

Empirical Study of the Influence of Commodity Market Dynamics on the Financial Market Performance

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Abstract: Commodity markets are important in determining global economic activity and directing investment decisions between financial markets [1]. The growing co-movements in commodity prices, equities, inflation expectations and macroeconomic indicators have made commodity analysis one of the most relevant areas of financial research [2]. In this study, we analyze the relationship of key commodity price movements with financial market aggregate performance dynamics and establish a strong link between movement in commodity prices and investor sentiments, volatility, and portfolio diversification strategies. The study adopts quantitative methods of analysis to find patterns, relationships and markets response across economic scenarios by utilizing secondary market data captured from third-party financial databases and market data available to the public domain. Results demonstrate that financial markets move considerably with commodity price changes when uncertainty is high. The paper adds to the literature on the changing role of commodities in economic and financial systems as investment assets. The work also states that commodity analysis is necessary for investors, policy makers and financial institutions to help gather information in highly intricate market environments.

Keywords: Commodity Markets, Financial Markets, Market Volatility, Investment Analysis, Portfolio Diversification, Economic Indicators.

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I. INTRODUCTION

Many of the macro-economic and sector-specific factors which largely influence financial markets have commodity markets as a key player. Commodities, whether crude oil or gold, silver or natural gas, are both inputs to economic activity and investment assets [1]. Commodity price changes are an important measure of global demand and supply conditions, geopolitical developments, inflation expectations, and investor sentiment [3].

In recent years, commodity markets have re-emerged in the eyes of investors as a consequence of economic uncertainty, inflation expectations and geopolitical tensions due to rising market prices. As a result, commodities no longer belong to the domain of simply physical goods, but are recent by many an essential financial vehicle that offers protection against inflation risk (hedging), diversification and investment alpha [4].

The relationship between commodity markets and financial markets has become very complicated. While high prices for commodities might be an indicator of economic growth and business activity, they might also lead to high rates of inflation and poor company performance. Likewise,

when there is turmoil and uncertainty in the economy, commodities like gold become popular safe havens [5].

Knowing these relationships is crucial for investors, policy makers and financial analysts who are looking to predict the changes of prices in each market segment of our economy and manage their investment risks in that process. The paper systematically examines the causal relationship between commodity prices and financial market performance, showing both empirical insights into the importance of commodities for modern investment decision-making.

II. LITERATURE SYNTHESIS

Academic literature has explored extensively the relation between commodity price and financial markets. Previous studies have shown that commodity prices are leading indicators of economic activity and transmit through various channels to stock market returns [1] [5].

The work done by Gorton and Rouwenhorst (2006) showed that there is a benefit of adding commodities futures to the investor portfolio because of the low correlation between them and other types of investments. According to

their results, commodities help protect against unexpected inflation. It also further contributes to improved risk-adjusted returns [6].

In the same line, Baur and Lucey (2010) analyzed gold as a safe-haven asset and pointed out that prices of precious metals either stay at same level or increase during the time when investors skeptically react in financial markets [7]. This feature has further established gold as a go to asset for safety in tricky economic times.

Research from oil markets has found significant responses between movements of crude oil prices and stock market returns. According to Hamilton (2009) large oil price increases indeed negatively impacts economic growth, by raising production costs as well as consumers demand. These developments often result in increased volatility and a lower risk appetite among investors [8].

Recent studies focus on growing financialization in commodity markets [3]. Institutional investors now trade in a wide variety of commodities which have increased the ties between commodity and financial markets. As such, this trend has increased cross-asset return co-movement and hence market transmission of shocks, which elevates the importance of commodity analysis for financial market prediction [9].

Despite substantial research, the evolving nature of global markets necessitates continued examination of commodity-financial market relationships. This study contributes to existing literature by analyzing recent market trends and identifying practical implications for investors.

➤ *Research Objectives*

The primary objectives of this research are:

- To study the impact of commodity price fluctuations on financial market activities.
- To evaluate the effect of top commodities over investor sentiment and market volatility.
- Evaluate the importance of commodities in portfolio diversification.
- To look for any new trends within the commodity markets and how this may affect investment strategies.
- To share practical suggestions to investors and financial analysts.

III. RESEARCH METHODOLOGY

➤ *Research Design*

An analytical and descriptive study design was used in this study. This research uses secondary market data obtained from financial databases, commodity exchanges, market reports and economic publications that are publicly available.

➤ *Data Collection*

Secondary data were collected from multiple sources, including:

- Commodity market reports
- Financial market databases
- Stock market indices
- Economic publications
- Industry research reports

The selected commodities for analysis include:

- Gold
- Crude Oil
- Silver
- Natural Gas
- Agricultural Commodities

Financial market performance was assessed using major stock market indices and market volatility indicators.

