PLATFORM - A Journal of Management & Humanities

Received: 2 Febuary 2023, Accepted: 10 April 2023, Published: 30 June 2023, Publisher: UTP Press, Creative Commons: CC BY 4.0

ANALYSIS OF RETURN RATES FOR ANOMALIES

R.Murugesan, Umesh Shinde

Department of Humanities and social sciences, National Institute of Technology, India

*E-mail: rmurugan@nitt.edu

ABSTRACT

This study investigates the presence of any purposive movement in the commodity market of expensive metals and energy commodities in the Indian market. Using daily, weekly, and monthly data for gold and crude oil from 2010 to 2020, We discover proof that the commodity market exhibits anomalies. We observed periodic anomalies present due to festivals celebrated. This may have an impact on the country's economic conditions. Given investors' growing propensity to reveal their portfolios to financial vehicles linked to them, this issue is significant for commodities used for speculation, hedging, and investment. The study also observes any significant non-periodic abnormality present for 10 years.

Keywords: *Anomalies, commodities market, investment, hedging, time series analysis*

INTRODUCTION

This study explores non-random swings in natural resources commodity markets, such as precious metals and energy commodities (Chhabra & Gupta, 2020). We utilise daily, weekly, and monthly figures for gold and crude oil in the Indian market from 2010 to 2020. We discover evidence for periodic and non-periodic anomalies in the commodities market for the studied period.

The study is actuated by the literature on seasonal patterns in commodity markets of expensive metals and energy-based products (Qadan et al., 2019). Due to the limited study on the Indian market, we were encouraged to observe this market (Chhabra & Gupta, 2020). This study will help investors, government agencies and other businesses to understand the trends in the Indian market and improvise accordingly.

Commodity markets hold a dominant position in any nation's economic advancement and development. This is especially important for a developing nation such as India. Commodity prices are generally insecure and unstable. This is predicted to arise due to various reasons such as natural calamities, local and worldwide strategies, industry, upswing or drop-in value exchange rate, and import trade rates. Understanding commodity price volatility is crucial given the growing trend of investors exposing their portfolios to financial instruments related to such commodities for speculative, hedging, and investing objectives. There is great interest in determining the extent to which commodity pricing disparities exist.

Several studies have found that various causal variables may explain some of the aberrant returns seen in the commodities market (Ciner et al., 2020; Abraham, 2022). As a result, they are impacted not just by economic or rational factors but also by illogical factors such as seasonal affective disorder, optimism, pessimism, or happiness caused by non-financial events (Kamstra et al., 2003). As a result, it might be considered to change according to investor emotion. The relationship of emotional position in economic activity in financial decision-making has recently been scrutinised (Floros et al., 2013). Investor

mood is the underlying process that might explain a portion of the anomalous returns seen in the commodities market. According to some psychological reasons, an increase in investor mood reduces risk aversion, making people eager to take on greater risk (Lepori, 2015). As a result, researchers have found that emotions influence economic behaviour and financial decision-making (Bassi et al., 2013). According to various studies, many non-economic conditions, such as weather, pollution levels, approaching holidays, and so on, are potential factors that could cause mood swings and thus affect security prices (Levy & Yagil, 2011; Leopri, 2016).

This is demonstrated by the positive abnormal returns observed during pleasant holidays such as the summer season, Diwali, Akshaya Tritiya, and Dussehra (Chan et al., 1996; Mehta & Chander, 2009). Indeed, we can conclude that vacations are associated with a good mood. Furthermore, we see negative returns during bad mood periods such as winter and political unrest (Bouman & Jacobsen, 2002). As a result, it is plausible to argue that investors are more inclined to expose their portfolios to riskier assets when they are in a good mood. Similarly, they are less inclined to make dangerous bets if in a foul mood.

Festivals are occasions which are for feasting and celebrating. They are associated with joy and happiness. Religious festivals are widely observed in all parts of the world. They are celebrated not only for fun but also for showing respect. India has the world's oldest culture. With such a religious country, culture and religious festivals are extremely important. As a result, festivals have a significant impact not only on India's social environment but also on the country's economic environment. During festivals such as Diwali, Ramzan, and Christmas, there is an increase in the purchase of many items such as clothing, ornaments, footwear, food items, and so on. People are starting new business activities, and buying capital goods and stocks can also be viewed. This causes an increase in economic activity, and abnormality can be viewed in returns.

