys of the two nations.

Literature Review

The vast populations of China and India have positioned them as major economic powers even before achieving widespread wealth. This represents a highly unusual development in the modern global economy. In fact, despite their economic scale, China and India remain the poorest among the world's large emerging economies. Both countries have significantly shifted the global balance of supply and demand across

primary commodities, manufactured products, and services. Their evolving patterns of specialization have strengthened their influence in international trade negotiations. However, they have to face domestic challenges posed by rising inequality and large unemployment Bensidoun, I., Lemoine, F., & Ünal, D., 2009). Before 1979, China was one of the world's most closed economies, and.Today, it is a global trade giant and a top destination for foreign direct investment (FDI). this reflects the success of its liberalization and promotion policies. These strategies have played a pivotal role in its remarkable economic rise. On the other hand, India since the early 1990s, has slowly shifted from relying on import substitution and public sector-led industrialization to adopting a more open and market-driven trade and investment approach. Even after the 1991 economic reforms, India's continued use of various trade policies to protect local industries, control production, and promote exports has made its import-export system overly complicated. Kalirajan, K., Wang, Y., Yu, M., & Singh, K. (2013). The agricultural and industrial sectors affect India's economic growth, and they both play a key role in supporting the country's economy. While the industrial sector helps drive faster growth, agriculture remains crucial for providing jobs and ensuring food security. The need for balanced development, where both sectors are strengthened together to achieve sustainable and steady economic progress. Sahoo, K., & Sethi, N. (2012). Kumar, Y. J. N., Kiran, G. S., Preetham, P., Lohith, C., Roshik, G. S., & Reddy, G. V. (2019).

The new arrangement of India's GDP has a considerable impact on employment. While the services sector now accounts for the highest share of GDP (44.60%), it employs just 35.70% of the population. Agriculture, on the other hand, continues to employ the most people (47.20%) despite its lower GDP contribution (17.39%). This mismatch implies a fundamental imbalance in the economy, with a big proportion of the people still working in low-productivity agricultural jobs. The manufacturing sector, while contributing a moderate 25.75% to GDP, employs just 24.70% of the workforce. Overall, while GDP growth shows economic progress, the transition to a service-led economy has not been matched by equivalent employment growth, emphasizing the need for policies that encourage job creation in higher productivity sectors such as manufacturing and modern services Jain, D., Nair, K., & Jain, V. (2015).

Chow, G. C., & Li, K. W. (2002). Found that in China, productivity (total factor productivity) grew at about.3% yearly during.1978-1998. Even if this slows down in the future, China could continue to expand at a healthy rate of at least 7% each year. This is due to the expected high rate of capital production at over 30% of GDP and a capital elasticity of approximately 0.6. Das, D. K., Erumban, A. A., & Mallick, J. (2021). Has divided the period from 1950 to 2015 into.two phases: the socialist regime (1950-1979) and the market-oriented regime (since 1980). In the former period a shift in growth drivers from state-led capital accumulation and non-market services during the socialist period to improved total factor productivity and market-driven services like telecommunications and finance during the liberalized era. While capital accumulation dominated early expansion, the latter period saw a combination of capital and productivity-driven growth. The research emphasizes that institutional development, such as higher education created during the Nehruvian era, played a delayed but significant role in gaining. productivity.after liberalization. However, chronic institutional deficiencies, insufficient human capital development, and job creation issues, particularly in manufacturing, continue to be major concerns.

