ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 7| Issue: 9| September 2021|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2021: 8.047 || ISI Value: 1.188

A STUDY WITH SPECIAL REFERENCE ON SELECT COMMODITIES DURING PRE AND POST PANDEMIC ESTIMATION OF COMMODITY TREND THROUGH HORDRIC PRESCOTT FILTER

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ABSTRACT

This study estimates the select commodities in Pre and Post COVID-19. The main objective of the study estimate the relationship between select commodities on macroeconomic variables during pre and post pandemic, for the study historical price of select commodities under the sector such as bullion, energy and metals, from the study period were segregated on the basis of lock down from 11 months prior to COVID-19 and 11 months after to COVID-19 (May 2019 to March 2020 and April 2020 to January 2021). Augmented Dickey Fuller Unit Root Test is used for checking the stationarity of the price series, Correlation Analysis is used to find the relationship between commodities under the sector such as bullion, energy and metals on macroeconomic variables during pre and post pandemic and Hordrick Prescott filter is employed for estimating the Trend of Gold, Silver, Copper, Zinc, Lead, Nickel, Aluminium, Crude oil and Natural gas in pre and post COVID-19. The study finally conclude that the closing price of such commodities during pre and post pandemic.

KEY WORDS: ***Closing price, Trend, Augmented Dickey Fuller Unit Root Test, Hordrick Prescott Filter.***
JEL Classification: G11, G13, G14

INTRODUCTION

Commodities plays a major role in day to day life and it is a symbol of wealth and prosperity some millennium years ago. As quoted by Warren Buffet "Commodities is a way of going long a fear". It is used as a fiat money and considered as sentimental money for people in India. It is also used as a investment in Stocks, Commodities, Securities, Currencies etc., In ancient days commodities has considered as the legalized currencies for different countries and treated as a medium of exchange for goods and services. Basically investors used commodities to hedge against political risk and inflation for their investment. The impact of COVID-19 on commodities has been uneven, and could have lasting effects," said **, World Bank** " When decreases in commodity prices are fugitive, policy stimulus can hedge their impact. However, when prices remain dejected for an extended period, policy makers need to find solutions immediately. Commodities is considered to be one of the safest heavens for investors. When coronavirus or COVID 19 declared as global pandemic, investors globally turned towards commodities for some period as it was steady with its performance. The base metal performance was very bad after the coronavirus passed to over 21 countries. In order to overcome the spread of virus many countries have announced lockdown. It was after the lift of lockdown, the things started looking a bit better. So their economies can rearrange smoothly to a new normal. Thus there is a sharp decreasing trend of commodities price during the corona pandemic and turned global health crisis into an economic one. As the Corona deepened in March the investors averse the risk initially and flocked into cash to recover the loss. It was responsible for record highs for gold, and record lows for crude oil. Despite this, almost all commodity prices recovered in the third quarter of 2021.

REVIEW OF LITERATURE

Chandrika (2020)[1] has expressed when corona virus or COVID 19 declared as global pandemic, investors globally turned towards gold for some period as it was steady with its performance. Later, the prices have come down and now there is all

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time high record in gold prices in India. Researcher focused the gold derivative market performance in India with regard to pre and post COVID 19 period. The daily closing prices of gold futures traded in Multi Commodity Exchange of India Limited are taken for a period of one year for the purpose of study. Statistical operations are performed with the help of E-views. Time series models like ADF test, are used to study the stationarity to examine the performance of gold futures during the pre and post corona virus period.

Paramita Mukherjee, Samaresh Bardhan (2020)[2] This paper attempts to explore the relationship between the stock prices and the prices of two mostly traded commodities in the derivatives market, viz. crude oil and gold in the Indian context. Based on the daily data during 2017-2020, the paper employs ARDL model in order to estimate the long-term relationships. It also finds out the impact of market disruptions following the recent COVID-19 pandemic, on this relationship in the context of Indian financial markets. The findings point to the fact that the stock returns and the commodity prices are closely linked with each other. Interestingly, our findings suggest that the pandemic has altered the relationship. In the pre-COVID period, there was no co integration among the stock, gold and crude oil prices. However, during the pandemic, we find evidence of co integrating relationships. The short run relationship also provides some interesting insights. In the pre-pandemic period, evidence points to a mutual impact on the two markets, e.g. past values of oil price and gold price influence the stock returns while returns on the stock market influences oil price volatility. However, during the COVID period, apart from crude oil prices, it is the volatility of gold prices that has emerged as the driver of the stock returns.