On examining the selected commodity, gold and crude oil are important commodities in the Indian market. Aside from the wedding season (fall to spring), gold is historically purchased in India at Hindu calendar festival occasions since these festivals are considered auspicious. It is a fantastic moment to attempt something new, such as purchasing gold. Three Hindu festivals are commonly discussed in gold market news throughout the world. Akshaya Tritiya, a one-day festival celebrating the start of the composition of the Mahabharata, Dussehra, the tenth day of Navratri festivities, and Diwali, which happens around 20 days following Dussehra. Based on the research, these are the most significant Hindu festivals that impact the gold return value. Oil is another important as well as the most traded commodity. Oil prices strongly impact inflation, GDP growth rate, and trade balances (Nasir et al., 2018).

Because of the importance of the commodities chosen, this study is useful for investors and portfolio managers who may use it to rebalance their portfolios and manage risk more effectively. Market participants can also use calendar anomalies to better their investing strategy. Financial institutions and governments can use the findings to enhance their estimates of projected developments in natural resource behaviour. They should be aware of any seasonal anomaly pattern present to accurately predict natural resource returns and volatility during periods of elevated mood.

As a result, understanding the significance of seasonal and non-seasonal trends in determining return values has broad implications for various fields, including portfolio management, hedging strategies, corporate investment choices, and academic research.

LITERATURE REVIEW

Srikanth's (2013) paper on the economic impact of festivals is based on the dependency of the calendar effect on festivals celebrated by the people. The paper analyses the effect of the Diwali festival on the Indian stock market by studying 10 working days before and 10 working days after Diwali in 2011. Statistical methods like hypothesis testing and ANOVA are performed on the data collected, and it is observed that Diwali has no significant impact on the Indian stock market. The effect is insignificant compared to other factors like inflation, interest rate, etc.

Qadan's (2019) Seasonal patterns and calendar anomalies in the commodities market for natural resources analyse the link between commodity prices and numerous anomalies such as the October effect, lunar cycle effect, and days when the American exchange is closed, among others. Daily, weekly, and

monthly data is used from 1986 to 2016 for energy commodities and precious metals like copper, gold, and silver to test the 25 anomalies effect on the commodity prices. Econometric methods like GARCH are used to determine both the relationship and volatility. The study's conclusions are especially applicable in many instances since the early 2000s when many multinational portfolio and hedge fund managers and individual investors increased their commodity exposure. However, Deepak's (2015) paper on the analysis of seasonality and sensitivity of the Indian Stock Market shows that calendar anomalies converge with patterns observed across global economies. In this paper, retesting using econometric models by comparing multiple indices allows us to reanalyse the conclusions made by several other calendar anomalies-based research papers, and it can be concluded that they share a 360-degree causal relationship.

In India, gold is precious and considered one of the essentials brought by people during the auspicious festival season. The influence of celebrations on gold price anticipation and volatility expresses the relationship between Mahabharata and Akshaya Tritiya and other important festivals like Dussehra and Diwali. Crude oil is one very crucial commodity factor in the global economy. Baber's (2013) paper on Factors affecting Gold prices in the Indian scenario, consumers' buying behaviour is among the factors in determining the gold price. The impact of crude oil price shock on the Indian Economy by Sreenu (2022) aims to discover the link between the impact of crude oil prices on Indian economic development and GDP growth. The GARCH model and description are used to evaluate volatility in the oil and stock markets, and an extension of vector auto-regression models is used to estimate the influence of oil prices on macroeconomic variables. The price of gold is impacted by crude oil prices and worldwide dollar values, according to Pathan's (2020) report on consumer behaviour and purchase of gold during the festival season for the purpose of investment and its projected return for consumers in Pune.

METHODOLOGY

Sample Selection

The gold and oil prices were selected because they extensively impact financial activities. This impact can be directly related to the consumption pattern, manufacturing, investments, and all other sectors. The volatility of gold and oil prices directly influences the stock price and some effects on the capital market, affecting the country's inflation rate and unemployment. Various factors, such as weather, political environment, international policies, and trade barriers, influence the price of crude oil. These factors create an unexpected demand and supply, which, in turn, makes the oil price highly volatile. Thus, it is essential for oil-exporting and importing countries to understand the volatility of crude oil as it creates uncertainty in all sectors of the economy.

Time Period

The increasing body of literature aligns with the most popular Fama (1970) Efficient Market Hypothesis, which emphasises that commodity asset prices should adhere to a random walk without detected patterns. Though many shreds of evidence indicate momentum and contraction effects in many financial markets, much less is known about price anomalies in the commodities markets. This research contributes to this limited literature.

The political and social unrest in many parts of the countries, the 2008 financial crisis, and other factors affected oil supply and demand throughout the decade's first half, but the market remained relatively balanced. Between the period 2011 to mid-2014, oil prices remained stable until the OPEC members started to produce more than their production ceiling. On the other hand, China, a major oil-importing nation, experienced an economic slowdown. These factors reduced the demand, and the supply reached a new height, thus leading to a fall in Price. With the shrinking financial reserves and the changing global environment, OPEC introduced its Production cut in sep-2016 to stabilise the market.

