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A STUDY ON IMPACT OF CRUDE OIL PRICES ON INDIAN ECONOMY WITH SPECIAL REFERENCE TO CURRENCY RATES

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ABSTRACT

Oil is very important raw material as most of the petrochemicals are used in Industrial activities for manufacturing other goods and especially used as a fuel in vehicles for transportation. It is found that 80 percent of the demand of crude in India is fulfilled through imports of crude oil.

Since crude oil is traded in dollars in the international market also known as “petrodollar” and bills for import needs to be settled in dollars India needs a huge amount of forex reserves for import payments. Since India is continuously facing a trade deficit, it will have to find out ways to reduce the trade deficit leading to inflation in the country.

There is a hidden string that ties currencies to crude oil. With the price actions in one venue, it forces a sympathetic or opposing reaction in the other. This correlation persists for many reasons, including resource distribution, the balance of trade (BOT), and market psychology.

As per the latest reports, both imports and exports have seen a fall as the coronavirus pandemic hurts the demand all over the globe. So, In this article an attempt is made to explain the impact of Crude Oil prices on Indian currency Rate against the major currencies and the correlation between them.

Keywords: petrochemicals, crude oil, inflation, currencies.

Introduction

COVID-19 created various operational and financial challenges for Indian businesses. During the period of lockdown, nearly 71.31 percent of the businesses suffered from reduced cash flows with the manufacturing sector being the worst hit. Delay and cancellation of many projects have also been a

major cause of concern. Gradually, a few macroeconomic and industry variables have begun to show noticeable growth, suggesting a rebound in the Indian economy. Power consumption has risen steadily and there has been an increase in petrol and diesel consumption; UPI, IMPS transactions were at a record high in September; E-way bill volume rose by 9.6 percent to 57.4 million in September; Electronic toll volume at 110.08 million in September.

Oil and Gas Sector in India:

Oil and gas sector is one of the eight core industries in India and it plays a major role in influencing decision making for all the other important sections of the economy. India's economic growth is closely related to its energy demand, hence, the need for oil and gas is projected to grow more, thereby making the sector quite conducive for investment. The Government has also adopted several policies to fulfil the increasing demand allowing 100 percent Foreign Direct Investment (FDI) in many segments of the sector, including natural gas, petroleum products and refineries among others.

Market Size

India's Crude Oil import rose sharply to US\$ 101.4 billion in the year 2019 - 20 from US\$ 70.72 billion in 2016 - 17. As on August 01, 2020, oil refining capacity of India has stood at 249.9 million metric tonnes (MMT), making it the second-largest refiner in Asia. Private companies own about 35.29 percent of the total refining capacity in FY2019 - 20. The crude oil production in India stood at 30.5 MMT, while the crude oil import has increased to 4.54 mbpd from 4.53 mbpd in FY 2019 - 20. The consumption of petroleum products grew by 4.5 percent to 213.69 MMT during FY 2019 - 20 from 213.22 MMT in FY 2018 - 19.

Investments

According to the data released by Department for Promotion of Industry and Internal Trade Policy (DPIIT), the petroleum and natural gas sector attracted FDI worth US\$ 7.82 billion between April 2000 and March 2020.

Road Ahead

Energy demand of India is anticipated to grow faster than energy demand of all major economies on the back of continuous robust economic growth. India's energy demand is expected to double to 1,516 Mtoe by 2035 from 753.7 Mtoe in 2017. Moreover, the country's share in global primary energy consumption is projected to increase by two-fold by 2035. The Crude oil consumption is expected to grow at a CAGR of 3.60 percent to 500 million tonnes by 2040 from 221.56 million tonnes in 2017. The Natural Gas consumption is forecast to increase at a CAGR of 4.18% to 143.08 million tonnes by 2040 from 58.10 million tonnes in 2018. The demand for diesel is expected to double to 163 million tonnes (MT) by 2029-30.

Crude Oil Production in India

The Crude Oil Production in India averaged 695.39 BBL/D/1K from 1994 until 2020, reaching an all-time high of 813 BBL/D/1K in November of 2010 and a record low of 526 BBL/D/1K in May of 1994.

In April 2020, when US crude oil prices plunged below the zero-dollar mark into negative territory for the first time in history, it sent shockwaves around the global energy industry.

