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A STUDY ON THE IMPACT OF CRUDE OIL PRICE CHANGE ON THE NATURAL RUBBER INDUSTRY IN INDIA

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ABSTRACT

The price of crude oil is a significant element that has an impact on many economic sectors. The study examines the impact of variations in crude oil prices on the price, production, and consumption of natural rubber in India. Correlation analysis, regression analysis, and the Granger causality test are the tools that were employed throughout the investigation, which took place between April 2010 and March 2020. The findings demonstrate that changes in crude oil prices have a considerable impact on the cost of natural rubber. However, changes in the price of crude oil have little impact on the production and consumption of natural rubber. Additionally, rising crude oil prices affect the cost of natural rubber. Even while the price of crude oil continues to rise, the price of natural rubber is still falling, which eventually has an impact on India's rubber farmers.

KEY WORDS: Crude Oil,Granger Causality Test,Correlation analysis,Regression Analysis.

INTRODUCTION

Crude is a commodity that is traded frequently in both the commodities market and the global economy.Currently, crude oil plays a significant role in the economic growth and Gross Domestic Product (GDP) of a country, and supply and demand have a significant impact on crude oil prices and profitability. Crude oil prices have fluctuated significantly throughout history, but recently they have become even more volatile. Oil-importing nations like India are significantly impacted by variations in oil prices, and this volatility is a major source of worry. By causing similar moves in stock prices, exchange rates, inflation rates, and unemployment rates, the unexpected changes in crude oil prices may have an impact on a number of different industries and sectors of the economy. Crude is a commodity that is traded frequently in both the commodities market and the global economy.

By causing similar moves in stock prices, exchange rates, inflation rates, and unemployment rates, the unexpected changes in crude oil prices may have an impact on a number of different industries and sectors of the economy. Crude oil is utilized as a major or secondary source of raw materials for industries including automotive, chemicals, paint, petroleum, etc., hence changes in crude oil prices can have a direct or indirect impact on these industries to varied degrees. Additionally, any increase in oil prices has an impact on the supply and demand for a variety of goods and services,it ultimately drives up the price of such goods' manufacture and delivery. As a result, given that the vast majority of businesses rely on crude oil, the volatility of crude oil prices is anticipated to have a considerable negative impact on the majority of industrial sectors worldwide.

Similar to other countries, India's natural rubber business is similarly impacted by changes in the price of crude oil.[i]This is due to the enormous influence that changes in the price of crude oil can have on the cost of synthetic rubber. Given that processed crude oil is used to make synthetic rubber, fluctuations in the price of crude oil will undoubtedly have an impact on the cost of synthetic rubber. The costs and production of its substitute product, notably natural rubber, may be impacted as a result. Only twenty percent of the total rubber produced in India is synthetic, with the remaining eighty percent being locally

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produced natural rubber. The inexpensive availability of synthetic rubber has caused the demand for natural rubber to drop over time

STATEMENT OF THE PROBLEM

Since crude oil is used to make synthetic rubber, the prices of the two commodities have typically moved in lockstep. However, since natural rubber is the replacement for synthetic rubber, it has had a significant impact on its pricing. When the cost of crude oil increases, the price of synthetic rubber will inevitably climb. Customers may choose natural rubber in this circumstance instead of synthetic rubber. As a result, natural rubber is in higher demand, which benefits rubber producers.However, it has been seen during the past few years that if rubber prices experience a boom, a decline is unavoidable. The drop in natural rubber prices over time, particularly in recent years, nevertheless leaves the rubber growers with insufficient revenues. Because of this circumstance, farmers who grow rubber are forced to switch to other agricultural products, and Indian producers of rubber are forced to reduce their output of natural rubber. Since natural rubber is widely grown in Kerala, this issue has been of great concern to rubber farmers there. Natural rubber's future is significantly influenced by fluctuating oil prices, which are unpredictable. Thus, the study examines the issues caused by fluctuations in crude oil prices that have an impact on the price and output of rubber in India.