Madhu Druva Kumar, Lokanadha Reddy, Gaadha (2020)[3] This paper undergone due to the devastations that emerged in the international market, the Indian financial market proportionally reacted to the pandemic and further witnessed a violent volatility. Considering the COVID-19 situation, this paper is an empirical investigation on the impact of COVID-19 on the agricultural commodities, specifically wheat, on NCDEX. Using daily closing spot and future prices of wheat on NCDEX, this study examines the impact of COVID-19 on the wheat prices over the period from 1st July 2019 to 30th April 2020. Furthermore, this study has tried to make a comparative analysis of the spot and future prices in the pre-COVID-19 period and during the COVID-19 situation, by using the help of statistical tests. Findings reveal that the price of wheat has encountered instability during the Corona pandemic period. While comparing the results with that of the period prior to Corona, we find that wheat prices, both spot and future, were highly impacted by the COVID-19 pandemic.

Shruthi & Ramani (2020)[4]**.** This study examines volatility transmission over the financial crisis. Recently established causality in impulse response functions and variance test to everyday data from January 2020 has been implied. To recognize the effect of the food cost crisis, statistics are separated into two intervals i.e. post-COVID period and the pre-COVID period. The variance causality test indicates that the risk transmission among agricultural commodity is zero, but oil market volatility spills on the markets for agricultural products excluding sugar in the post-crisis period. Thus, this paper signifies that the statistical Trend transmission differs post food price crisis. Following, risk transmission materializes as an additional element of the statistical interrelations among agricultural and energy markets.

Christian Elleby, Ignacio Perez Dominguez, Marcel Adenauer & Giampiero Genovese, in their study Impacts of the COVID-19 Pandemic on the Global Agricultural Markets **(2020)**[5] investigated the impact of the very first lockdown regulations imposed by governments globally, on the agricultural commodities markets, and found that there was a significantly negative impact (4-18% decrease) on the meat prices, dairy products, bio-fuel prices, maize, and oilseeds, as a result of the demand shock created from the pandemic.

Mahindra Dev and Rajeshwari Sengupta (2020)[6] had highlighted the impact of Coronavirus on the overall economy by comparing the situations before the crisis and after the crisis. This paper especially talked about Informal Sector, Banking Sector, MSMEs, Financial Markets and Limited policy space. The Government announced various policies to handle the situation of crisis and how these policies are successful and implemented in the real world is also the main component of the paper. It has discussed how the country lockdown has brought all economic activities to an abrupt halt and in turn will have further spillover effects on investment, employment, income and consumption, pulling down the aggregate Growth of the economy. In last, it has discussed the measures that the Reserve Bank of India, State and Central

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Government could adopt to improve the economic situations simultaneously controlling this virus.

Bharat Kumar Meher (2020)[7] analysed the Impact of COVID-19 on Price volatility of Crude Oil and Natural Gas Listed on Multi Commodity Exchange of India. In this study, an attempt has been made to estimate the price volatility of crude oil and natural gas listed on multi commodity exchange of India (MCX). We measured the leverage effect of COVID-19 on price volatility of crude oil and natural gas by using the daily prices of crude oil and natural gas from May 01, 2017 to April 30, 2020. The findings of the study reveal that there is a presence of leverage effect of COVID-19 on the price volatility of crude oil. However, this leverage effect is not present on the price volatility of natural gas. The findings of the study will help investors to develop investment strategies and to the policymakers to formulate appropriate policies to overcome or minimise the impact of COVID-19. The forecasting graphs of crude oil prices indicate that there is a possibility that price volatility will be higher in the future. However, it is difficult to forecast the expected price volatility of natural gas for the future because the price volatility graph is extremely fluctuating.