Swamy, S. (1973) added that China and India started with similar economic growth patterns between 1952 and 1970, and their development paths diverged over time. India showed more stable and consistent progress, especially in agriculture and overall economic output, while China experienced greater fluctuations due to political disruptions. Industrial growth was initially comparable, but China's broader measurement approach gave it an edge in value-added terms. However, by the late 1960s, India's economy was gaining momentum, and China's growth was slowing. These differences highlight how sectoral focus and policy stability shaped the distinct economic trajectories of the two countries during this period. In their comparative growth accounting of China and India from 1980 to 2005, Bosworth and Collins (2008) demonstrate that both countries achieved substantial growth in GDP, but through different routes.China's rapid growth path was supported by its extraordinary industrial sector growth, which was fuelled by FDI and aggressive trade liberalization..In.contrast, India's.growth was.primarily.driven by the service industry,.which demonstrates.a.different paradigm for development..In particular, the transfer of.labour from agriculture.to.higher-productivity industry and services.made a major contribution.to.improvements in efficiency in both nations..The.authors.emphasize. that.maintaining these rates of.expansion depends

on essential elements such as ongoing improvement in.total factor productivity by efficiently using their resources like labour and capital,.continued.structural. changes among industries, and.continued.investment in human and physical capital..Their.research emphasizes. the.need for customized.economic.policies that take into account.each.country's.relative strengths.and reform. priorities. Hussin, F., & Yik, S. Y. (2012). Has examined the contributions of various economic sectors to the overall growth of China and India, revealing significant differences in their development patterns. In China, the industrial and manufacturing sectors emerged as the dominant drivers of growth, reflecting the country's aggressive industrialization policies. India's growth, on the other hand, was more service-oriented, with notable contributions from IT and related industries, alongside steady, though less dynamic, performance in agriculture and industry. The analysis highlights how sectoral strategies have shaped each country's economic trajectory, suggesting that sustained and balanced sectoral development is essential for long-term growth and resilience.

China and India, the two most populous nations, also rank among the world's largest economies, trailing only behind the United States in terms of GDP. While China consistently outperforms India on most economic and social development indicators, India fares slightly better in areas such as environmental impact and corruption levels (Mazumdar & Sarkar, 2013). A key demographic distinction lies in the age-dependency ratio: India has a growing young population, positioning it advantageously for future growth, provided it can effectively educate and train its youth (Kannan & Raveendran, 2009). China's dominance over India in the manufacturing sector stems from a mix of structural, policy, and market-driven advantages. China's manufacturing contributes a significantly larger share to GDP, employs a higher portion of its labour force, and operates with lower capital intensity, promoting broader employment. These benefits are facilitated by flexible labour laws and limited access to external finance, encouraging firms to adopt labour-intensive production methods. In contrast, India's manufacturing sector remains fragmented, with over 50% of employment concentrated in very small firms employing 5–9 workers. These firms are often characterized by low productivity and poor wages, while the larger firms are capital-intensive and generate fewer jobs. The absence of medium-sized, labour-intensive enterprises—referred to as the "missing middle"—further weakens India's industrial employment potential. Although India possesses a favourable demographic structure, unlocking its growth potential will require targeted reforms in education, skill development, and support for scalable manufacturing enterprises to build a more inclusive industrial economy (Wei & Balasubramanyam, 2015).

Islam, M. M., & Fatema, F. (2021). This study explores the impact of innovation on firm-level efficiency in China and India, offering valuable insights into how innovation strategies shape competitiveness in emerging economies. The analysis reveals that while both countries recognize innovation as a key driver of efficiency, Chinese firms have generally demonstrated stronger outcomes, supported by more robust institutional frameworks, greater R&D investment, and proactive government policies. Indian firms, though showing promising progress, face challenges related to resource constraints, regulatory hurdles, and inconsistent policy support. The findings highlight the need for India to strengthen its innovation ecosystem by enhancing R&D incentives, improving infrastructure, and fostering stronger collaboration between industry and academia. By addressing these gaps, Indian firms can significantly improve their efficiency and global competitiveness.

Srinivasan, T. N. (2004). This study emphasizes that despite the competitive dynamics of India and China, both countries face common challenges such as poverty reduction, employment generation, and sustainable development. Importantly, the paper argues that China and India stand to benefit significantly from deeper economic cooperation, leveraging their complementarities to enhance regional stability and prosperity. Strengthening bilateral ties, improving trade facilitation, and engaging in joint development initiatives are recommended as strategic pathways forward. Continued dialogue and mutual learning remain essential for both nations to navigate their evolving economic roles in the global landscape.