REVIEW OF LITERATURE

The strong correlation between natural rubber prices and crude oil prices, exchange rate swings, macroeconomic issues, etc. has been the subject of research studies conducted worldwide. The volatility influence of crude oil prices on the price of natural rubber was identified through an analysis of previous studies. (Hamilton, 2009) tries to investigate the factors that influence fluctuations in crude oil prices and also demonstrates the statistical behavior of pricing as well as crucial aspects of petroleum's supply and demand.The study looked into how variables including speculative pricing of crude oil, delays in or geographical impediments to boosting output, high global demand, and monopolistic pricing of OPEC nations contributed to the spike in crude oil prices in the summer of 2008.

(Raju, 2016) investigated the factors that contributed to the volatility and decline in natural rubber prices in the producing countries. These factors included the sharp decline in crude oil prices, the decline in synthetic rubber prices, the economic slowdown in both developed and developing nations, and the depreciation of currencies in natural rubber exporting nations. Due to the co-integration of the domestic and global markets, fluctuations in the price of natural rubber on the global market have an impact on its price on the home market. (Pareed&Kumaran, 2017) carried out a study by assessing the costs of natural rubber throughout the course of the six months that concluded in March 2016. According to the findings, natural rubber changes by 0.68 percent for every 1% fluctuation in oil prices.

The DCC-BVGARCH model was used by (Kumar &Maheswaran, 2013) to examine the volatility dynamics of crude oil on the stock prices of industrial sectors. The positive spillover effect of oil prices on the metals sector returns and the negative spillover effect of oil prices on the auto sector are both evident. In the case of volatility spillover, the price of crude oil has a short-term beneficial influence on the energy sector and the auto industry, but it has a long-term negative impact. During the 2008–2009 global financial crisis, conditional correlations between the crude oil market and the Indian manufacturing sectors peaked.

According to Joseph et al. (2018), it has long been believed that having a wealth of natural resources slows down economic growth, but the innovation system methodology shows that this is not the case. According to Tran (2020), there are the following categories of risks related to rubber production: natural disasters, price fluctuations, an unstable legal system, widespread illness, disease, and epidemics, farming practices, and quantifiable damages affecting the rubber industry. According to Goh et al. (2016),

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rubber price volatility is a substantial risk that has an impact on producers, consumers, dealers, and others. As a result, precisely projecting rubber prices would be very helpful in making decisions.

RESEARCH GAP

Since research on the impact of changes in crude oil prices on the Indian natural rubber business has been lacking, our study fills that gap. The majority of study has focused on the volatility of crude oil prices and how it affects stock markets, commodities markets, industries like the automotive, tire, energy, and mining as well as a few macroeconomic indicators like GDP, inflation, etc. Studies on rubber's production, consumption, imports, and exports have been conducted in Malaysia, Thailand, and other countries with a particular emphasis on the impact of price changes. The spot prices of crude oil and natural rubber in India were not taken into consideration in any competent analysis of the Indian situation. Most of them made use of information on crude oil prices in US dollars.

There has been a lot of research done on the effects of changes in crude oil prices on the synthetic rubber business, but nothing has been done to determine the relationship between crude oil prices and the price of natural rubber. The demand for natural rubber from the automotive and tyre industries, changes in crude oil prices, and climate changes are some of the variables that have been recognized and studied as influencing natural rubber pricing in India. The rubber industry, where the price of crude oil is a significant factor impacting the pricing of natural rubber in India, has not yet conducted a significant study to assess the impact of crude oil price changes on the industry. As a result, this study investigates how variations in crude oil prices affect India's natural rubber sector.

OBJECTIVES OF THE STUDY

1. To examine the correlation between Indian natural rubber prices and crude oil prices.
2. To determine the effect of crude oil prices on the price of natural rubber in India .
3. To evaluate whether changes in crude oil prices affect India's production and consumption of natural rubber.

