

A STUDY OF ENERGY CONSUMER PRICE INFLATION TRENDS IN INDIA AND CHINA (2010–2022)

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ABSTRACT:

Energy Consumer Price Inflation plays a vital role in determining the overall cost of living and production expenses within an economy. This study aims to compare the trends of energy consumer price inflation in India and China from 2010 to 2022. Both countries, being large emerging economies, experience significant impacts from fluctuations in global energy prices. India, heavily reliant on energy imports, faces inflationary volatility due to global crude oil price shocks, changes in taxation, and deregulation policies. Meanwhile, China, with a stronger control over its energy pricing mechanisms and a diversified energy portfolio, displays relatively stable inflation trends. These differences are crucial to understanding how each nation responds to internal and external economic pressures. The study employs statistical tools to identify inflation trends, test for correlations, and examine differences in mean energy inflation rates over time. The analysis reveals that although there is a moderate correlation between the energy inflation trends of India and China, the relationship is not statistically significant. However, a significant difference in average inflation rates is observed, with India recording much higher and more volatile energy inflation than China. These insights offer valuable implications for policymakers in both nations aiming to maintain economic stability while ensuring energy affordability amid global uncertainty.

Keywords: Energy consumer Inflation, India, China, Monetary Policy.

INTRODUCTION:

Energy Consumer Price Inflation refers to the rate at which the prices of energy-related goods and services, such as electricity, fuel (petrol, diesel, LPG), gas, and other household energy sources, increase over time from the consumer's perspective. It is a component of overall consumer price inflation and reflects how rising energy costs impact household budgets, production expenses, and transportation costs. This type of inflation is influenced by factors like global oil prices, government subsidies or taxes, supply disruptions, and shifts in energy demand. Monitoring energy consumer price inflation is crucial for policymakers as it directly affects cost of living, economic productivity, and inflation control measures.

Energy prices play a critical role in shaping the overall inflationary trends of a country, directly influencing production costs, transportation, and household expenses. For emerging economies like India and China, energy inflation holds particular significance due to their rapidly growing industrial sectors and expanding urban populations. Fluctuations in global oil prices, domestic energy policies, and demand-supply dynamics all contribute to the variability of energy consumer price inflation in these countries. Understanding these trends helps policymakers manage inflation and ensure economic stability.

India, with its heavy dependence on energy imports, is particularly vulnerable to global energy price shocks. The country's energy consumer price inflation has witnessed sharp spikes and troughs in the past decade, reflecting the volatility in international crude prices, government subsidy adjustments, and domestic taxation policies. Additionally, India's push for renewable energy and gradual deregulation of fuel prices have also influenced inflation patterns. Such changes affect both rural and urban consumers, making energy inflation a socio-economic concern.

On the other hand, China has pursued a different energy strategy, with significant investments in domestic energy production, coal, and renewables. Although China, too, is affected by global energy markets, its inflation trends have generally remained more stable compared to India. Government interventions, state-owned enterprises, and price control mechanisms have contributed to maintaining relative control over energy prices. However, as China transitions towards greener energy and reduces coal dependence, its energy inflation dynamics are also evolving.

Comparing India and China provides an opportunity to examine how different policy approaches and economic structures influence energy price trends. While India's market-driven pricing mechanisms expose it more to global volatility, China's centralized pricing and diversified energy base offer a buffer against extreme inflation. Nevertheless, both countries face challenges in balancing economic growth with energy affordability, especially amid global disruptions such as the COVID-19 pandemic and geopolitical tensions affecting energy supply chains.

This study aims to analyze and compare the trends of energy consumer price inflation in India and China from 2010 to 2022 using statistical tools and publicly available secondary data. By identifying inflation patterns, their causes, and the degree of correlation between the two countries, this research provides insights into how each economy has responded to external shocks and internal policy shifts. The findings can aid in formulating energy pricing strategies that are both economically viable and socially inclusive.