Raghuramapatruni, R. (2014). looked at how trade between India and China has developed over time, with a special focus on services like IT and business support. It is revealed that while trade in goods has grown a lot, it is mostly in China's favour, meaning India buys more from China than it sells. However, India is very strong in services, especially in areas like information technology, which can help balance the trade between the two countries. Right now, problems like strict rules and limited access to China's markets are holding back

growth in services trade. The study suggests that both countries need to work together more closely to solve these problems and create fairer trade opportunities. By cooperating more in areas such as digital services, education, and healthcare, India and China can establish a stronger and more balanced economic relationship that benefits both parties.

Singariya, M., & Sinha, N. (2015). India's agriculture and manufacturing sectors are both important for economic growth, but the manufacturing sector has a stronger impact on raising people's average income. This means that as manufacturing grows, it helps improve the standard of living more quickly. However, the agriculture sector is still very important because it provides jobs and food for a large part of the population, especially in rural areas. It is being suggested that to achieve steady and balanced economic growth, India should continue to support agriculture while also working to expand and modernize its manufacturing sector. This combined approach can help boost incomes and improve living conditions for more people across the country. Further, Haralayya, B., Aithal, P. S., & Aithal, P. S. (2021) disclosed that a strong and efficient banking system is very important for economic growth, as it provides the financial support needed for businesses, industries, and individuals. The study highlights that improvements in banking services, financial inclusion, and digital banking can help boost investment, create jobs, and support overall development.

while over time the services sector's share has grown, the shift may not fully indicate real productivity improvements. It highlights that agriculture and industry still have deep-rooted roles in the economy Binswanger-Mkhize, H. P., 2013. Datta, M. (2011). Also, questions about the rise of the services sector and the decline of agriculture and industry really reveal true economic growth. They found that while services have increased in GDP share, this doesn't always mean there has been a real improvement in productivity or living standards. Agriculture and industry remain very important for jobs and stability.

Chakraborty, C., & Nunnenkamp, P. (2008). Added that FDI has contributed to growth, but its impact varies across different sectors. Some sectors, like services, benefited more from FDI than others, such as manufacturing. The study highlights that while economic reforms and FDI are important for growth, their success depends on sector-specific conditions and supportive policies. The paper suggests that India should continue improving its investment climate, especially in sectors with untapped potential.

Mangal, S.K., & Agarwal, D. R. (2012). discussed the need for balanced growth across all sectors to ensure sustainable development as they discovered how the composition of India's GDP and the growth of different sectors—like agriculture, industry, and services—have changed since the economic reforms of the 1990s. the services sector has grown the fastest, becoming the largest part of the economy, while the share of agriculture has declined. Industry has shown moderate growth. these changes reflect India's shift toward a more service-based economy. Wu (2007) compares the growth of the service sector in China and India, highlighting how both countries have seen increasing contributions from services to their overall economic development. The study notes that while China's rapid economic growth has been largely driven by manufacturing and industrial output, its service sector has also expanded significantly in recent years. In contrast, India's growth has been more strongly led by the service sector, particularly in areas like information technology and business process outsourcing. Wu emphasizes that these differences in sectoral contributions reflect broader economic strategies, with China focusing more on industrialization and India leveraging its human capital in services.

Hasan, R., & Barua, S. (2013). In their comparative analysis of China's and India's economic growth reveal two distinct yet successful development trajectories. Both countries offer important lessons for emerging economies. China's model illustrates the power of state-led planning and infrastructure investment, while India highlights the potential of a service-led economy and democratic governance. Moving forward, sustained economic growth for both nations will depend on addressing internal disparities, ensuring inclusive development, and adapting to global economic shifts.

Ultimately, the success of China and India underscores that there is no one-size-fits-all model for development. Instead, context-specific strategies, effective governance, and long-term policy commitments are critical to achieving sustainable economic growth.