Ozili and Thankom (2020)[8] had highlighted the spillovers of COVID-19 on the global economy. The paper tries to highlight the impact of Coronavirus on different sectors of economy like travel industry, hospitality industry, sports industry, oil price war among countries, import dependent countries, financial sector, health sector, education sector, event industry and entertainment industry. It has also discussed some fast policy responses introduced by policy makers in various countries to avoid the harsh impact of disease spreading virus across the globe. The paper emphasizes the recession faced by most countries and the tradeoff between saving lives and saving the economy encountered by almost all the countries. It also concludes that apart from all the challenges, it has made a major move for all the countries to improvise their health sector and has led to a transition phase in the economy in terms of online education, transportation systems, health and hygiene and even an opportunity to fix both economic and financial system with great stimulus packages.

STATEMENT OF THE PROBLEM

In India the growth and emergence of derivative market is relatively a recent phenomenon. From the date of emergence derivative market has exponential growth both in terms of volume and numbers of trade contracts. It is one of the economies that contribute to the economic development in recent years, derivative markets are found has a positive contributor to the economic development in short run but the effect disappears in long run. It has clearly replicated in the outbreak of corona virus. On January 2020 the world health organization declared global health emergency which impacted not only on health aspect but it gigantically affected the financial market internationally. Due to the depredation that emerged in the international market that made India financial market proportionally react to the pandemic. Furthermore witnessed a intemperate volatility in the market. This covid-19 situation is another savage after financial crises that happened in 2008.

The sudden declaration of pandemic lockdown all over the world have crashed the share prices as well as the commodity prices as the whole, which is and evidence that it has impacted severely on commodity market as well, which can be identified through the commodity price fluctuation throughout the pandemic. Initially commodity market prices declined for most of the commodities which lead to decrease in prices of goods and services, this is a clear picture that purchasing power of the people has also impacted o the commodity price. The currency fluctuations in forex are also reason in volatility of commodity market whether bullish or bearish.

Despite this, almost all commodity prices recovered in the third quarter. Crude oil prices have doubled since April low, supported by sharp oil supply cuts, but prices remain one-third lower than pre-pandemic. The pandemic has the potential to lead to permanent changes in the demand and supply of commodities, and especially to the supply chains that move those commodities from producers to consumers around the world. Natural gas prices have fallen substantially this year but coal prices have been less affected, since the demand for electricity has been less affected by mitigation measures. Gold prices, on the other hand, have risen as buyers have sought safety amid financial market turbulence. Gold prices have reached an all-time high in India due to the pandemic, but a large part of this has been driven by depreciating rupee and increased import duty. On the other hand, international gold prices are much lower than the all-time high price. Same as stock market, commodity market is also a good economic indicator which has been grounded across sector during this pandemic. Hence there is a necessity to understand how pandemic has impacted on commodity prices throughout the covid break and to analysis the growth and trends of select commodities along with risk and return in pre as

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well as post covid, and also to determine the factors affecting the fluctuation in derivative market.

OBJECTIVES

The paper fulfills the following objective:

- To know whether the select commodities prices in Pre and Post COVID-19 is stationarity or not.
- To examine the relationship between select commodities on macroeconomic variables during pre and post pandemic.
- To analyse the trend of select commodities during pre and post pandemic COVID-19.

HYPOTHESIS OF THE STUDY

Based on the identified objectives, the following hypothesis are framed:

- **Ho**: There is no significant relationship between the select commodities and macroeconomic variables on Pre and Post Pandemic situation.