The trade patterns also changed as the oil demand continually increased in Asian countries. On the other hand, growing concern for environmental issues and sustainable development has forced OPEC to enhance dialogues with outside parties like the UN, Consumers, Non- OPEC members to attain market stability. Thus, the period from 2010 to 2020 has encountered significant events and reforms, and this period will be studied to understand the volatility and seasonality patterns thoroughly. In the global arena, India is one of the largest consumers of gold.

Traditional practices and customs have created an increase in demand during the festival seasons and wedding seasons. "The World Gold Council" states that the demand is primarily driven by the per capita income, and for one percentage increase in income, the per capita gold demand rises by one percentage. Thus, a more extended testing period of ten years has been selected from 2010 to 2020 to reduce errors and increase accuracy.

Sample Variable: Return

The return on Price is computed as follows,

$$R_t = \ln[P_t / P_{t-1}] * 100$$

where,
R_t =Daily Return on Price
ln=Natural log
P_t= Price of the commodity on the day
P_{t-1} = Price of the commodity on the day before

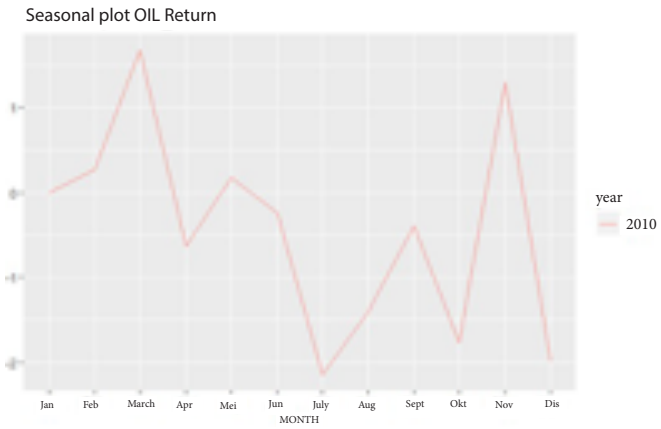
ANALYSIS AND INTERPRETATION

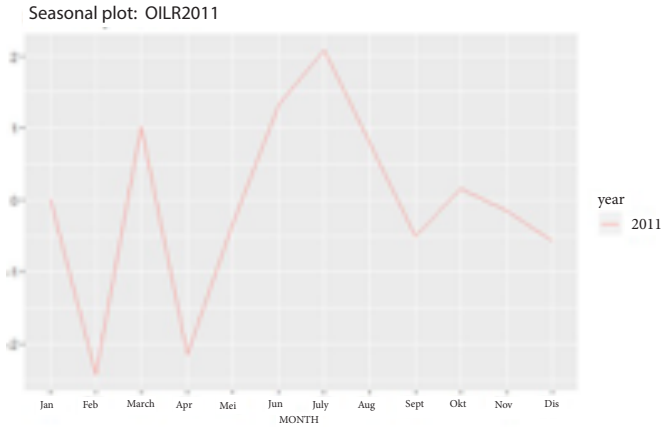
Analysis of Crude Oil Prices and Returns

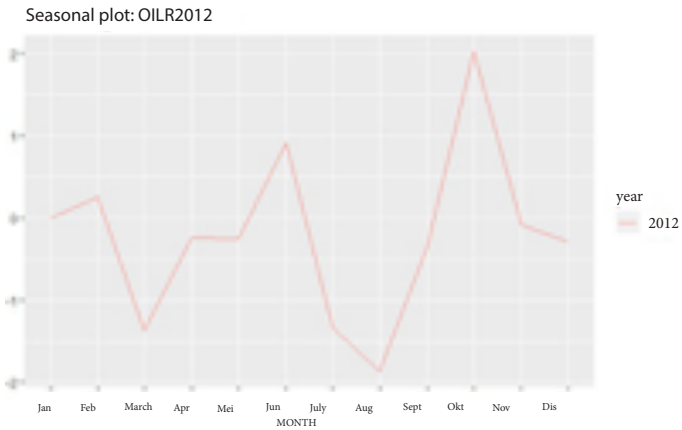
Seasonality Testing

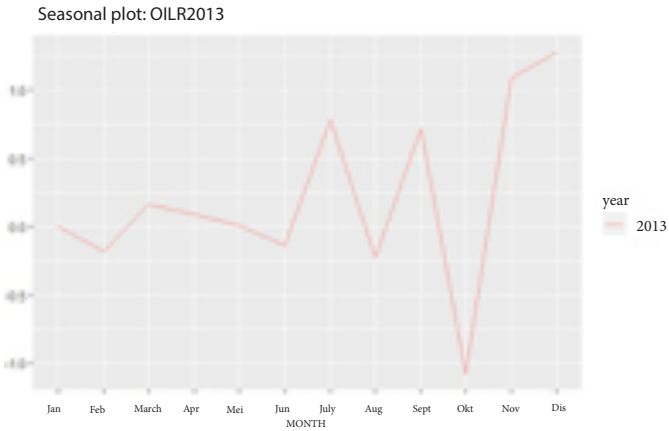
Plots have been made using the "ggseasonalplot" command in R-studio to study the seasonal behaviour and volatility with the return value as the sample variance. The plots are computed for all the years with months as the recurring frequency.