Methodology

This study examines the dynamic relationship between Gross Domestic Product (GDP) and sectoral contributions (Agriculture, Industry, and Services) in China and India from 1984 to 2023. To ensure the validity and robustness of the analysis, the structured econometric approach, combining stationarity testing and regression modelling, has been followed.

The dependent variable taken is Gross Domestic Product (GDP), which represents the total monetary value of all goods and services produced within a country in a given year, serving as a key indicator of overall economic performance. For China, this is labelled as GDP, while for India, it is referred to as GDP01. The independent variables include agriculture, industry, and services, which are the three main sectors contributing to GDP. Agriculture (Agriculture for China, Agriculture01 for India) refers to the output from farming, livestock, forestry, and fishing activities. Industry (Industry for China, Industry01 for India) represents the production activities from manufacturing, mining, construction, and utilities, reflecting the country's industrial strength. Services (Services for China, Services01 for India) capture the output from the service sector, including activities such as banking, education, healthcare, transportation, tourism, and information technology, which play an increasingly important role in modern economies. Additionally, the regression models include a constant term (C), which accounts for the base level of GDP when all independent variables are zero, though it mainly serves as a statistical component rather than a directly interpretable economic measure.

This study uses two main techniques to analyse the relationship between GDP and the agriculture, industry, and services sectors in China and India. First, Augmented Dickey-Fuller (ADF) unit root test is being applied to check whether each time series (GDP, agriculture, industry, and services) is stationary or non-stationary. Stationarity means that the statistical properties of the series, like its mean and variance, remain constant over time — this is important because using non-stationary data in regression models can lead to misleading or spurious results. The data is being tested at its level, first difference, and second difference (if necessary), both with and without a trend, to make sure that variables are stationary. Second, Ordinary Least Squares (OLS) regression analysis is being performed to examine how the independent variables (agriculture, industry, services) affect the dependent variable (GDP). OLS helps estimate the strength and direction of these relationships by providing coefficients that show how much GDP changes when each sector changes. The statistical indicators, like R-squared, adjusted R-squared, p-values, the F-statistic, and the Durbin-Watson statistic, are also being used to check the model's goodness of fit, significance, and presence of autocorrelation. Together, these techniques help ensure the analysis is reliable and meaningful.

The Data Used In This Study

The study uses the annual time series data on selected variables for the sample period from 1984 to 2023, covering 40 years, which is sufficiently long enough to allow for a meaningful time series investigation. Secondary data is being used in the study; it was obtained from the World Development Indicator (WDI) website. The methodology used for data collection needs to be consistent with the objectives of the study. As this study examines the

contribution of economic sectors (agriculture, manufacturing, and services) to economic

growth in China and India, secondary data is appropriate for the study

Data Analysis

Unit Root Test

The table displays the results of a Unit Root Test (an Augmented Dickey-Fuller (ADF) test) for checking the stationarity of various economic variables for China and India. The test is conducted at three stages: At Level, 1st Differencing, and 2nd Differencing, under two conditions — Intercept and Intercept & Trend. A p-value less than 0.05 means the data is stationary (i.e., it doesn't have a unit root).

CHINA

GDP

- *Null hypothesis (H_0)*

The GDP series has a unit root, i.e., it is non-stationary.

- *Alternative hypothesis (H_1)*

The GDP series does not have a unit root, i.e., it is stationary.

At the level form, the ADF test statistics for the GDP series under both the intercept and intercept with trend specifications have high probability values (0.9366 and 0.9784), which are greater than the 5% significance level. Therefore, the null hypothesis of a unit root cannot be rejected, indicating that the GDP series is non-stationary at level.

After taking the first difference, the probability values decline to 0.0161 under the intercept specification and 0.0548 under the intercept with trend specification. Since the probability value under the intercept specification is below 0.05, the null hypothesis of a unit root is rejected, suggesting that the first-differenced GDP series becomes stationary.