METHODOLOGY

The study is mainly based on secondary data. The study focuses on the impact of COVID-19 in Indian derivative market of selected commodities listed in MCX. There are nine commodities Gold, Silver, Copper, Natural gas, Crude oil, Lead, Nickel, Zinc and Aluminium have been analysed in this study to understand how far this commodity prices are impact by COVID-19. The study is based on the selected commodities prices listed in MCX in India. In addition to that other related information was collected from various published research articles, books and derivative markets websites. The present study covers a period of two years 2019-2021. The study period were segregated on the basis of 11 months prior to COVID-19 and 11 months after to COVID-19 (May 2019 to March 2020 and April 2020 to February 2021). Augmented Dickey Fuller Unit Root Test is used for checking the stationary of the price series, Correlation Analysis is used for finding the relationship between price select commodities on macroeconomic variables during pre and post pandemic.

RESULTS AND DISCUSSION

AUGMENTED DICKEY FULLER UNIT ROOT TEST

TABLE 1

Results of Augmented Dickey-Fuller Test of Select Commodities in Pre COVID-19 Period

Commodities	Price for Selected Commodities in Pre COVID-19					
	LEVEL		1st Difference		2nd Difference	
	t-Statistics	Probability	t-Statistics	Probability	t-Statistics	Probability
Gold	-3.221	0.014	-	-	-	-
Silver	-0.545	0.602	-4.282	0.005	-	-
Copper	0.647	0.537	-1.771	0.126	-3.352	0.020
Natural Gas	-1.375	0.211	-2.441	0.050	-3.703	0.014
Crude Oil	0.874	0.410	-1.403	0.210	-4.258	0.008
Lead	-2.808	0.024	-	-	-	-
Nickel	0.232	0.821	-3.592	0.015	-	-
Zinc	-1.265	0.237	-2.820	0.022	-	-
Aluminium	-3.303	0.0131	-	-	-	-

***Source**: Compiled and Calculated from MCX*

Table 1 reveals the results of the unit root test applied to determine the order of integration among the time series data. The Augmented Dickey Fuller test was used at level, First difference and Second difference under assumption of constant. According to the results of the test Copper, Natural gas and Crude oil contain unit root test at level which indicated that these time series were not stationarity on level and First difference, but it became stationarity when its Second difference was taken. That is the degree of integration of this series is *I*(2). The Silver, Nickel and Zinc price is stationarity on First difference, that is degree of integration appears *I*(1). Therefore the Gold, Lead and Aluminium prices is stationarity on level, that is the degree of integration appears as *I*(0).

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TABLE 2
Results of Augmented dickey-fuller test of Selected Commodities for Post COVID Period

Commodities	Price for Selected Commodities in Post COVID-19					
	LEVEL		1st Difference		2nd Difference	
	t-Statistics	Probability	t-Statistics	Probability	t-Statistics	Probability
Gold	-1.629	0.147	-3.423	0.014	-	-
Silver	-2.419	0.046	-	-	-	-
Copper	-2.340	0.041	-	-	-	-
Natural Gas	-1.788	0.116	-3.033	0.023	-	-
Crude Oil	-2.521	0.039	-	-	-	-
Lead	-0.902	0.393	-4.625	0.002	-	-
Nickel	0.232	0.821	-3.592	0.015	-	-
Zinc	-1.344	0.2157	-2.738	0.040	-	-
Aluminium	2.555	0.043	-	-	-	-

***Source**: Compiled and Calculated from MCX*

Table 2 reveals the results of the unit root test applied to determine the order of integration among the time series data. The Augmented Dickey Fuller test was used at level, First difference and Second difference under assumption of constant. According to the results of the test Gold, Natural gas, Lead, Nickel and Zinc contain unit root test at level which indicated that these time series were not stationarity on level, but it became stationarity when its First difference was taken. That is the degree of integration of this series is *I*(1). The Silver, Copper, Crude oil and Aluminium prices is stationarity on level, that is the degree of integration appears as *I*(0).