On comparing plots for the past ten-year, we try to establish a behavioural pattern concerning the months of the years. The outliers are identified to check the abnormality in data and identify the reason for that specific behaviour.









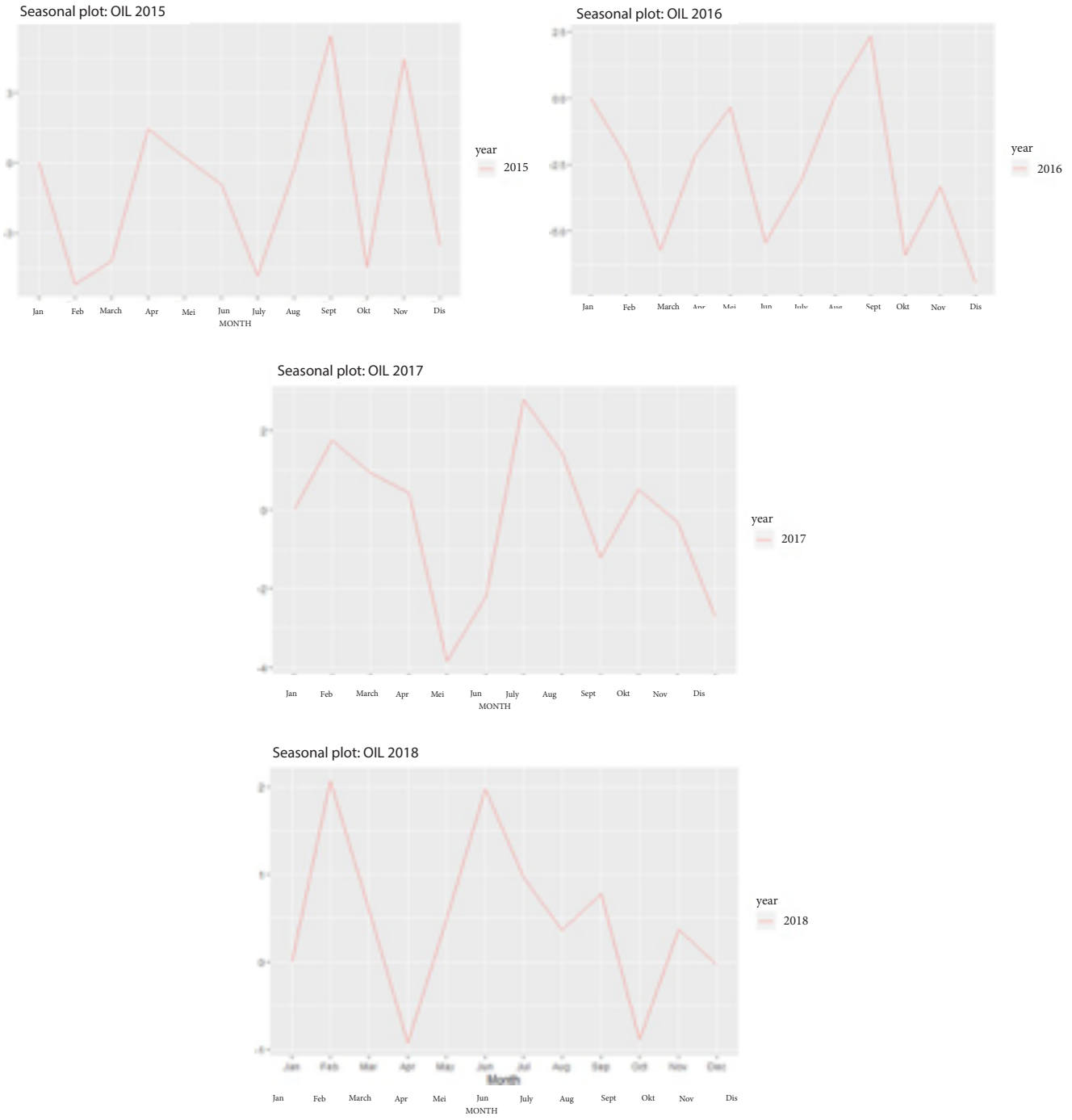


Figure 1 Individual year data of the return values for crude oil from 2010 to 2018

Figure 1 shows individual year data of the return values for crude oil from 2010 to 2018. A few seasonal patterns are noted in the crude oil return value based on the data plotted. A month-of-the-year effect is seen due to tax loss in February. Hence, a significant increase in February, the February effect is seen in the oil prices. Based on an article by Sharma and Dhiman (2021), the Indian economy is a satellite of the global economy. Hence, the winter effect is also reflected in the Indian market. The returns during December and January remain the lowest compared to the rest of the values. This is due to decreased demand for crude oil during winter.