Table 1: Unit root test (an augmented dickey-fuller (adf) test)

S.No.	Variables	*At level*		*1st differencing*		*2nd differencing*	
		Intercept	*Intercept & trend*	*Intercept*	*Intercept & trend*	*Intercept*	*Intercept & trend*
CHINA	GDP	0.9936	0.9784	0.9161	0.5488	0.0000	
	AGRICULTURE	0.9730	0.6828	0.0401			
	INDUSTRY	0.9969	0.9451	0.7843	0.4935	0.0000	
	SERVICES	0.9102	0.9957	0.9958	0.6916	0.0000	
INDIA	GDP	1.0000	0.9762	0.0000			
	AGRICULTURE	1.0000	0.9610	0.0001			
	INDUSTRY	0.9995	0.8434	0.0000			
	SERVICES	1.0000	0.9873	0.9664	0.0000		

Further, at the second difference, the probability values are 0.0000 under both specifications, which strongly reject the null hypothesis of a unit root. This indicates that the GDP series is highly stationary after second differencing.

Agriculture

- *Null hypothesis (H_0)*

The series has a unit root, i.e., it is non-stationary.

- *Alternative hypothesis (H_1)*

The series does not have a unit root, i.e., it is stationary.

At the level form, the ADF test statistics under both the intercept and intercept with trend specifications have probability values of 0.3732 and 0.6892, respectively. Since these values are greater than the 5% significance level, the null hypothesis of a unit root cannot be rejected. This indicates that the series is non-stationary at level.

After taking the first difference, the probability values decrease to 0.0210 under the intercept specification and 0.0480 under the intercept with trend specification. As both values are less than 0.05, the null hypothesis of a unit root is rejected. Therefore, the first-differenced series becomes stationary, indicating that the variable is integrated of order one, I(1).

Industry

- *Null hypothesis (H_0)*

The series has a unit root, i.e., it is non-stationary.

Alternative hypothesis (H_1)

The series does not have a unit root, i.e., it is stationary.

At the level form, the ADF test statistic under the intercept specification has a probability value of 0.0959, which exceeds the 5% significance level, indicating non-stationarity. However, under the intercept with trend specification, the probability value is 0.0451, which is slightly below 0.05. Therefore, the null hypothesis of a unit root is rejected only under the trend specification, suggesting that the series is borderline stationary at level when a trend is included.

After taking the first difference, the probability values become 0.0743 under the intercept specification and 0.0435 under the intercept with trend specification. While the intercept specification still indicates non-stationarity, the probability value under the trend specification is below 0.05, leading to rejection of the null hypothesis. This indicates that the series becomes stationary after first differencing when a trend is considered.

Services

- *Null hypothesis (H_0)*

The series has a unit root, i.e., it is non-stationary.

- *Alternative hypothesis (H_1)*

The series does not have a unit root, i.e., it is stationary.

At the level form, the ADF test statistics under both the intercept and intercept with trend specifications show probability values of 0.1812 and 0.7697, respectively.

Since these values are greater than the 5% significance level, the null hypothesis of a unit root cannot be rejected. This indicates that the series is non-stationary at level.

After taking the first difference, the probability values decrease to 0.0686 under the intercept specification and 0.0616 under the intercept with trend specification. Although these values are lower than those at level, they are still slightly above the 5% significance level. Therefore, the null hypothesis cannot be rejected at the 5% level, but the results indicate that the series is close to becoming stationary after first differencing.

Further, at the second difference, the probability values are 0.0000 under both specifications, which strongly reject the null hypothesis of a unit root. This indicates that the GDP series is highly stationary after second differencing.

INDIA

GDP

- *Null hypothesis (H_0)*

The series has a unit root, i.e., it is non-stationary

- *Alternative hypothesis (H_1)*

The series does not have a unit root, i.e., it is stationary.