As stunned oil investors and countries watched, the West Texas Intermediate (WTI) crude futures plunged to -\$37.63 a barrel - a dive or more than 305 per cent. The price plunge was quite inevitable in the aftermath of the near-decimation of the energy industry as the Coronavirus pandemic raged worldwide. But for India, it was a blessing in disguise. Swiftly mobilising its resources, India

began buying from the spot crude oil market and topping up its Strategic Petroleum Reserves (SPR) – a move that helped to save the country by an estimated \$670 million in foreign exchange.

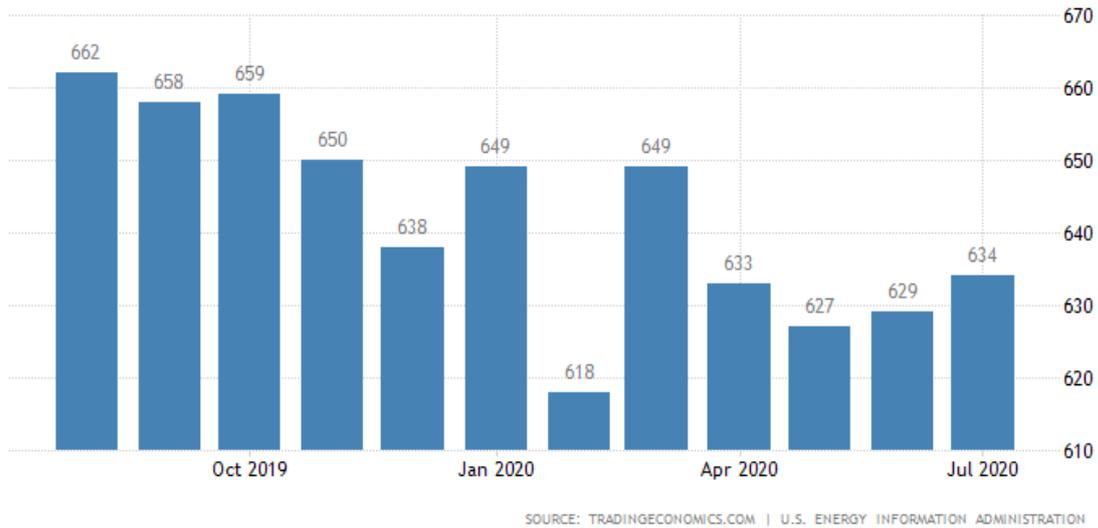


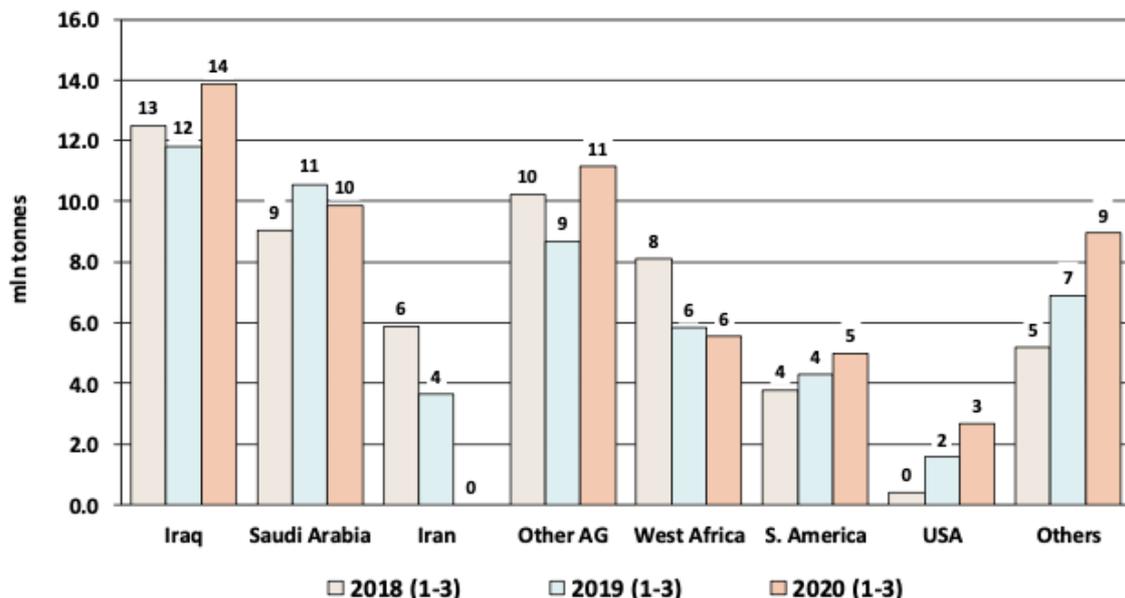
Fig. No. 1

Even though the pandemic heavily impacted key end-user segments such as transportation and manufacturing sectors and significantly reduced the demand for fuel products in India, refiners were quick to re-align their operating models and supply chain cycles to ensure business continuity. The gradual appreciation of refinery utilisation – one of the most critical and price-sensitive aspects of the energy industry in India – will thus enable refining companies to remain focused on key growth projects that would ensure India’s long-term competitiveness to deliver strong future growth.

