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### THE IMPACT OF THE ECONOMIC GROWTH OF CHINA AND INDIA ON OIL PRICES

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#### **ABSTRACT**

In last two decades, the economies of China and India have grown at a very high rate, which exposed them to the need for more energy, including oil. The increase in the demand of oil for these countries is expected to impact the oil prices. This study uses 10-year, quarterly data to investigate whether the economic growth in China and India has affected oil price. To analyze the data, ordinary least square method was applied. The test results of the model revealed that only economic growth in China has had an impact on the oil prices, and not India. The findings of this study are similar to those of some previous studies.

#### **INTRODUCTION**

Oil prices all around the world have a great impact on every economy's health, regardless of the ups and downs of the oil market. This huge impact stems from the impact of oil starting from that on prices, stock markets, and even the gross domestic product. Energy has various forms which are used all around the world to meet the human and country's energy requirements. International Energy Association (IEA) has stated that almost 80% of the globe's prime energy demands are encountered by fossil fuels [1].

The high demand of energy among emerging economies is mainly expected to happen in Asia, which includes China and India. A research done by Asif and Muneer [2] have pinpointed that there are mainly five countries that have a significant impact on global energy situation which are China, India, Russia, UK and USA. Those countries, together, spend on energy a budget which is

about half of the world's budget. China and India, UK and USA are all heavily depending on oil imports for sustenance of their growth, and their demand for energy. The energy consumption, particularly of oil, in emerging economies is expected to grow at an averagely annual rate of 3.2% until 2025 [3].

With all the market crashed and bank runs, prices of oil increase and decrease. Arab countries which are famous and well known for massive oil resources which also impact their economy since beginning are now facing issues like these as well. Basher et al. [4] state that Arab world depends on their oil that is why slight changes in oil prices affect them strongly. Moreover, Allcott et al. [5] pinpoint that in the past cheap oil has buoyed the economy worldwide because customers spend much more out of one excessive dollar in their pocket than manufacturers do. However, in present time that reckoning is less straightforward than it was in previous time.

Besides this, Peersman et al. [6] suggest that after the current drop in crude prices, Russia has declared a 10% cut in public spending. Even Saudi Arabia is decreasing its budget to apportion with its deficiency of 15% of GDP [7]. Furthermore, Kumar et al. [8] indicates that the economies of the Saudi Arabia slowed and dropped further last month, according to monthly trackers of business and economics activity published, as reducing oil prices and a stumbling economy worldwide also hits the region of Saudi Arabia. Selley et al. [9] state that the kingdom cut employing rapidly in the fourth quarter of the same year, trimming its budget deficit from an expected 21 percent of GDP to a real 15 percent of GDP. It decides to cut employing further this following year. Additionally, the oil price has dropped from above US\$110 per barrel eight months ago to about \$30 now, hitting countries budgets and employing in a region or area dependent on the government sector for a growth of the economy. However, according to several analysts, in present time data includes a mounting sign that the effect of low oil prices is starting to hit the country [10]. Additionally, low oil prices are not just clutching Saudi Arabia's local budget, forcing severity on a kingdom not familiar with it. Also, it is getting its toll on Saudi assistance for international projects as well [11].

Oil prices also affect the emerging countries as well. According to a research done by Jahagirdar et al. China being fourth largest producer of oil all around the world, although it could also be seen that they are not from the top exporters and this is due to their heavy consumption of oil in their manufacturing and industrial sector rather than offering it to other countries and markets. Although China's demand for oil is now getting lower and lower and as China is one of the largest importers of oil. Jahagirdar et al. [12] mentioned that "According to a US Energy Information Administration report in 2013, nearly 45% of China's oil consumption was met by domestic production, as one of the world's leading oil importers, China brings in more than 2 billion bbl. each year. Historically, China's seemingly insatiable demand has helped sustain commodity prices at levels higher than recent prices. As for India, a research done by Kotak Securities [13] indicates that India happens to be one of the largest importers of oil around the world. Indian have indicated that a \$5 continuous increase in price per barrel results in a 1.3% inflation increase within one year, and a 0.1% reduction in the GDP [14].

Any change in oil prices and especially a fall would affect India's economy by the following ways: first, the Indian economy depends on oil import about 80% of its total need, which means that any change in price would have an impact on India. Second, because India uses oil a lot in its transportation of goods and services an increase in oil prices would lead to an increase in the commodity prices itself which causes inflation.