At the level form, the ADF test statistics under both the intercept and intercept with trend specifications show probability values of 1.0000 and 0.9762, respectively. Since these values are far greater than the 5% significance level, the null hypothesis of a unit root cannot be rejected. This indicates that the series is non-stationary at level.

After taking the first difference, the probability values fall sharply to 0.0001 under the intercept specification and 0.0004 under the intercept with trend specification. As both values are well below the 5% significance level, the null hypothesis of a unit root is rejected. This confirms that the first-differenced series is stationary, indicating that the variable becomes stationary after first differencing.

Agriculture

- *Null hypothesis (H_0)*

The series has a unit root, i.e., it is non-stationary

- *Alternative hypothesis (H_1)*

The series does not have a unit root, i.e., it is stationary.

At the level form, the ADF test statistics under both the intercept and intercept with trend specifications show probability values of 0.9394 and 0.9713, respectively. Since these values are greater than the 5% significance level, the null hypothesis of a unit root cannot be rejected. This indicates that the series is non-stationary at level.

After taking the first difference, the probability values decrease sharply to 0.0000 under the intercept specification and 0.0001 under the intercept with trend specification. As both values are well below the 5% significance level, the null hypothesis of a unit root is rejected. This confirms that the first-differenced series is strongly stationary.

Industry

- *Null hypothesis (H_0)*

The series has a unit root, i.e., it is non-stationary

Alternative hypothesis (H_1)

The series does not have a unit root, i.e., it is stationary.

At the level form, the ADF test statistics under both the intercept and intercept with trend specifications show probability values of 0.9134 and 0.9344, respectively. Since these values are greater than the 5% significance level, the null hypothesis of a unit root cannot be rejected. This indicates that the series is non-stationary at level.

After taking the first difference, the probability values decrease significantly to 0.0000 under the intercept specification and 0.0001 under the intercept with trend specification. As both values are well below the 5% significance level, the null hypothesis of a unit root is rejected. This confirms that the series becomes stationary after first differencing.

Table 2: Regression analysis

Dependent Variable: GDP
Method: Least Squares
Date: 04/30/25 Time: 14:40
Sample: 1984 2023
Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-63571.80	51411.31	-1.236533	0.2243
AGRICULTURE	1.706378	0.624739	2.731347	0.0097
INDUSTRY	1.221485	0.123489	9.891416	0.0000
SERVICES	1.713168	0.057430	29.83047	0.0000

R-squared	0.999773	Mean dependent var	5209653.
Adjusted R-squared	0.999754	S.D. dependent var	5862592.
S.E. of regression	91990.23	Akaike info criterion	25.79139
Sum squared resid	3.05E+11	Schwarz criterion	25.96028
Log likelihood	-511.8278	Hannan-Quinn criter.	25.85246
F-statistic	52788.65	Durbin-Watson stat	0.328876
Prob(F-statistic)	0.000000		

Services

• *Null hypothesis (H_0)*

The series has a unit root, i.e., it is non-stationary.

• *Alternative hypothesis (H_1)*

The series does not have a unit root, i.e., it is stationary.

At the level form, the ADF test statistics under both the intercept and intercept with trend specifications show probability values of 1.0000 and 0.9873, respectively. Since these values are greater than the 5% significance level, the null hypothesis of a unit root cannot be rejected. This indicates that the series is non-stationary at level.

After taking the first difference, the probability values fall sharply to 0.0004 under the intercept specification and 0.0006 under the intercept with trend specification. As both values are well below the 5% significance level, the null hypothesis of a unit root is rejected. This confirms that the series becomes stationary after first differencing.

Summary

For both China and India, none of the variables (GDP, Agriculture, Industry, Services) are stationary in their original form ("at level"). After taking the first difference, most of them become stationary, indicated by the drop in p-values (most < 0.05). In China's GDP case, even a second differencing was done, confirming strong stationarity. This tells us these economic indicators are non-stationary initially but become stationary after differencing, meaning they follow a trend over time and need differencing to be used in time series modelling.