India’s Crude Oil Imports:

India, which is 83 per cent dependent on imports to meet its oil needs, bought 111.4 million tonnes of crude oil from overseas during April – September 2020. Iraq is India's top crude oil supplier, meeting close to one-fourth of the total demand. Saudi Arabia has traditionally been India's top oil source, but has been relegated to the second spot, exporting 20.7 million tonnes of crude oil in the first six months.

India - Crude Oil Imports by Source in Jan-Mar
(mar 2020 ; source: refinitiv ; seaborne only ; in mln tonnes)



India Crude Imports by Source in Jan-Mar 2020

(mar 2020 ; source: refinitiv ; % of import volume)

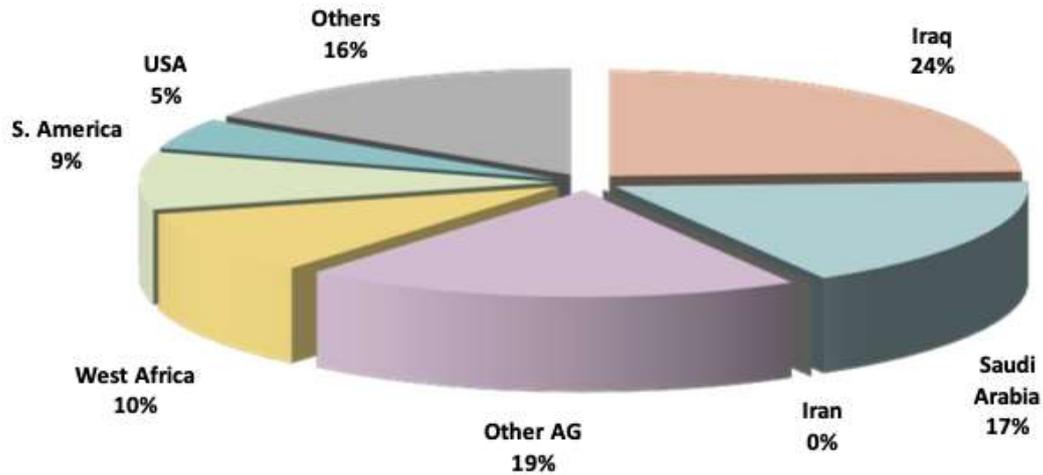


Fig. No. 2

India's crude oil imports dropped to 2.82 million b/d in June, the lowest observed at least since early 2017. Consumption and demand were highly affected earlier this year, especially during the lockdown, which later on showed a quick recovery. India imported 5.14 million b/d of crude oil in July, up 82 percent month-on-month and 23 percent up year-on-year. This has been the highest recorded so far in Commodities at Sea, suggesting that the country quickly filled the gap developed in June. The average of June and July stands marginally below four million b/d, very close to levels of normal activity.

High volatility is expected to become the new normal in India's oil demand, as COVID-19 seems to be highly affecting the population's habits. Much more people recently started preferring to commute with their own vehicles, which could be a considered parameter having an impact on crude oil imports and demand for fuels. If this trend lasts, crude oil imports could be further strengthened while the domestic market could potentially absorb more refined products, keeping clean exports at low levels.