CORRELATION

TABLE 3
Shows Correlation for the Select Commodities on Macroeconomic Variable for month of May 2019 to March 2020

	CPI	EXCHANGE RATE	INFLATION RATE	INTEREST RATE	MONEY SUPPLY
GOLD PRICE	-0.381	0.835**	0.772**	-0.919	0.924**
SILVER PRICE	0.007	0.214*	0.531*	-0.453	0.272*
COPPER PRICE	0.265*	-0.519	0.035	0.162*	-0.422
LEAD PRICE	0.047	-0.043	-0.006	-0.028	-0.052
ZINC PRICE	-0.042	-0.037	-0.157	0.086	-0.281
NICKEL PRICE	0.560*	-0.787	-0.612	0.855**	-0.867
CRUDE OIL PRICE	0.614**	-0.790	-0.225	0.622*	-0.720
NATURAL GAS PRICE	0.379*	-0.442	-0.603	0.676*	-0.711
ALUMINIUM PRICE	0.429*	-0.884	-0.669	0.839**	-0.942

***Source:** Computed from e-views*

The Table 3 displays the relationship between selected commodities and macro economic variables. The strength association between Gold 0.924 are highly positive correlated with Money supply, secondly Nickel price highly correlated with the Exchange rate 0.855. The positive correlation are silver price have positively correlated with CPI and Copper price have positively correlated with Exchange rate. In CPI Gold price and Zinc price have negatively correlated, In Exchange rate except gold and silver all commodities have negatively correlated, In Inflation rate except Gold, Silver and Copper all other commodities have negatively correlated, In Interest rate Gold, Silver and Lead have negatively correlated and Money supply except gold and silver other commodities have negatively correlated.

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TABLE 4
Correlation for the select commodities on Macroeconomic Variable for month of April 2020 to February 2021

	CPI	EXCHANGE RATE	INFLATION RATE	INTEREST RATE	MONEY SUPPLY
GOLD PRICE	0.304**	0.031*	0.470*	0.347*	-0.107
SILVER PRICE	-0.367	-0.824	-0.514	-0.714	0.851*
COPPER PRICE	-0.352	-0.886	-0.540	-0.825	0.969**
LEAD PRICE	-0.277	-0.800	-0.509	-0.849	0.903**
ZINC PRICE	-0.399	-0.887	-0.586	-0.850	0.972**
NICKEL PRICE	-0.211	-0.907	-0.313	-0.648	0.919**
CRUDE OIL PRICE	0.191*	0.838**	0.488**	0.849**	-0.887
NATURAL GAS PRICE	0.129*	-0.771	0.028	-0.406	0.664*
ALUMINIUM PRICE	-0.439	-0.899	-0.545	-0.770	0.937**

Source: Computed from e-views

Table 4 depicts the relationship between selected commodities and macro economic variables. The strength association between select commodities are highly correlated except gold price and crude oil price all other commodities are highly correlated with Money supply . The positive correlation are Crude oil price have positively correlated with Exchange rate and Inflation rate. In CPI except Gold price, Crude oil price and Natural gas price all other commodities have negatively correlated, In Exchange rate except gold and Crude oil all other commodities have negatively correlated, In Inflation rate except Gold, Crude oil and Natural gas all other commodities have negatively correlated, In Interest rate except Gold and Crude oil all other commodities have negatively correlated and Money supply except Gold price have negatively correlated.