In China and India, overall growth is evolving more or less predictably, but imports and the exports flex faster than expected, in part due to a slowdown of investment and manufacturing activity. Demand in China and India is projected to multiply over the coming years. Recognizing the importance of the oil consumption by two major emerging economics, this study investigates the relationship between China and India economic growth and oil prices, and whether both together have an impact on oil prices. The importance of the study is in its attempt to understand the relationship economic growth, which is expected to increase the demand for energy (oil) for these two emerging economies and the oil prices in the world markets. In this regard, 10-year quarterly data is studied for both China and India individually as well as jointly to test the stated relationships.

## METHODOLOGY

### *Model*

The model used in this study is based on equation 1.

$$OP = a + b_I GDP_I + b_C GDP_C + e \quad (1)$$

Where, OP: Oil Prices, GDP<sub>I</sub>: Gross Domestic Product of India, GDP<sub>C</sub>: Gross Domestic Product of China, a: Intercept, e: Error term.

### *Data*

This study is based on the secondary, time series data. The data source was IMF (International Monetary Fund) database; it was used to get data on GDP (Gross Domestic Product), which was taken as a percentage change of GDP both China and India. On the other hand, the data on oil prices was obtained from FRED database (The Federal Reserve St. Louis). The duration of the data obtained is 10 years quarterly data from 2006-2015.

### *Model Testing*

The model of the conducted study will be tested is regression analysis. The regression model is one of the most widely used statistical techniques as it is conducted to check whether the model verifies a fit or not and it helps to predict actual outcomes as well. Two data matrices engage within the model and are named X and Y they are used in order to build up an equation which is  $Y=F(X)$ . Eventually this model will try to explain the relationship and the variations in the Y and X variables. Regression analysis generates an equation for which it can describe the relationship between two variables which are the independent (predictor) variables and the dependent (response) variables.

### *Hypothesis Testing*

The T-Test is considered one of the hypothesis tests that looks through the two means of groups that are statistically different from each other, and normally it is used when a small sample size experiment is conducted and when the variance of two normal distributions are unknown. The statistical test that happens within the t-test is known as t-statistic as it assesses the t statistic, the distribution, and degrees of freedom that show whether the means of the population differ and that is by determining a (P) probability value.

### *Decision*

The hypothesis was tested by applying the t-test, while the significance was tested by using the t-statistics. The p value is to be compared with the significance level of 5% ( $\alpha= 0.05$ ). The null hypothesis of  $\beta= 0$  is rejected if the p-value is less than 0.05 otherwise the null is not rejected.

## **RESULT AND DISCUSSION**

### *Descriptive analysis of GDP*

Based on Table 1, the mean quarterly return of GDP of China was positive 8.905% with a standard deviation of 1.69%, with a kurtosis of 1.308 and skewness of 0.251. Which indicates a hump around the mean of 8.905 is normal. The skewness of 0.25 indicates a slight skew toward the right.

Based on Table 1, the mean quarterly return of GDP of India was positive 7.07% with a standard deviation of 2.05%, with a kurtosis of -0.60 and skewness of -0.09. Which indicates a hump around the mean of 7.07% is normal. The skewness of -0.09 indicates a slight skew toward the left.

Based on Table 1, on the quarterly period of study done on Oil Prices, the mean quarterly return was positive 1% with a standard deviation of 18.65%, with a kurtosis of 2.25 and skewness of -0.69. Which indicates a hump around the mean of 1% is normal. The skewness of -0.69 indicates a slight skew toward the left.

**Table 1:** Descriptive statistics of GDP China, GDP India and Oil Prices

Element	China	India	Oil Prices
Mean	8.905	7.066	1.001
Standard Error	0.268	0.324	2.948
Median	8.950	7.200	0.075
Mode	10.400	6.900	#n/a
Standard Deviation	1.694	2.048	18.647
Sample Variance	2.868	4.195	347.695
Kurtosis	-1.308	-0.603	2.255
Skewness	0.251	-0.085	-0.693
Range	5.700	7.900	106.333
Minimum	6.200	3.000	-58.912
Maximum	11.900	10.900	47.422

Element	China	India	Oil Prices
Sum	356.200	282.650	40.023
Count	40.00	40.000	40.000

### **Model Test Results**

Based on Table 2, the Regression model test results of India's GDP and Oil Prices using the equation 2:

$$OP = -11.927 + 1.830GDP_I + e \quad (2)$$

Where, OP is the dependent Variable, Oil Prices, and  $GDP_I$  is the independent Variable, India's GDP. The test results of the model show that the independent variable, GDP of India, has beta coefficient of 1.830. The t-statistics of the coefficient are 1.265 with corresponding p-value of 0.214. As p-value is greater than the critical value of 0.05, the null hypothesis of zero-beta coefficient is not rejected. It follows that the GDP of India does not have an impact on the oil prices. The explanatory power of the model, represented by its  $R^2$ , says that variance of the GDP of India explains 4 percent of the variance in the oil prices.