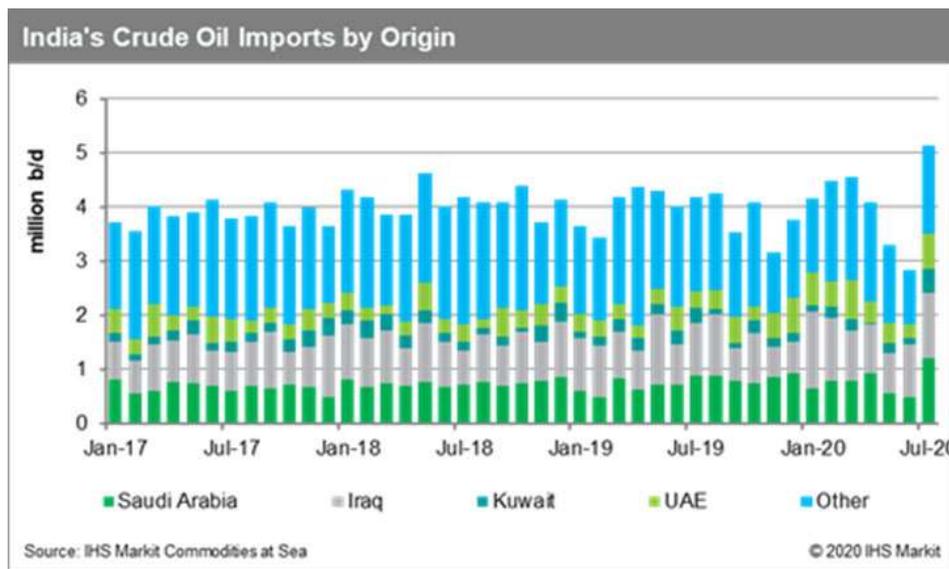


Fig. No. 3

Imports of crude oil from both Saudi Arabia and Iraq increased impressively, with flows from each country surpassing 1.2 million b/d in July. This has been a massive growth of 154% for Saudi Arabia and 24% for Iraq month-on-month.

Meanwhile, oil product exports fell further in July, down about 4.6 percent month-on-month and 21 percent since last year. This has been primarily driven by the decline observed in diesel exports. Some refineries have been under maintenance since late third quarter of 2020.

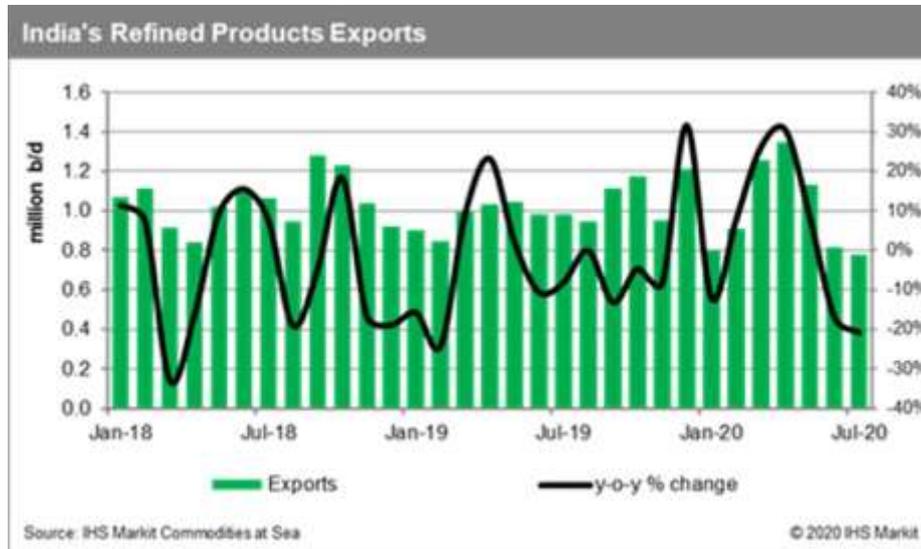


Fig. No. 4

Literature Review:

Krugman (1980) builds a theoretical dynamic partial-equilibrium portfolio model of an oil price increase influence on exchange rates in a world consisting three countries: United States of America, Germany and OPEC. According to him, the short-run and the long-run effects of the oil price increase will be opposite such as an increase in oil price at first induces dollar appreciation but then it turns into dollar depreciation. The effect of an oil price increase on exchange rate depends on "the share of local currency in OPEC's portfolio", "the share of country's goods in OPEC imports", and "the country's share in world oil imports

Rautava (2004) studied the effects of oil prices and exchange rates in Russian economy. Quarterly data from 1995 first quarter to 2002 last quarter is used for analysis, which shows that increase in oil prices have positive impact on GDP and permanent appreciation of exchange rate reduces GDP thus effect of oil price changes can be balanced by changes in exchange rate

Huang and Guo (2007) in their study for the period of 1990- 2005 found similar results for China that real oil price leads to an appreciation in long-run real exchange rate.

Reboredo (2012) does a correlation analysis between oil price and exchange rate trying to model them. In the model daily data from January 4, 2000 to June 15, 2010 is used, in which it is found that oil price increase is weakly associated with dollar depreciation and vice-versa depending on co-movement intensity.