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HORDRICK PRESCOTT FILTER

Figure 1

Hordrick-Prescott Filter

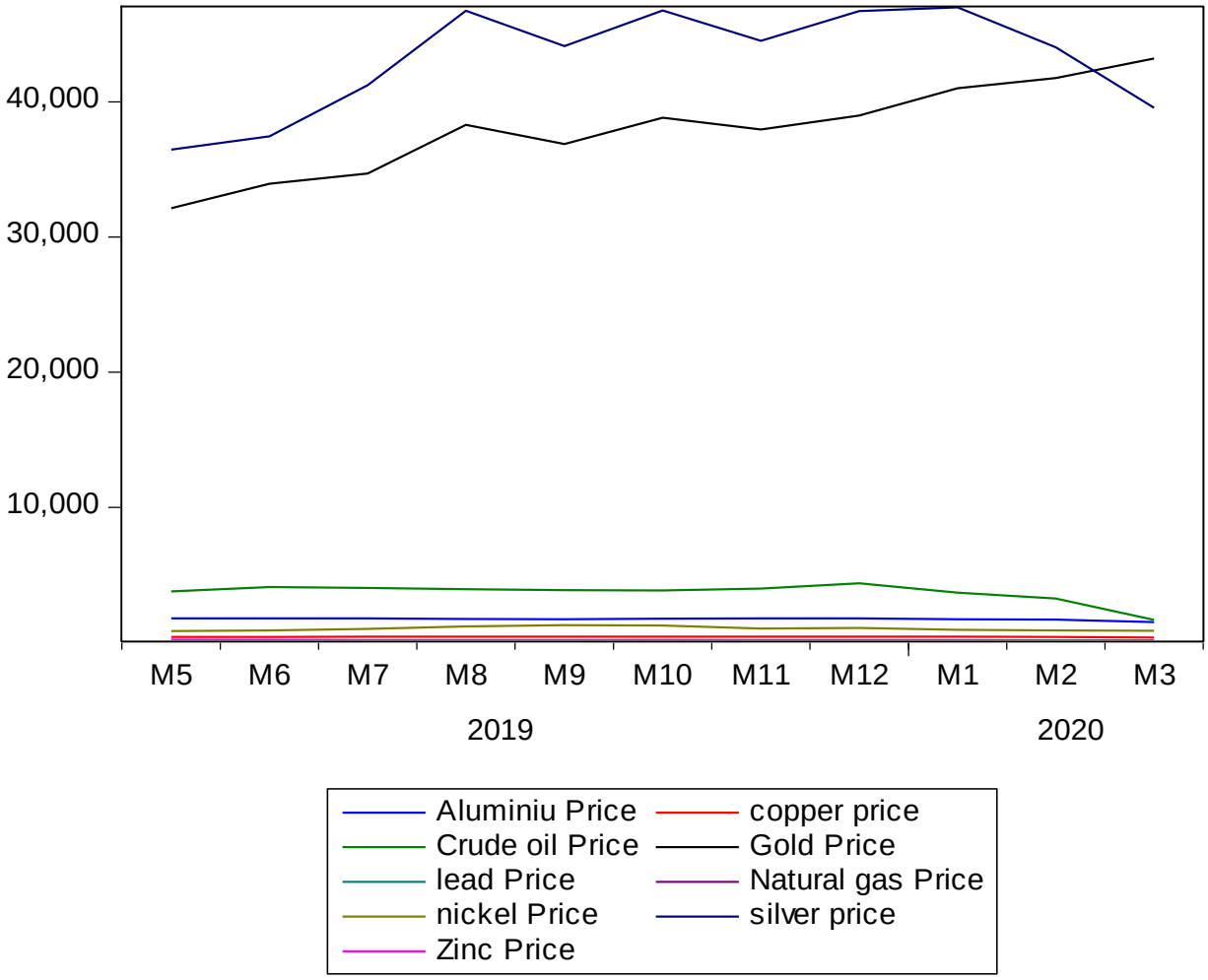

Figure 1 shows the trend of select commodities price during pre pandemic COVID-19 using Hordrick Prescott Filter chart. In this technique, the commodity price is plotted and along with it, an upward trend and a lower trend is also plotted. The chart shows that the select commodities price of the Gold and Silver is high, Therefore the other commodities price are least. It starts from the positive trend and then moves to negative trend at last.