METHODOLOGY USED

The study is an analytical research on secondary data collected from various published sources such as websites, journals, newspaper etc. The independent variable selected for this study is crude oil prices (COP) and the dependent variables are natural rubber prices (NRP), production of natural rubber (PNR) and consumption of natural rubber (CNR). Data related to daily prices of crude oil in India is extracted from Multi-Commodity Exchange (MCX) of India and the monthly average natural rubber prices of Ribbed Smoked Sheet (RSS-4), traded in the domestic market are collected from Indian Rubber Board, Kottayam. Monthly production and consumption of natural rubber are also gathered from Indian Rubber Board, Kottayam. Utilizing methods like the Unit Root Test, Correlation Analysis, Regression Analysis, and Granger Causality Test, the data are studied in E perspectives. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests are used to check the stationarity of all series at the 5% level of significance. We employ correlation analysis to investigate the connection between crude oil prices and natural rubber prices. We use regression analysis to calculate the impact of crude oil prices on the cost of producing and consuming natural rubber. Using historical crude oil prices, we use the Granger causality test to project natural rubber prices into the future.

FINDINGS & DISCUSSIONS

To assess if the time series data is stationary or not, the Augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) tests are used as unit root tests. If a dataset has a unit root, which can be used in future regression analysis, it is considered to be non-stationary. Here, stationarity has been investigated for the variables crude oil prices (COP), natural rubber prices (NRP), production of natural rubber (PNR), and consumption of natural rubber (CNR). The results of the unit root tests are shown in Table 1

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TABLE1:Results of unit root test using ADF test and P Ptest

	ADFTEST		PPTEST	
VARIABLES	**LEVEL**	**1ST DIFFERENCE**	**LEVEL**	**1ST DIFFERENCE**
CrudeOilPrices(COP)	-2.469761	-7.434095**	-2.197278	-7.462011**
NaturalRubberPrices(NRP)	-2.005162	-8.499082**	-1.811168	-8.487768**
ProductionofNaturalRubber (PNR)	-1.153941	-3.612108**	-4.803884**	-
ConsumptionofNaturalRubber(CNR)	-1.432551	-13.90907**	-2.272569	-18.02196**

**thenullhypothesisisrejectedata5%significancelevel

The Augmented Dickey-Fuller (ADF) test shows that the prices of crude oil (COP), natural rubber (NRP), production of natural rubber (PNR), and consumption of natural rubber (CNR) are non-stationary at the level but stationary at the first difference (0.05 level of significance). The Phillips-Peron test for unit root reveals that whereas production of natural rubber (PNR) is stationary at the level itself, crude oil prices (COP), natural rubber pricing (NRP), and natural rubber consumption (CNR) are stationary at the first difference.

Covariance Analysis: Ordinary

Date: 08/31/18 Time: 23:11
Sample: 2010M01 2020M03

Included observations: 123.

Correlation	NRP	COP
NRP	1.000000	
COP	0.513295	1.000000

t-Statistic	NRP	COP
NRP	-----	
COP	6.579081	-----

Probability	NRP	COP
NRP	-----	

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COP	0.0000	-----

The correlation analysis, which is used to assess the degree to which there is a relationship between the prices of crude oil and natural rubber, is shown in the above table. The correlation between crude oil and natural rubber prices in these results is roughly 0.513295, indicating that both variables move in the same direction. This indicates that there is a significant positive correlation between the prices of crude oil and natural rubber. As a result, when the price of crude oil rises, so do the prices of natural rubber and vice versa.

TABLE2: Results of Regression Analysis

DependentVariable	Coefficient	t-statistics	R-squared	ProbabilityValue
D(NRP)	0.945285	3.887919	0.111874	0.0002
D(PNR)	0.446799	0.135567	0.000153	0.8924
D(CNR)	1.228173	1.438601	0.016954	0.1529

The results of the regression analysis are shown in the previous table. The findings indicate that there is a high positive correlation between the prices of crude oil and natural rubber, with the coefficient of crude oil price being 0.945285, according to the data. According to this, the price of natural rubber rises by 0.945285 units for every unit that the price of crude oil rises. The output's p-value for the price of crude oil is 0.0002, which is less than 0.05. It informs us that the price of crude oil is noteworthy at a 5% level of confidence. As a result, the price of crude oil has a big impact on the cost of natural rubber. R-square is 0.111874, indicating that it is possible to rely on the price of crude oil.