A seasonal increase in return is observed for April, June, August, September, and November, while a seasonal

drop is seen for December, January, and March (Figure 2). During the summer period, an increase in economic activities is noted. This leads to an increase in demand for crude oil. Hence a periodical increase in crude oil prices can be noted during this period.

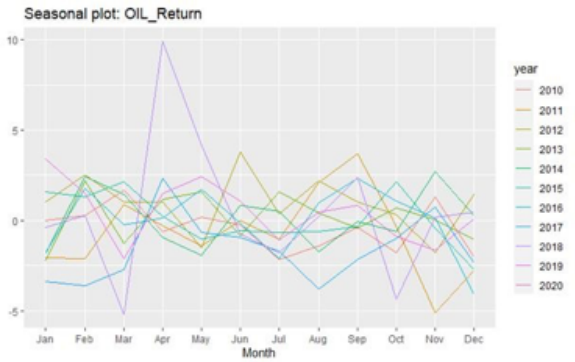


Figure 2 Annual return rates for crude oil from 2010 to 2020

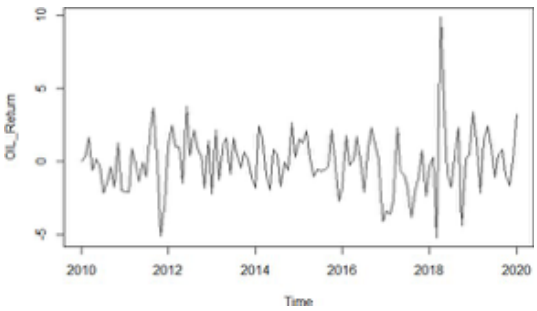


Figure 3 Time series data of the crude oil prices from 2010 to 2020

In March, as the Indian economy closes to start a new year in April, the return values for this month generally face a decline. While Indian festivals such as Akshaya Tritiya (celebrated in April or May) and Dussehra and Diwali (celebrated in October or November) do not directly impact the demand for crude oil, a noted positive impact is seen on the return rates. While the impact may not be as statistically significant as the Winter and Summer effect, these festivities positively impact the return values.

Figure 3 shows the time series data of the crude oil prices from 2010 to 2020, which was collected and plotted. It can be observed that there was a significant variation in crude oil prices in the years 2010 and 2020. Apart from the periodic anomalies present in Crude oil's return values, a significant abnormality can be observed in certain periods in the time series plot. A significant drop in return value was noted at the end of 2011. This was observed due to the political turnovers in Egypt, Libya, Yemen, and Bahrain, which had a global impact on crude oil prices worldwide. Hence, its impact was also seen in the Indian market.

Due to OPEC's policy changes, a decrease in demand with an increase in supply caused the crude oil return values to slump in 2017. In 2018, the political unsettlement and disagreements between the United States and global oil producers greatly impacted crude oil prices to drop significantly before recovering. Post 2018, the impact of changing demand and supply of crude oil and political instability has caused the prices to fluctuate greatly.

Analysis of Gold Prices and Returns

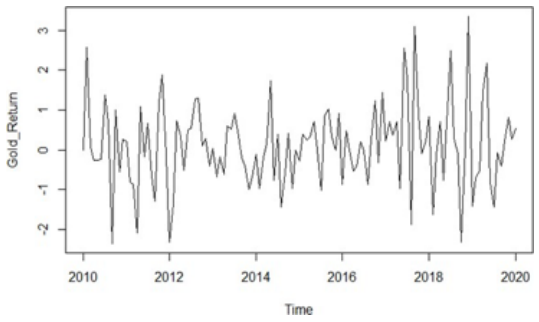
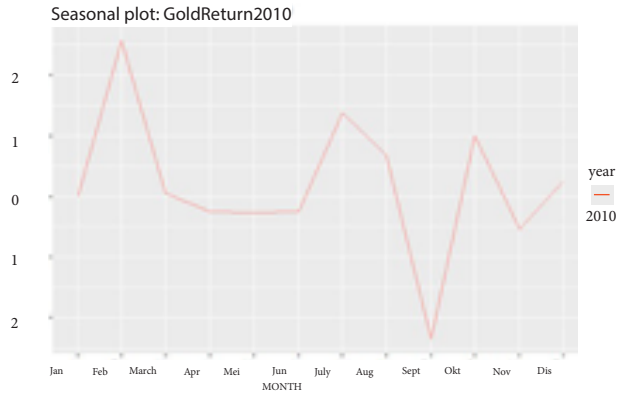
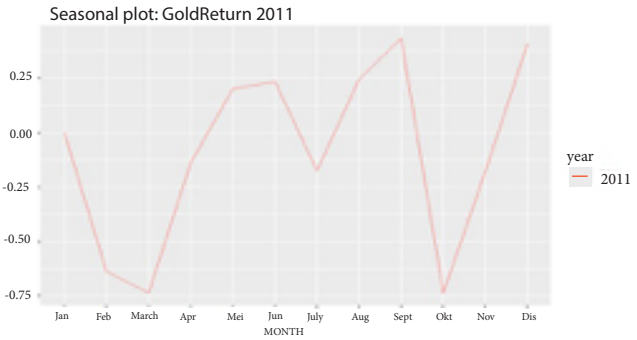