➤ *Data Analysis Techniques*

The study employed:

- Trend Analysis
- Comparative Market Analysis
- Descriptive Statistical Analysis

These techniques facilitated the identification of patterns, relationships, and market responses associated with commodity price fluctuations.

IV. DATA DESCRIPTION AND PRELIMINARY ANALYSIS

➤ *Dataset Overview*

This study used a secondary data from the financial and commodity market data collected over the internet for publicly available information. We compiled historical price data for five years of selected commodities: Gold, Crude Oil, Silver, Natural Gas and Agricultural Commodities. Data of the corresponding financial markets were collected in consideration of benchmark stock market indices and indicators for market volatility, which made it possible to conduct a comparative analysis [10] [11].

Our dataset included monthly observations for all variables. We applied data cleaning procedures including elimination of figures with missing values, removal of repeated observations and adjustment of measurement units for commodities. This step improved data reliability and confirmed the validity of subsequent statistical analyses.

➤ *Descriptive Statistics*

Descriptive statistical analysis was done to get some insight into market behavior. Statistical calculations of important measures including mean, median, min value, max value and standard deviation percentage change were performed for each commodity and indicator of the financial market.

Table 1 Descriptive Statistics of Selected Commodities (2020 - 2026)

Commodity	Mean Price	Median Price	Std. Deviation	Minimum	Maximum
Gold (USD/Oz)	2,058.50	1,945.00	382.10	1,470.00	2,750.00
Crude Oil (WTI) (USD/Barrel)	73.10	72.10	23.40	18.40	123.70
Silver (USD/Oz)	25.40	24.10	5.90	11.80	34.90
Natural Gas (USD/MMBtu)	3.85	3.15	1.85	1.50	9.80
Agricultural Index	110.40	108.20	14.80	84.20	146.80

The descriptive statistics suggest significant heterogeneity in price behaviour across the selected commodities. Gold price movements were stable long term, reinforcing the safe haven character of Gold during economic downturns. On the other hand, Crude Oil and Natural Gas were much more volatile, due to their susceptibility to geopolitical events, shifts in global demand- and supply-side disruptions. Silver is more volatile than gold due to the industrial commodity and investment asset components. Prices of agricultural commodities showed fairly stable trends linked to seasonal and production factors. The heterogeneous risk-return profile and the potential role of commodities in

optimal asset allocation/portfolio selection are emphasized by these results.

➤ Trend Analysis

Trend analysis was performed to detect the long-term trend in a dataset. Commodity prices were also studied over the duration of the study to identify whether prices trended upwards, downwards or cycled.

The analyzed data also showed an increasing price of Gold, especially during times of financial market instability, inflation, and economic uncertainty.

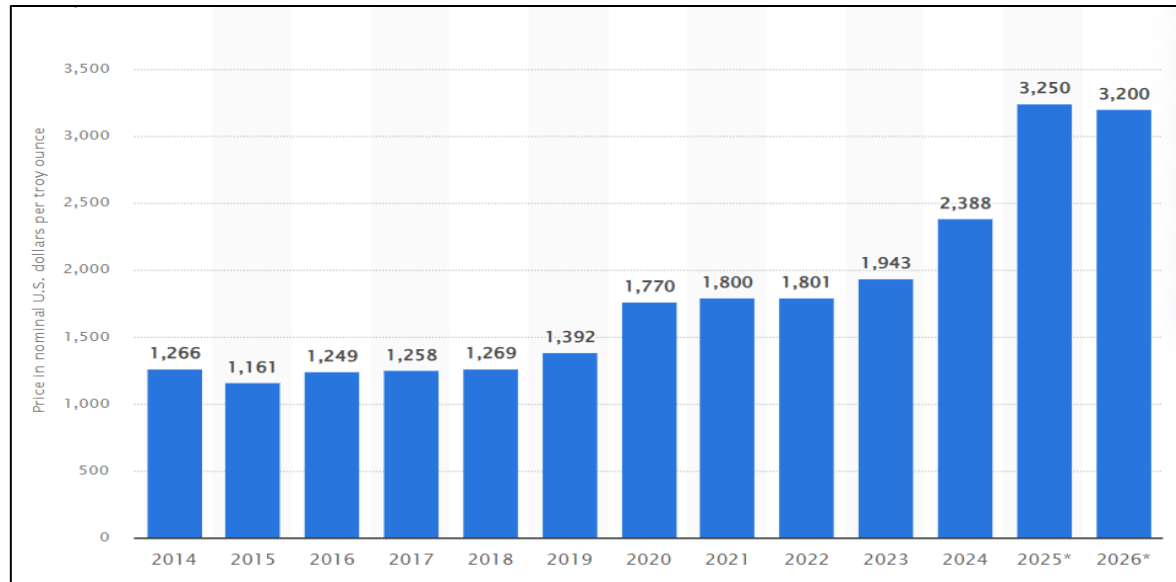


Fig 1 Gold Average Prices Worldwide from 2014 to 2024 with a Forecast Through 2026