LITERATURE REVIEW

1. **International Monetary Fund. (2010)**, In the research titled "Price dynamics in China" The IMF report concludes that China's consumer price inflation is largely influenced by supply-side dynamics, especially in food and energy. While core inflation remained stable, sharp swings in energy and food prices often led to short-term inflation spikes. The study also emphasizes that China's administrative control over fuel prices somewhat buffers direct transmission but may distort market efficiency and delay inflation responses.
2. **International Monetary Fund. (2010)**, In the research titled "Regional economic outlook: Asia and Pacific, Inflation dynamics in Asia" This regional report shows contrasting inflation dynamics between China and India. While China experienced stable core inflation with limited pass-through from energy prices due to regulatory buffers, India witnessed more volatile inflation, significantly influenced by oil and food price shocks. The IMF suggests that India adopt more flexible fuel pricing and improve its supply chain responsiveness to external shocks to enhance inflation stability.
3. **Mohanty, D., et.al (2011)**, In the research titled "Inflation in India: An analysis of recent trends" This RBI study concludes that inflation in India post-2008 was driven by both supply shocks, especially in food and energy, and demand-side pressures

linked to fiscal stimulus and global recovery. It also identifies structural rigidities such as inefficiencies in supply chains and the dominance of administered prices in fuel, which amplify inflationary trends. The authors recommend policy reforms in pricing, procurement, and supply logistics to manage future inflation risks.

4. **Joshi, V., & Acharya, S. (2011)**, In the research titled “Commodity prices and domestic inflation in India” The study concludes that commodity prices, particularly those of energy and food, have a substantial impact on domestic inflation in India. It shows that inflation is not solely demand-driven, but significantly influenced by global commodity price fluctuations, especially crude oil. The authors argue that effective monetary policy should account for imported inflation and recommend strengthening supply-side mechanisms to mitigate the inflationary impact of commodity shocks.
5. **Kumar, P., & Sinha, M. (2014)**, In the research titled “Oil price shocks and inflation in India: An empirical analysis” The study empirically demonstrates a strong and statistically significant relationship between international oil price shocks and inflation trends in India. Both headline and core inflation are found to respond to oil price increases, although the impact varies across time lags. The findings underline the vulnerability of India’s inflation structure to global energy markets and recommend strategic reserves and energy diversification to buffer these shocks.
6. **Zhang, D., et.al (2017)**, In the research titled “Energy price shocks and inflation in China: A wavelet-based perspective” Using wavelet-based analysis, the study reveals that energy price shocks exert both short- and long-term influence on inflation in China. The effects are time-varying and more pronounced during periods of economic instability or global price volatility. The research suggests that energy price management and inflation control should be closely integrated in Chinese macroeconomic policy planning, especially during oil market disruptions.
7. **Ren, Y. S., et.al (2024)**, In the research titled “Inflation expectations of households in India: Role of oil prices, economic policy uncertainty, and spillover of global financial uncertainty” This research finds that household inflation expectations in India are heavily influenced by global oil price fluctuations, as well as economic policy uncertainty and global financial shocks. The authors highlight that energy prices serve as a strong signal for future inflation in the minds of consumers, especially in a developing economy like India. The study suggests that managing these expectations is crucial for inflation targeting and monetary policy effectiveness.

RESEARCH GAP

The reviewed studies collectively highlight the significant influence of global energy price fluctuations, especially crude oil, on domestic inflation in both India and China between 2010 and 2022. However, a key research gap exists in the comparative, integrated, and longitudinal analysis of how both countries, despite their economic size, policy structures, and energy dependencies, have managed energy-induced inflation differently over this period. Most studies treat India and China separately or focus on either short-term or aggregate effects without examining structural differences, such as pricing mechanisms (administered vs. market-linked), energy import dependence, subsidy regimes, and policy responses in a cross-country framework. Furthermore, there is limited empirical work that incorporates post-2020 data to assess the combined effects of the COVID-19 pandemic, geopolitical tensions, and energy market volatility on inflation expectations and macroeconomic stability in the two countries. This creates a critical gap for future research to explore energy inflation trends in a

comparative and policy-centric framework, integrating macroeconomic modeling and forward-looking inflation targeting strategies.