**Table 2:** Anova for India

	Coe	S. E	t-stat	p-value	Lower 95%	Upper 95%	Lower 95%	Upper 95%
Intercept	-11.927	10.634	-1.122	0.269	-33.454	9.600	-33.454	9.600
India	1.830	1.447	1.265	0.214	-1.099	4.758	-1.099	4.758

Based on Table 3, regression model test results of China's GDP and Oil Prices using the equation 3:

$$OP = -34.693 + 4.008GDP_C + e \quad (3)$$

Where, OP is the dependent Variable, Oil Prices, and  $GDP_C$  is the independent Variable, China's GDP. The test results of the model show that the independent variable, GDP of China, has beta coefficient of 4.008. The t-statistics of the coefficient are 2.409 with corresponding p-value of 0.021. As p-value is less than the critical value of 0.05, the null hypothesis of zero-beta coefficient is rejected. It follows that the GDP of China has an impact on the oil prices. The explanatory power of the model, represented by its  $R^2$ , says that variance of the GDP of China explains 13.3 percent of the variance in the oil prices. The significance of F-test is 0.021, which is less than 0.05, and then the model is a good-fit model.

**Table 3:** Anova for China

	Coe	S. E	t-stat	p-value	Lower 95%	Upper 95%	Lower 95%	Upper 95%
Intercept	-	15.073	-2.302	0.027	-	-4.180	-	-4.180

	Coe	S. E	t-stat	p-value	Lower 95%	Upper 95%	Lower 95%	Upper 95%
	34.693				65.206		65.206	
India	4.008	1.664	2.409	0.021	0.641	7.376	0.641	7.376

Based on Table 4, regression model test results of India and China's GDP and Oil Prices using the equation 4:

$$OP = -34.911 + 4.668GDP_C - 0.01GDP_I + e \quad (4)$$

Where, OP is the dependent Variable, Oil Prices, and  $GDP_i$  and  $GDP_c$  is the independent Variable, India's GDP and China's GDP respectively. The test results of the model show that the independent variables, GDP of China and GDP of India have beta coefficients of 4.668 and -0.801, respectively. The t-statistics of the coefficients are 2.031 and -0.421 with corresponding p-values of 0.049 and 0.676. P-value of China is 0.049 which is less than the critical value of 0.05; the null hypothesis of zero-beta coefficient is rejected. As p-value in India of 0.676 is greater than the critical value of 0.05, the null hypothesis of zero-beta coefficient is not rejected. It follows that the GDP of India does not have an impact on the oil prices, while the GDP of china does have an impact on Oil Prices. The explanatory power of the model, represented by its adjusted R2, says that variance of the GDP of India and China together explains 9 percent of the variance in the oil prices.

**Table 4:** Anova for India and China

	Coe	S. E	t-stat	p-value	Lower 95%	Upper 95%	Lower 95%	Upper 95%
Intercept	-34.911	15.247	-2.290	0.028	-65.805	-4.017	-65.805	-4.017
China	4.668	2.298	2.031	0.049	0.012	9.324	-0.012	9.324
India	-0.801	1.900	-0.421	0.676	-4.651	3.049	-4.651	3.049

Thus overall, the results of this study provide answers to the research questions that were raised in this study. Although both China and India are huge importers of oil and are highly dependent on it for their growth and prosperity, only economic growth of China has significant impact on the oil prices. The finding is consistent with previous studies on China, some of which have stated that China economic growth have impacted oil prices through the softening of its demand. The test results of R-squared signify that the GDP of China explains Oil Prices by 13.2%, which may suggest that an increase in oil prices as well as the GDP of China will result in an impact on both variables. On the other hand, India did not have any previous study of which it showed that it may have affected the Oil Prices, and this is the reason this study has touched upon this aspect.

## CONCLUSION

The question of the impact of oil prices on the economic growth of China and India resulted in China being significant both univariate and multivariate, while India as seen turned to be not significant both univariate and

multivariate. The conclusion of China came to be similar to previous studies as a research in Stanford University by Jahagirdar et al. [12] was conducted showing China is one of the huge four net exporters around the world although it is not shown due to their high consumption of oil. Adding to that, through the past years China has softened their demand for oil, which may have contributed to the decrease of oil prices. On the other hand, India proved that its GDP had no impact on oil prices. Investors who are investing or who are planning to invest in China should not ignore that Oil Prices impact the economic growth as a whole, and that a higher growth rate means higher price.

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