Regression Analysis

The results of an Ordinary Least Squares (OLS) regression analysis examine the relationship between Gross Domestic Product (GDP) as the dependent variable and Agriculture, Industry, and Services as independent variables, covering the period from 1984 to 2023, with 40 observations..Here's an interpretation of the key results:

China

The regression output analyses the relationship between GDP (dependent variable) and three independent variables: Agriculture, Industry, and Services, using data from 1984 to 2023 (40 observations). The regression model has a very high R-squared value of 0.999773, indicating that about 99.98% of the variation in GDP is explained by these three sectors. The Adjusted R-squared is also high (0.999754), confirming the model's strong explanatory power even after adjusting for the number of predictors.

Looking at the coefficients, Services has the highest positive impact on GDP (coefficient = 1.731168), followed by Agriculture (1.706378) and Industry (1.221485). The t-statistics and probability values (p-values) show that Industry and Services are highly significant predictors of GDP (p-values = 0.0000), while Agriculture is also statistically significant (p-value = 0.0097), although to a lesser extent. The constant term (C) is not statistically significant, as its p-value is 0.2243.

Additional diagnostic measures, such as a very low standard error of regression (91990.23) and a high F-statistic (52788.65) with a p-value of 0.000000, further confirm that the overall model is statistically significant. However, the Durbin-Watson statistic of 0.328876 suggests the presence of positive autocorrelation in the residuals, which might indicate a need for further model refinement or the inclusion of time-series corrections. Overall, the model demonstrates a very strong relationship between GDP and the economic sectors, especially highlighting the dominant role of services and industry.

India

the results of an Ordinary Least Squares (OLS) regression analysis, with GDP01 as the dependent variable and Agriculture01, Industry01, and Services01 as independent variables..The analysis covers the period from 1984 to 2023, with 40 observations..Here's an interpretation of the key results:

The regression analysis in this output examines the impact of Agriculture, Industry, and Services on GDP (labelled as GDP01) from 1984 to 2023. The model shows an exceptionally strong fit, with an R-squared value of 0.999923, indicating that 99.99% of the variation in

Table 3: Regression analysis

Dependent Variable: GDP01
Method: Least Squares
Date: 04/30/25 Time: 15:16
Sample: 1984 2023
Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.17E+10	5.31E+09	2.200407	0.0343
AGRICULTURE01	0.896985	0.107671	8.330832	0.0000
INDUSTRY01	0.874154	0.042293	20.66902	0.0000
SERVICES01	1.271659	0.039725	32.01184	0.0000

R-squared	0.999923	Mean dependent var	1.20E+12
Adjusted R-squared	0.999917	S.D. dependent var	1.04E+12
S.E. of regression	9.49E+09	Akaike info criterion	48.88023
Sum squared resid	3.24E+21	Schwarz criterion	49.04911
Log likelihood	-973.6045	Hannan-Quinn criter.	48.94129
F-statistic	156241.6	Durbin-Watson stat	1.315019
Prob(F-statistic)	0.000000		

GDP01 is explained by the three sectors. The Adjusted R-squared is similarly high at 0.999915, confirming the robustness of the model even after adjusting for the number of predictors.

All three variables—Agriculture, Industry, and Services—are statistically significant, as shown by their very low p-values (all < 0.001). The coefficients suggest that all three sectors have a strong positive impact on GDP, with Services having the largest effect (coefficient = 1.271659), followed by Agriculture (0.896985) and Industry (0.874154). The constant term (C) is also statistically significant with a p-value of 0.0343.

The model's overall fit is excellent, as indicated by a very high F-statistic (156241.6) and a corresponding p-value of 0.000000, confirming that the model is statistically significant. The Durbin-Watson statistic of 1.315019 suggests there may be mild positive autocorrelation, but it's closer to the ideal value of 2 than in the previous model.