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Figure 2

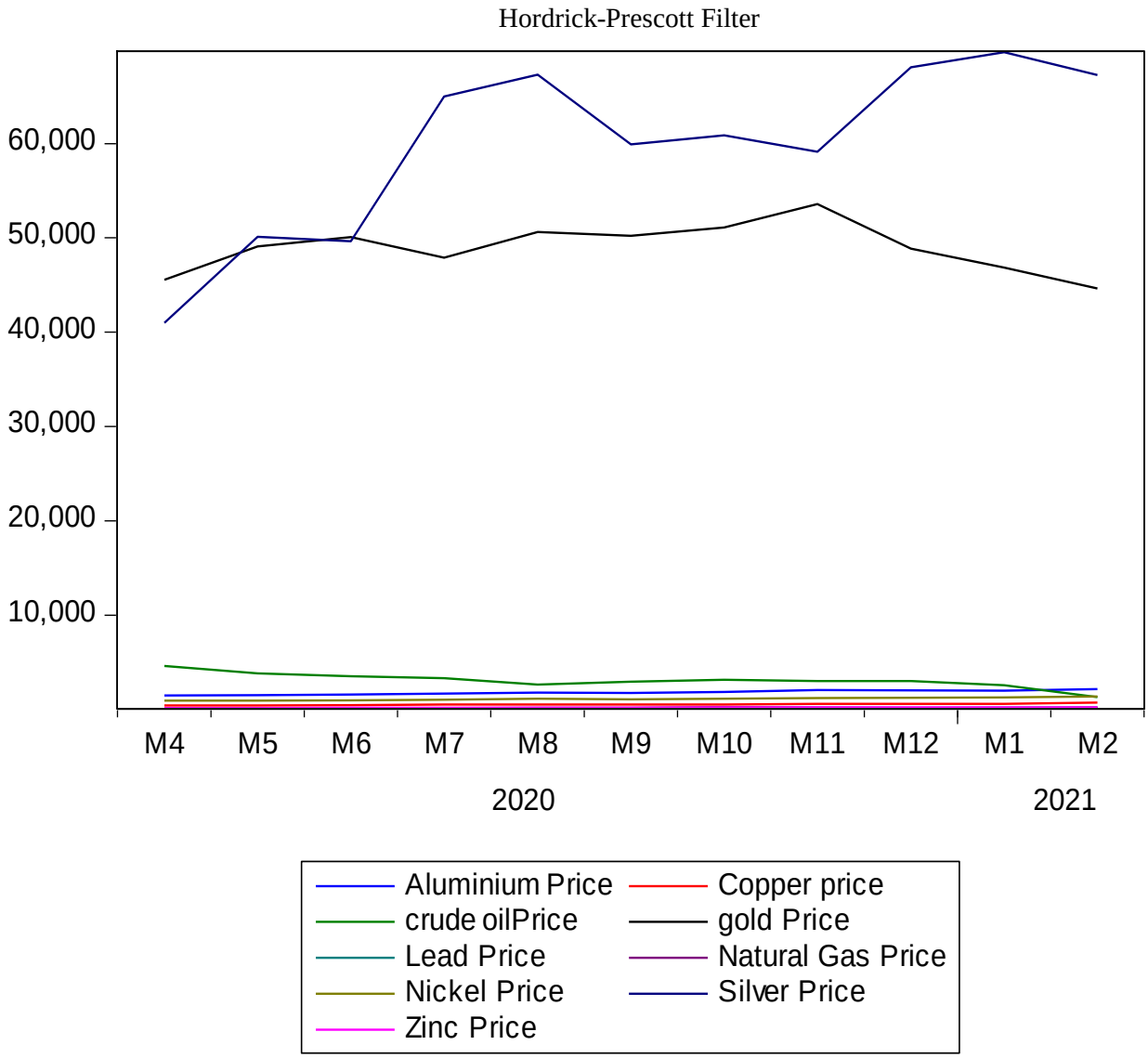

Figure 2 shows the trend of select commodities price during post pandemic COVID-19 using Hordrick Prescott Filter chart. In this technique, the commodity price is plotted and along with it, an upward trend and a lower trend is also plotted. The chart shows that the select commodities price of the Gold and Silver is high, Therefore the other commodities prices are low. It starts from the positive trend and then moves to negative trend at last.

CONCLUSION

Commodities is considered to be one of the safest heavens for investors in India.The price of these energy and metals shows a high fluctuation in the market. So this study analysed the trend of the select commodities price listed in commodity market. It also analysed the correlation between these commodities. The findings of the analysis show that the price of select commodities are fluctuating in a significant manner and they have a moderate positive correlation. It can be concluded that these commodities can be used

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for the investment purpose and use as a tool against trend as they are moderately correlated.

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