Lizardo and Mollick (2010) in their study includes oil price to the monetary exchange rate model for 17 net oil exporter countries. They conclude that, oil price increases lead to a considerable depreciation of US dollar in a net oil exporter country.

Benhabib et al. (2014) using cointegration analysis and VAR model on monthly data, studied the relationship between oil price and nominal exchange rate in Algeria for the period of 2003-2013, in

which he finds that there is no cointegration relationship between the variables. However, unlike the other studies, VAR analysis shows that increasing oil prices lead Algerian currency to depreciate.

Methodology of the Study:

The study used the data on the Crude oil prices in US Dollars and the currency exchange rates of four major currencies – US Dollar, Pound Sterling, Euro and Japanese Yen for the period of 12 months from November 2019 to October 2020. The data is analysed using the Statistical tools like Mean, Standard Deviation and Correlation.

Analysis and Interpretation of data:

Table No. 1: Exchange rates of Rupee against major currencies

Month	US Dollar (₹)	Pound Sterling (₹)	Euro (₹)	Japanese Yen (₹)
Oct 2020	73.4807	95.5242	86.4981	69.9050
Sep 2020	73.3091	96.2121	86.9371	69.4150
Aug 2020	74.2870	98.0526	87.8502	70.2250
July 2020	75.1768	95.8779	86.8816	70.9150
June 2020	75.5031	93.1100	84.3781	70.1550
May 2020	75.7136	93.7615	83.3749	70.7750
April 2020	75.4713	93.7370	81.9169	70.3750
Mar 2020	73.8140	92.9082	81.4051	68.1900
Feb 2020	71.8849	93.6029	79.3861	66.1300
Jan 2020	71.4407	94.1514	79.4237	65.6350
Dec 2019	71.4979	93.0666	79.4540	65.5000
Nov 2019	71.3027	92.2548	79.0474	65.5800

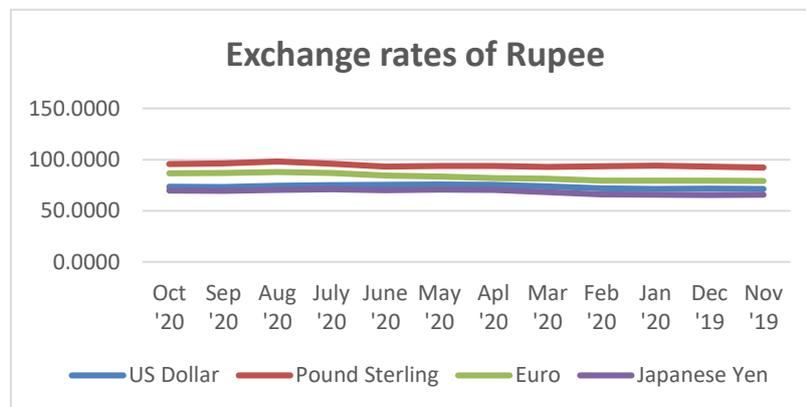


Fig. No. 5

Interpretation:

It is observed that during the initial period of study, all major currencies got strengthened against rupee, which later on got depreciated. As the Indian economy has geared up with the initiative of 'Atmanirbhar Bharath', changing FDI Policies and the ban of Chinese apps, rupee started gaining its value against the major currencies of the world in the recent months.

Table No. 2: Relationship between US Dollar exchange rate and Crude Oil Prices

Month	US Dollar exchange rate (₹)	Crude oil price (\$ per barrel)
Oct 2020	73.4807	37.255
Sep 2020	73.3091	41.49
Aug 2020	74.2870	41.81
July 2020	75.1768	40.045
June 2020	75.5031	37.355
May 2020	75.7136	27.635
April 2020	75.4713	19.575
Mar 2020	73.8140	33.615
Feb 2020	71.8849	47.435
Jan 2020	71.4407	56.37
Dec 2019	71.4979	58.51
Nov 2019	71.3027	55.685
Mean	73.5735	41.39833333
Std Dev.	1.6326	11.2520471
Correlation	-0.871623676	