In conclusion, this regression strongly supports that the Agriculture, Industry, and Services sectors significantly contribute to GDP growth, with Services having the most substantial impact. The model is highly reliable, but slight autocorrelation may need to be addressed for even more precise forecasting.

COMPARISON OF SECTORAL IMPACT ON GDP

The Ordinary Least Squares (OLS) regression analyses conducted on China's GDP and India's GDP01 data from 1984 to 2023 provide valuable insights into the magnitude of impact that Agriculture, Industry, and Services have on economic growth in India and China. In the case of India (GDP model), the Services sector shows the highest magnitude of influence on GDP with a coefficient of 1.731168, closely followed by Agriculture (1.706378), and then Industry (1.221485). This suggests that while Services are the primary driver of GDP growth, Agriculture remains significantly influential, and Industry, although important, has a relatively lower marginal impact. In contrast, the China-based model (GDP01) also highlights Services as the dominant contributor with a coefficient of 1.271659, but with a smaller gap between sectors: Agriculture (0.896985) and Industry (0.874154) follow closely. This indicates a more balanced sectoral impact on China's GDP, with less disparity between the contributions of each sector.

Thus, in terms of magnitude of impact, India exhibits a more service-intensive growth structure, with Agriculture still playing a major role, while China demonstrates a more evenly distributed sectoral impact, likely reflecting its historically strong industrial base complemented by growing services and a gradually declining role of agriculture. Both models confirm the statistically significant role of all three sectors in driving GDP, but the magnitude of their influence varies in alignment with each country's distinct development trajectory.

Conclusion

China's economy has risen more steadily and expanded in size because of its focused industrial and export-driven model. In comparison, India's growth has been more unpredictable, but per capita income has recently increased significantly. The comparison highlights how different techniques have resulted in varied, but important, economic outcomes. This study examines the impact of the agriculture, industry, and services sectors on the GDP of China and India from 1984 to 2023. Regression analysis is being used in the study to see how each sector contributes to GDP growth. The results show that all three sectors have a positive impact on GDP, with services having the strongest effect, especially in India. Agriculture and industry also help increase GDP, but their impact is smaller compared to services. In both China and India, all three sectors—agriculture, industry, and services—have a positive effect on GDP, but the strength of their influence varies. In China, agriculture plays a significant role, contributing 1.71 units to GDP for every one-unit increase in agricultural output, a stronger impact than in India, where agriculture adds 0.90 units to GDP for the same increase. Similarly, the industry sector in China has a greater effect on GDP, with every one-unit increase in industrial activity leading to a 1.22-unit rise in GDP. In India, the impact of industry is slightly weaker, contributing 0.87 units to GDP for each unit increase in industrial output. However, both countries show that the services sector has the largest impact on GDP. In China, services contribute 1.71 units to GDP for every unit increase, while in India, the services sector has an even stronger influence, raising GDP by 1.27 units for each increase. Overall, China's agriculture and industry sectors have a more significant impact on GDP than India's, while India's services sector plays a more prominent role than China's.

India still has a lot to prove in the manufacturing sector. India's manufacturing sector remains fragmented, with over 50% of employment concentrated in very small firms employing 5–9 workers. These firms are often characterized by low productivity and poor wages, while the larger firms are capital-intensive and generate fewer jobs. They need to make a substantial investment

to build up a world-class infrastructure, which will attract foreign investments, which is an appalling need for as the country has a low level of capital accumulation. Higher investment in the manufacturing sector will also ensure productive employment opportunities for the less-skilled labour force of India. India still has a power shortage, which it needs to address very quickly. The government should encourage foreign investment in the power sector. Their tax structure has to be reformed very quickly and the decision-making at the government level has to be very swift. On the other hand, financial sector reforms and implementing market-oriented institutional framework are the two major responsibilities to be addressed by the Chinese government. China has huge potential in the IT service and outsourcing business, if it can build up skilled labour with English-speaking abilities. China also needs to lessen government control and encourage more private competition, which will improve productivity in some key sectors like banking.

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