RESEARCH METHODOLOGY

This study adopts a quantitative research methodology based entirely on secondary data obtained from the World Bank's inflation database, covering the years 2010 to 2022. Two primary statistical tools are used: correlation analysis to determine the relationship between energy consumer price inflation in India and China, and a paired samples t-test to assess whether there is a statistically significant difference in their inflation rates. Descriptive statistics including mean, standard deviation, and standard error are also computed to compare the variation in inflation levels between the two countries. The research is analytical in nature, relying on data visualization and interpretation of numerical outputs for conclusion.

DATA ANALYSIS

The data analysis in this study is based on secondary data sourced from the World Bank's inflation database, covering the period from 2010 to 2022 for both India and China. This data specifically focuses on Energy Consumer Price Inflation, which includes changes in the prices of electricity, fuel, gas, and other energy-related consumer goods and services. The use of secondary data allows for a comprehensive historical comparison of inflation trends over time. Through descriptive statistics, correlation analysis, and paired samples testing, the study examines the patterns, relationships, and differences in energy inflation between the two countries, providing valuable insights into the impact of policy measures, global price fluctuations, and domestic energy market structures.

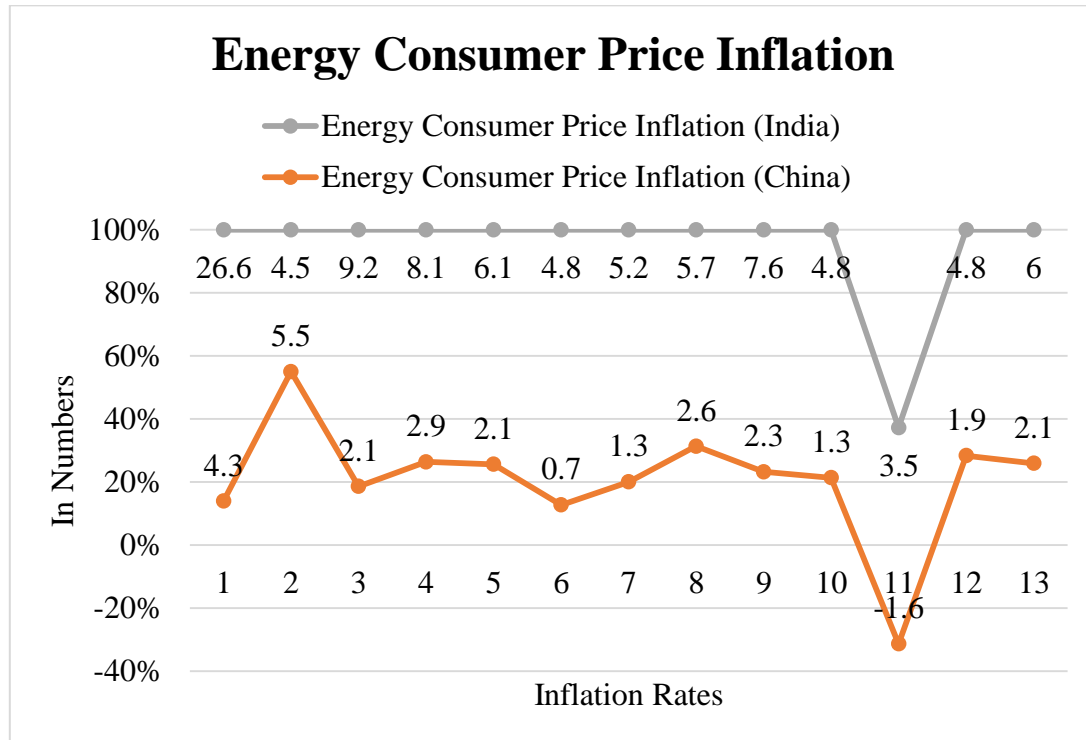
Energy Consumer Price Inflation

Series Name	Energy Consumer Price Inflation (China)	Energy Consumer Price Inflation (India)
2010	4.3	26.6
2011	5.5	4.5
2012	2.1	9.2
2013	2.9	8.1
2014	2.1	6.1
2015	0.7	4.8
2016	1.3	5.2
2017	2.6	5.7
2018	2.3	7.6
2019	1.3	4.8
2020	-1.6	3.5
2021	1.9	4.8
2022	2.1	6.0

Source: <https://www.worldbank.org/en/research/brief/inflation-database>

The data from 2010 to 2022 reveals contrasting trends in Energy Consumer Price Inflation between China and India. India consistently experienced higher energy inflation than China throughout the period, with a peak of 26.6% in 2010, significantly above China's 4.3% in the same year. While India's inflation fluctuated moderately, ranging between 3.5% and 9.2% after 2010, China maintained relatively low and stable energy inflation, with occasional dips such as -1.6% in 2020, reflecting deflation possibly due to pandemic-driven demand suppression. China's energy inflation remained under control due to policy interventions and