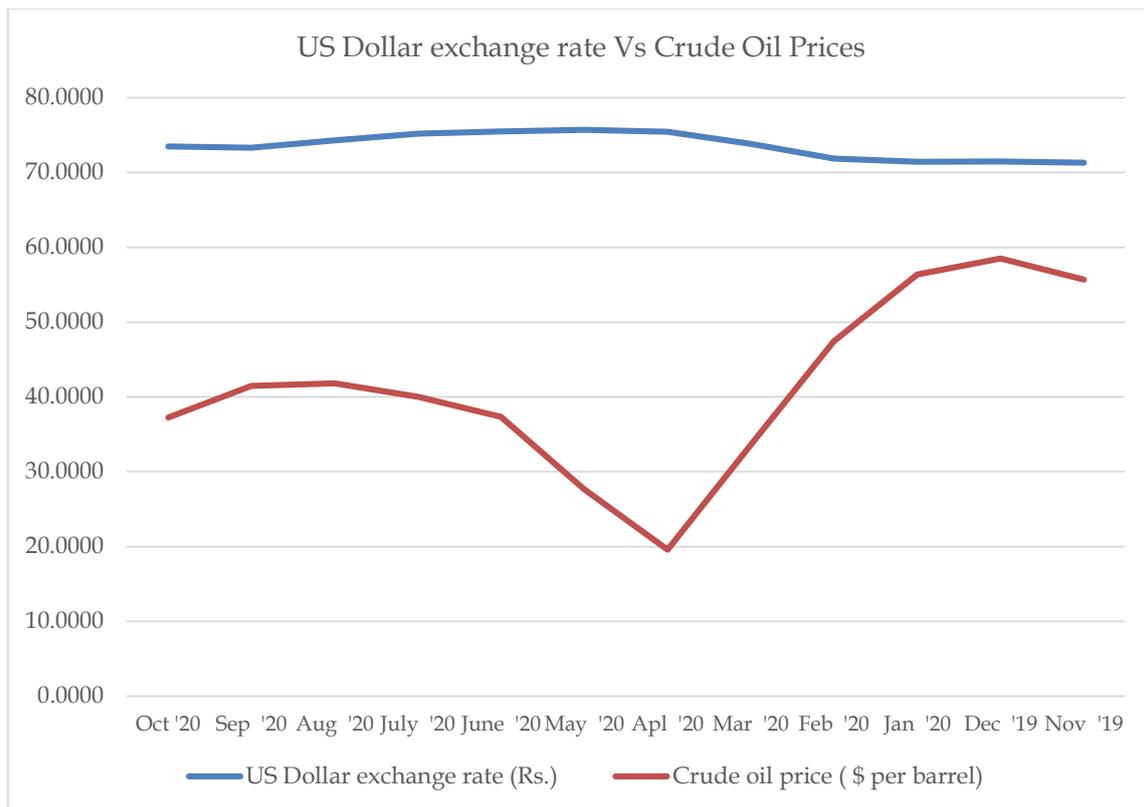


Fig. No. 6

Interpretation:

It is observed that there is a negative correlation between US Dollar exchange rate and crude oil prices. The crude oil prices fell in the initial period of study, basically due to the lock down imposed at many countries which increased the amount of crude oil imports by India. The crude oil import became a substantial source of demand for dollar in India's foreign exchange market, which contributed to

strengthen the dollar against Indian rupee especially in the month of April, 2020 when the price fell drastically to \$19.575 per barrel from \$ 33.615 per barrel in March 2020. Later on, as the lock down got released, the crude oil prices started increasing and India reduced the volume of oil imports which is reflected in the form of weak dollar against rupee as observed in recent months.

Table No. 3: Relationship between Pound Sterling exchange rate and Crude Oil Prices

Month	Pound Sterling (₹)	Crude oil price (\$ per barrel)
Oct 2020	95.5242	37.255
Sep 2020	96.2121	41.49
Aug 2020	98.05255	41.81
July 2020	95.87785	40.045
June 2020	93.11	37.355
May 2020	93.7615	27.635
April 2020	93.73695	19.575
Mar 2020	92.9082	33.615
Feb 2020	93.6029	47.435
Jan 2020	94.15135	56.37
Dec 2019	93.06655	58.51
Nov 2019	92.2548	55.685
Mean	94.3549	41.39833333
Std Dev.	1.6295	11.2520471
Correlation	-0.122276152	