Figure 4 Time series data of the gold prices from 2010 to 2020





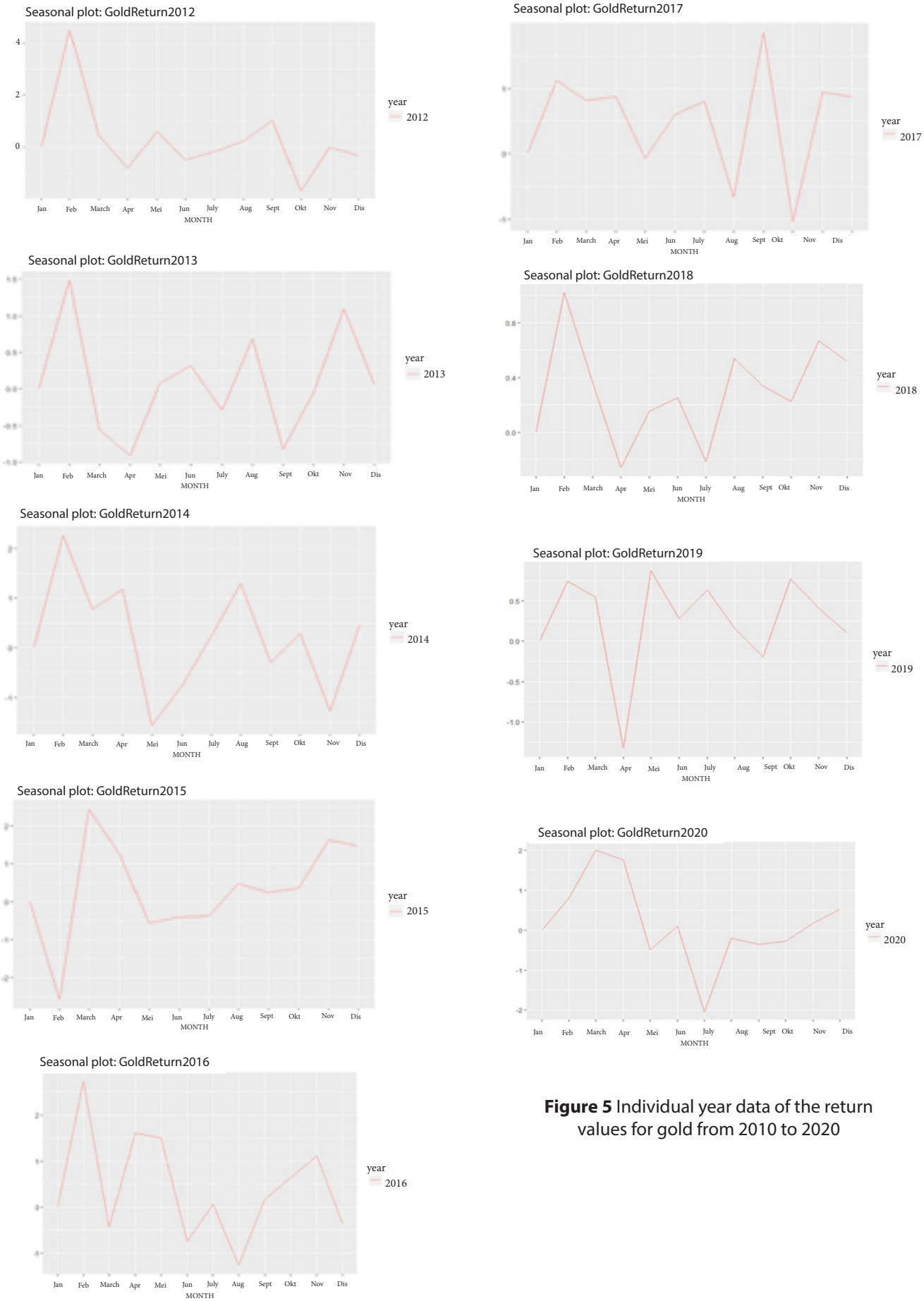


Figure 5 Individual year data of the return values for gold from 2010 to 2020

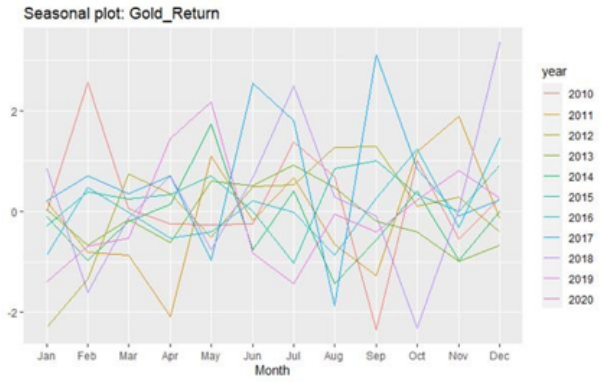


Figure 6 Annual returns rates for gold from 2010 to 2020

Figures 4 to 6 show the data analysis of the return prices for gold from 2010-2020. The time series data of gold return was plotted from 2010 to 2020. We present each anomaly and discuss them in detail.

January Effect

The January effect is also known as the year-end effect. It claims that returns in January are frequently higher than those in other months. Gold and silver markets are efficient, with no obvious differences in returns between January and the rest of the year. (Agnani & Aray, 2011) Our data imply that the returns on the gold market follow a seasonal trend. Positive returns outnumber negative returns by a large margin, and our results are unaffected by outliers when the January impact is considered.

The SAD Effects

The next observed effect was the Seasonal affective disorder (SAD) effect. The SAD effect is depression due to shortened length of days in the fall as well as in the winter. The length of the day is believed to impact the mood of the investors. Risk-averse investors start avoiding risk when the length of the days shortens. This negatively impacts the Gold and Oil prices and the whole market (Garrett et al. 2005).

The Other January Effects

The other January effect, often known as the January barometer, forecasts the behaviour of the next eleven months based on the stock market's success in January (Cooper et al. 2006). According to this strategy, if the return in January is positive, the returns over the next eleven months will also be positive. Moreover, if the January return is negative, the next 11 months will also be negative. This can be seen in most of the years considered in our study if we neglect a few rare cases. Therefore, the commodity gold follows the pattern of the other January effect.

Christmas Effect

The positive sentiment connected with Christmas causes commodity prices and returns to rise (Qadan & Aharon, 2018). Even though the market is closed on Christmas, the reaction is visible on the first trading day after the holiday. We observe from the plot that there is a rise in return during Christmas in almost all the years considered here. It was expected that festivals like Diwali, Dussehra and Akshaya Tritiya could affect the gold prices in the respective festival seasons, but there were no significant changes in the returns.