A favorable relationship between the price of crude oil and the production of natural rubber can be seen in the regression output. It shows that a unit rise in the price of crude oil results in a 0.446799 unit increase in the production of natural rubber. The price of crude oil has a p-value of 0.8924, which is higher than 0.05. Additionally, the R-square value is 0.000153, indicating that there is no statistically significant relationship between crude oil prices and the production of natural rubber.

However, the regression analysis shows a favorable correlation between the price of crude oil and the usage of natural rubber. The price of crude oil has a coefficient of 1.228173. In other words, the consumption of natural rubber increases by 1.228173 units for every unit that the price of crude oil rises. The price of crude oil has a p-value of 0.1529, which is higher than 0.05. As a result, the consumption of natural rubber is not considerably impacted by the price of crude oil.The R-square value is 0.016954, indicating that crude oil price changes account for 1.69% of changes in natural rubber consumption.

The study finds a significant correlation between crude oil prices and natural rubber prices when assessing their effects. This indicates that the price of natural rubber rises when the price of crude oil is on the rise. The prices of natural rubber are still falling or declining for rubber growers in India on the current domestic market. This circumstance may be the cause of how little the price of crude oil has an impact on the local market's production and consumption of natural rubber.

Pairwise Granger Causality Tests

Date: 09/11/18 Time: 12:34

Sample: 2010M01 2020M03

Lags: 2

NullHypothesis:	Obs	F-Statistic	Prob.
NRPdoesnotGrangerCauseCOP	121	2.15183	0.1209

COPdoesnotGrangerCauseNRP	4.26047	0.0164

The output from the above table reveals the relationship between the prices of crude oil and natural rubber. It makes it possible to predict the price of natural rubber using the price of crude oil. We discovered that the p-value is 0.1209, which is higher than 0.05, when comparing the price of natural rubber and the price of crude oil. Therefore, we agree with the null hypothesis. Thus, the price of crude oil is not Granger caused by the price of natural rubber. On the other hand, the results show that the p-value is 0.0164, which is less than 0.05, when the prices of crude oil and natural rubber are compared. Therefore, we rule out the null hypothesis that rising crude oil prices are a direct cause of falling natural rubber prices. As a result, there is a one-way causal relationship between the prices of crude oil and natural rubber.

SUGGESTIONS

The government must make sure that the market volatility for crude oil does not negatively impact the market for natural rubber because there is a close relationship between the markets for the two commodities. Previous studies have shown that a rise in crude oil prices has helped to reinvigorate the market for natural rubber and its price. Given that crude oil is used to make synthetic rubber, which has a strong link with the price of natural rubber, a rise in crude oil prices might theoretically be used to boost natural rubber prices. However, the price of rubber is remains between Rs. 130 and Rs. 150 per kilogram, which has prevented farmers from tapping the resource.

The rubber farmers are the ones who are most negatively impacted by the low price of natural rubber. Government should raise rubber's Minimum Support Price (MSP).so that even in the event of a dynamic shift in crude oil prices, it does not fall below the price anticipated by the farmers. Controlling the flow of rubber imports and increasing the import tariff are necessary to protect the interests of domestic rubber producers. Only when domestic natural rubber prices are stabilized can natural rubber output increase. By satisfying the need of the tyre industries, the market for natural rubber must be boosted.

CONCLUSION

In order to understand the impact of crude oil price fluctuations on the production (PNR) and consumption (CNR) of natural rubber, the paper examined the relationship between crude oil prices (COP) and natural rubber pricing (NRP). The analysis found a significant positive correlation between the prices of natural rubber and crude oil. Therefore, if the price of crude oil (COP) rises, the price of natural rubber (NRP) will also rise. This further demonstrates the existence of a significant impact of crude oil prices on the price of natural rubber. The study also confirmed that there is a significant impact of crude oil prices on the production (PNR) and consumption (CNR) of natural rubber. The causality test shows that the crude oil price granger causes the price of natural rubber, and that this helps rubber growers and many sectors estimate natural rubber prices.

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