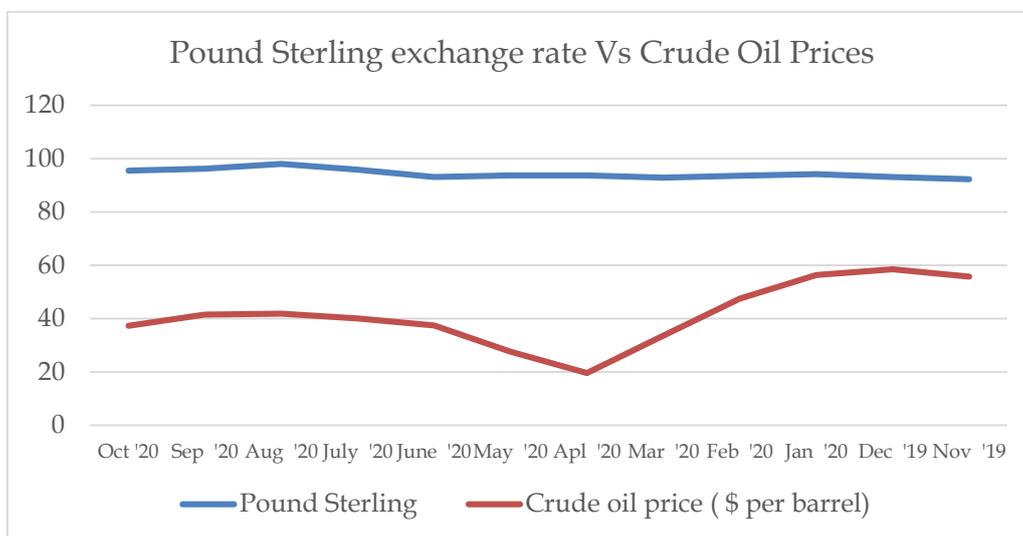


Fig. No. 7

Interpretation

As per the above statistics, there exists a negative correlation between Pound exchange rate and crude oil prices. The crude oil prices fell in the initial period of study, basically due to the lock down imposed at many countries which increased the amount of crude oil imports by India. This strengthened the pound sterling against Indian rupee especially in the month of April, 2020 when the price fell drastically to \$19.575 per barrel from \$ 33.615 per barrel in March 2020. Later on, as the lock

down got released, the crude oil prices started increasing and India reduced the volume of oil imports which is reflected in the form of weak pound against rupee as observed in recent months.

Table No. 4: Relationship between Euro exchange rate and Crude Oil Prices

Month	Euro exchange rate (₹)	Crude oil price (\$ per barrel)
Oct 2020	86.49805	37.255
Sep 2020	86.93705	41.49
Aug 2020	87.8502	41.81
July 2020	86.88155	40.045
June 2020	84.3781	37.355
May 2020	83.37485	27.635
April 2020	81.9169	19.575
Mar 2020	81.40505	33.615
Feb 2020	79.3861	47.435
Jan 2020	79.4237	56.37
Dec 2019	79.45395	58.51
Nov 2019	79.0474	55.685
Mean	83.0461	41.39833333
Std Dev.	3.241739086	11.2520471
Correlation	-0.421683318	