CONCLUSION

The findings of this research are consistent with many previous studies (Hollstein et al., 2021a, Hollstein et al., 2021b). As mentioned in many previous studies, This study has also identified sizable premia for jump risk, momentum, skewness, volatility-of-volatility, downside beta, idiosyncratic volatility, and MAX, in commodity markets. Further, our study is consistent with extant research findings, which reveal that commodity investors should rebalance their portfolios regularly, and Returns for annual holding periods are substantially weaker than for monthly rebalancing.

The study conducted for the two commodities, Gold and Crude oil, for the past 10 years (2010- 2020) with daily, weekly, and monthly price data value analyses the anomalies that affect the commodity prices in the Indian stock market. In India, apart from the natural anomalies like inflation rate, interest rate etc., cultural and traditional practices of people affect the commodity price in-turn the stock market. The findings challenge the efficient market theory, demonstrating that the January, sad, and Christmas effects impact the commodity markets of energy and metals, namely crude oil and gold. In the case of Indian festivals like Diwali and Akshaya Tritiya, had no significant changes in the return when compared to the impact of already existing anomalies in interest rates, Forex market

conditions, Christmas effect for crude oil and gold. Apart from all these anomalies that cause fluctuations, Investors' emotional states, like sentiment values, can significantly affect price and volatility. This study also allows investors to formulate better trading strategies by understanding the factors and their effects on the stock market. Thus, non-random fluctuations in the commodities market are recorded and analysed.

REFERENCES

Abraham, R.M.K. (2022). Financialisation of Commodity Markets: Evidence from India. *Margin: The Journal of Applied Economic Research, 16*(1), 106-131.

Agnani, B., & Aray, H. (2011). The January effect across volatility regimes. *Quant. Finance 11*(6), 947–953.