price controls, whereas India's higher and more volatile rates suggest greater exposure to global oil prices, currency fluctuations, and domestic supply chain challenges. This divergence highlights differences in energy market structures, subsidy regimes, and economic resilience between the two countries. The following information is shown below in bar diagram.



OBJECTIVE AND HYPOTHESIS

Objective 1 To Study relationship between Energy Consumer Price Inflation of India and China.

Null Hypothesis H_{01} : There is no relationship between Energy Consumer Price Inflation of India and China.

Alternate Hypothesis H_{11} : There is a relationship between Energy Consumer Price Inflation of India and China.

To test the above null hypothesis Correlation Test is applied and obtained results are as follows.

Correlations				
			Energy Consumer Price Inflation (China)	Energy Consumer Price Inflation (India)
Energy Consumer Price Inflation (China)	Pearson Correlation		1	.458
	P-value			.115
	N		13	13
Energy Consumer Price Inflation (India)	Pearson Correlation		.458	1
	P-value		.115	
	N		13	13

Interpretation: The above results indicate that calculated p-value is 0.115. It is more than 0.05. Therefore, Correlation test is accepted. Hence Null hypothesis is accepted and Alternate hypothesis is rejected.

Conclusion: There is no relationship between Energy Consumer Price Inflation of India and China.

Findings: The correlation analysis between Energy Consumer Price Inflation in China and India reveals a moderate positive Pearson correlation coefficient of 0.458, suggesting that as energy inflation increases in one country, it tends to increase in the other as well. However, the p-value of 0.115 indicates that this relationship is not statistically significant at the 0.05 level, meaning there is no strong evidence to confirm a consistent linear association between the two variables based on the sample of 13 observations. Thus, while a moderate relationship exists, it may be due to chance and requires further data for validation.

Objective 2 To compare Energy Consumer Price Inflation of India and China.

Null Hypothesis H_{02} : There is no significant difference in Energy Consumer Price Inflation of India and China.

Alternate Hypothesis H_{12} : There is a significant difference in Energy Consumer Price Inflation of India and China.

To test the above null hypothesis Paired Samples Test is applied and obtained results are as follows.

Paired Samples Test						
	Paired Differences			t	df	P-value
	Mean	Std. Deviation	Std. Error Mean			
Energy Consumer Price Inflation (China) - Energy Consumer Price Inflation (India)	-5.337	5.408	1.500	-3.558	12	.004

Interpretation: The above results indicate that calculated p-value is 0.004. It is less than 0.05. Therefore, one sample test is rejected. Hence Null hypothesis is rejected and Alternate hypothesis is accepted.