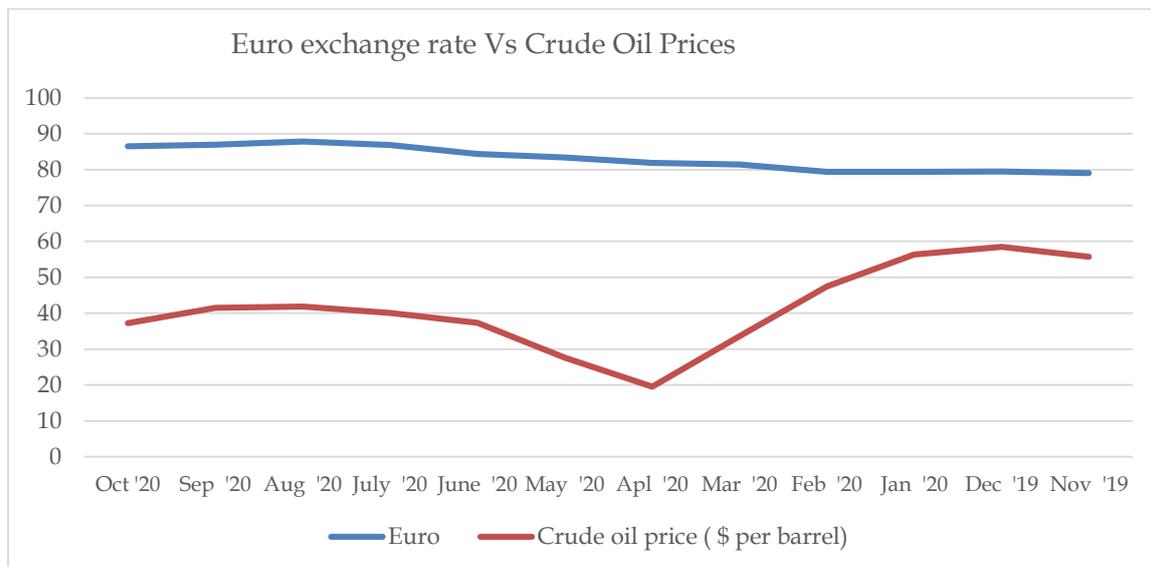


Fig. No.8

Interpretation

The above data shows a negative correlation between Euro exchange rate and crude oil prices. The crude oil prices fell in the initial period of study, basically due to the lock down imposed at many countries which increased the amount of crude oil imports by India. This strengthened the Euro against Indian rupee till August 2020. Later on, as the lock down got released, the crude oil prices started increasing and India reduced the volume of oil imports which resulted in decreased value of Euro against rupee in the last two months.

Table No. 5: Relationship between Yen exchange rate and Crude Oil Prices

Month	Yen exchange rate (₹)	Crude oil price (\$ per barrel)
Oct 2020	69.905	37.255
Sep 2020	69.415	41.49
Aug 2020	70.225	41.81
July 2020	70.915	40.045
June 2020	70.155	37.355
May 2020	70.775	27.635
April 2020	70.375	19.575
Mar 2020	68.19	33.615
Feb 2020	66.13	47.435
Jan 2020	65.635	56.37
Dec 2019	65.5	58.51
Nov 2019	65.58	55.685
Mean	68.5667	41.39833333
Std Dev.	2.130016954	11.2520471
Correlation	-0.817294581	

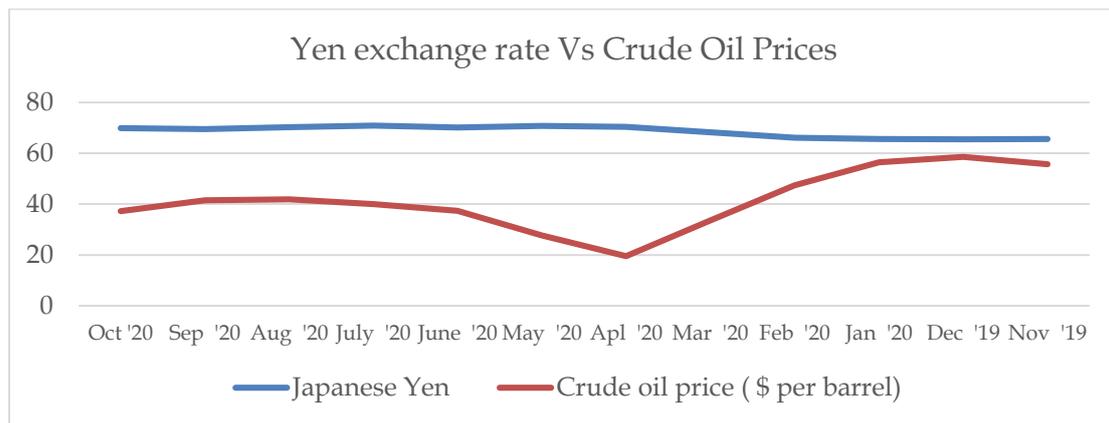


Fig. No. 9

Interpretation:

There is a negative correlation between Yen exchange rate and crude oil prices. The crude oil prices fell in the initial period of study, basically due to the lock down imposed at many countries which increased the amount of crude oil imports by India. This strengthened the Yen against Indian rupee till May 2020. Later on, as the lock down got released, the crude oil prices started increasing and India reduced the volume of oil imports which resulted in decreased value of Yen against rupee during the recent months.

Conclusion

The current paper examined the impact of crude oil prices on the rupee exchange rate against the four major currencies = US Dollar, Pound Sterling, Euro and Japanese Yen using time series data from November 2019 to October 2020. Oil price were decreasing continuously in the initial months, which increased the volume of Indian import of crude oil, pushing up the demand for major currencies which strengthened them against rupee. This led to a reduced purchasing power of Indian currency in the international market. Gradually, there is a positive move that is found in the value of Indian currency which is a good sign for the Indian economy. In addition, India is also planning to become

independent with regard to its crude oil requirements which may possibly strengthen Indian rupee against the major currencies of the world.

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