Baber, P., Baber, R., & Thomas, G. (2013). Factors affecting gold prices: a case study of India. In *National Conference on Evolving Paradigms in Manufacturing and Service Sectors*.

Bassi, A., Colacito, R., & Fulghieri, P. (2013). O sole mio: an experimental analysis of weather and risk attitudes in financial decisions. *Rev. Financ. Stud. 26*(7), 1824–1852.

Chhabra, D., & Gupta, M. (2020). Market efficiency and calendar anomalies in commodity futures markets: a review. *Agricultural Economics Research Review, 33*(2), 263-277.

Chan, M.L., Khanthavit, A., & Thomas, H. (1996). Seasonality and cultural influences on four Asian stock markets. *Asia Pac. J. Manag. 13*(2), 1–24.

Ciner, C., Lucey, B., & Yarovaya, L. (2020). Spillovers, integration and causality in LME non-ferrous metal markets. *Journal of Commodity Markets, 17*, 100079.

Cooper, M.J., McConnell, J.J., Ovtchinnikov, A.V. (2006). *The other January effect. J. Financ. Econ. 82*(2), 315–341.

Deepak, R. (2015). Security returns spectrum-An analysis of seasonality and sensitivity of Indian stock markets. *DHARANA-Bhavan's International Journal of Business, 9*(1), 56-71.

Fama, E.F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance, 25*(2), 383–417. https://doi.org/10.2307/2325486

Floros, C., & Tan, Y. (2013). Moon phases, mood, and stock market returns international evidence. *J. Emerg. Mark. Financ. 12*(1), 107–127.

Garrett, I., Kamstra, M.J., & Kramer, L.A. (2005). Winter blues and time variation in the price of risk. *J. Empir. Financ. 12*(2), 291–316.

Hollstein, F., Prokopczuk, M., & Tharann, B. (2021). Anomalies in commodity futures markets. *The Quarterly Journal of Finance, 11*(04), 2150017.

Hollstein, F., Prokopczuk, M., Tharann, B., & Simen, C. (2021). Predictability in Commodity Markets: Evidence from More Than a Century. *Journal of Commodity Markets, 24*, 100171.

Kamstra, M.J., Kramer, L.A., Levi, M.D., (2003). Winter blues: a SAD stock market cycle. *Am. Econ. Rev. 93*(1), 324–343.

Lepori, G.M. (2015a). Investor mood and demand for stocks: evidence from popular TV series finales. *J. Econ. Psychol. 48*, 33–47.

Lepori, G.M. (2016). Air pollution and stock returns: evidence from a natural experiment. *Journal of Empirical Finance, 35*, 25–42.

Levy, T., & Yagil, J. (2011). Air pollution and stock returns in the US. J. Econ. *Psychol. 32*(3), 374–383.

Mehta, K. & Chander, R. (2009). Seasonality in Indian stock market: a re-examination of January effect. *Asia Pac. Bus. Rev. 5*(4), 28–42.

Nasir, M.A., Naidoo, L., Shahbaz, M., & Amoo, N. (2018). Implications of Oil Prices Shocks for the Major Emerging Economies: A Comparative Analysis of BRICS. *Energy Economics*, https://doi.org/10.1016/j.eneco.2018.09.023

Pathan, S., & Charkha, S. (2020). *Consumer Behaviour and Purchase of Gold during the Festive Season for Purpose of Investment and its Expected Return for Customers in Pune City, Maharashtra, India* [Transformative Role of Business in Social Responsibility : An Indian Perspective]. SKN Singhad School of Business Management, Pune, India.

Qadan, M., & Aharon, D. (2018). How Much Happiness Can We Find in the US Fear Index. *Finance Research Letters, 30*, 246-258.

Qadan, M., & Kliger, D. (2016). The short trading day anomaly. *Journal of Empirical Finance 38*, 62–80.

Qadan, M., Aharon, D.Y., & Eichel, R. (2019). Seasonal patterns and calendar anomalies in the commodity market for natural resources. *Resources Policy, 63*, 101435.

Srikanth, P., & Ram, M.R. (2013). Economic Impact of Festivals: Evidence from Diwali effect on Indian stock market. *Researchers-world: Journal of Arts, Science & Commerce, 4*, 27-37.

Sreenu, N. (2022). Impact of FDI, crude oil price and economic growth on CO2 emission in India: -symmetric and asymmetric analysis through ARDL and non-linear ARDL approach. *Environmental Science and Pollution Research*, 1-14.

Sharma, S., & Dhiman, B. (2021). Pandemic Scare on Commodity market- Covid 19, In *Disruptive Technology, Industry 4.0, Management, Information Technology, and Social Science* (pp.128-132). INSC International Publishers.