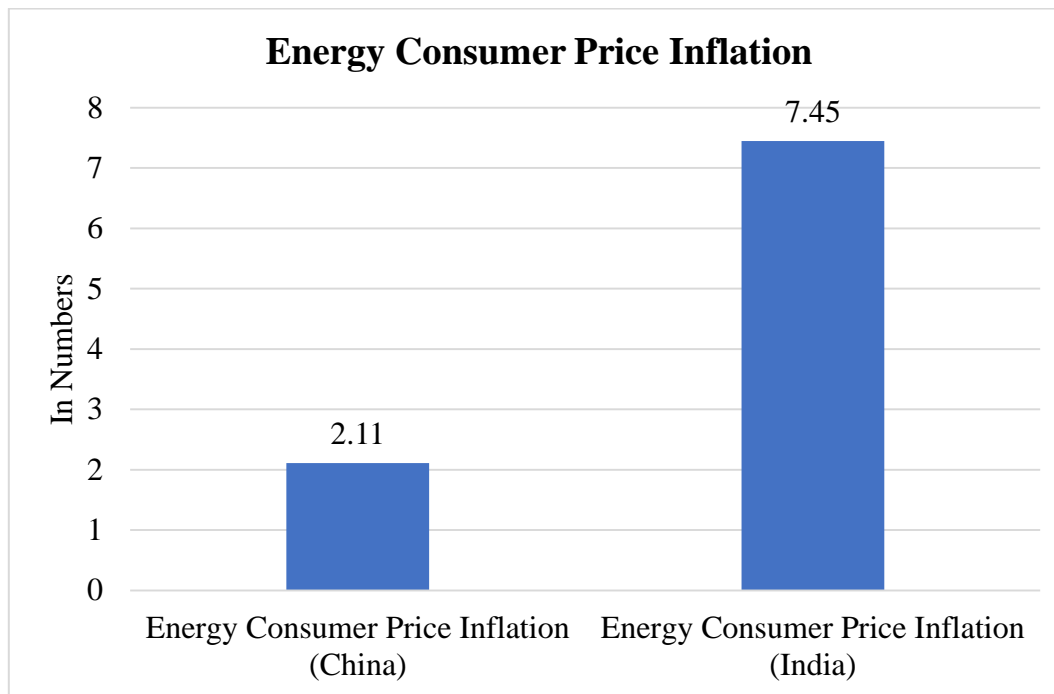
Conclusion: There is a significant difference in Energy Consumer Price Inflation of India and China.

Findings: To understand the findings of hypothesis, mean scores of energy Consumer Price Inflation of India and China is shown in below table.

Paired Samples Statistics	Mean	N	Std. Deviation	Std. Error Mean
Energy Consumer Price Inflation (China)	2.11	13	1.691	.469
Energy Consumer Price Inflation (India)	7.45	13	5.969	1.656

The Paired Samples Statistics table shows that the mean Energy Consumer Price Inflation for China is 2.11%, while for India it is significantly higher at 7.45%, based on 13 paired observations. The standard deviation for China is 1.691, indicating relatively low variability in inflation rates, whereas India shows much higher variability with a standard deviation of

5.969. The standard error of the mean, which reflects the precision of the sample mean estimate, is 0.469 for China and 1.656 for India, reinforcing that India's energy inflation rates not only average higher but also vary more widely compared to China over the observed period. The following information is shown below in bar diagram.



CONCLUSION

The comparative analysis of energy consumer price inflation in India and China from 2010 to 2022 reveals a significant difference in inflation patterns between the two nations. While India experienced higher and more volatile inflation due to greater dependency on energy imports and a market-linked pricing mechanism, China maintained relatively stable inflation through stronger state intervention and diversified domestic energy resources. Although a moderate positive correlation exists between the two countries' inflation trends, it is not statistically significant, indicating that energy inflation in India and China is influenced more by their domestic policies and structural differences than by synchronized external shocks. These findings underscore the need for country-specific energy pricing strategies and policy interventions.

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