Source: Statista.com [12]

A prime example of this can be represented through the column chart above, showing that global gold prices have gone on a one-way trajectory in pretty much the whole period analysed and the strong growth after 2020. This trend is driven by rising economic uncertainty, continuing inflationary pressures, geopolitical tensions and changes in monetary policy of important economies. Gold's safe-haven status is confirmed by surging prices when financial markets are under stress. Investors tend to channel funds into gold,

away from volatile financial markets, in order to maintain wealth and lower portfolio risk. This anticipated rise to 2026 adds weight to the notion that gold is expected by investors to remain an inflation- and macroeconomic hedge for the foreseeable future. These results are consistent with the observation from the study that gold is negatively correlated with financial market stress and may enhance portfolio diversification.



Fig 2 Crude Oil Price Volatility [Last 10 years]
Source – TradingEconomics.com [13]

On the other hand, the history of Crude Oil is characterized by numerous boom and bust cycles in tandem with global economic conditions, policies and geopolitical events.

As the above figure illustrates, crude oil prices have experienced considerable volatility over the past decade with one of the most sensitive commodities in respect to global economic conditions and geopolitical developments, and supply-demand imbalances. Notice how the price drops during periods of economic slowdown and reduced industrial activity, followed by sharp price rises when supply chain disruptions post geopolitical conflict lead to re-inflated global demand. Crude oil is significantly more volatile than all of the

commodities considered in this analysis, and therefore is viewed as a very risky investment asset but at the same time can also provide high return if risk is managed properly. These price cycles show that crude oil is a leading indicator of the economy and a good proxy for share market investor sentiment. The results also indicate that modest oil-price hikes are typically linked to strong economic growth, but large price shocks could lead to inflationary pressures and financial market volatility.

Most agricultural commodities continued to show seasonal patterns, while Silver and Natural Gas experienced periodic swings that were largely induced by industrial demand and macroeconomic developments.



Fig 3 Natural Gas Price Volatility [Last 10 years]
Source – TradingEconomics.com

This figure above depicts massive volatility in natural gases within the time series mentioned which is representative of how natural gas prices can respond with variable seasonal demand patterns, meteorological conditions, energy consumption trends and geopolitical

events. Sharp price rises are mainly linked to supply shortages and stronger energy demand, while sharper declines correspond to oversupply conditions and lower industrial consumption. Natural gas has far higher price volatility than precious metals like gold, and is therefore a speculative

investment vehicle. These fluctuations reaffirm a widely held view that natural gas prices respond to external market forces and can have ramifications for energy intensive industries and overall economic performance.

The trends described in this observation provided early evidence of the dynamic effect that commodity markets exert on shifting economic environments and, additionally, how

these commodity market changes may affect overall financial market performance.

➤ *Correlation Analysis*

To examine the relationship between commodity prices and financial market performance, Pearson correlation coefficients were calculated.

Table 2 Correlation Matrix Between Selected Commodities and Financial Market Performance.

Variable	Gold	Oil	Silver	Market Index
Gold	1.00	-0.18	0.47	-0.58
Oil	-0.18	1.00	0.29	0.46
Silver	0.47	0.29	1.00	0.31
Market Index	-0.58	0.46	0.31	1.00

The objective was to determine the strength and direction of associations between commodity price movements and stock market indicators. The degree of correlation between the different commodities was showed to be quite disparate on analysis.

The relationship between commodity prices and the performance of financial markets is shown in this correlation matrix, which ranges from weak to strong. On one hand, gold has a relatively high negative correlation with market index (-0.58), meaning whenever there is investor uncertainty in the market they tend to flee towards gold once again corroborating its legacy as safe-haven asset. Crude Oil has a positive (but low) correlation with the market index at 0.46 which indicate that oil prices generally move in line with economic expansion and growth, as well as financial market activity. Silver shows a weak positive correlation with both Gold and the market index, which is similar to its behavior as a both an industrial and investment commodity. With a 0.29 correlation, Crude Oil and Silver have seen some commonality in response to deeper cyclical patterns in the economy. Overall, the study reinforces the importance of more detailed cross-market linkages for analyzing specific markets and also provides closing evidence that commodity markets are integrated with finance.

➤ *Data Visualization and Interpretation*

Line charts, trend plots and diagrams were used to graphically analyze the behavior of commodity prices over time and their interactions in each market. The visualizations backed the statistics up, showing spikes in price and corrections during significant commodity price moves, including periods of low and high volatility. There have been multiple fluctuations on the financial market that occurred together with a larger demand for safe-haven commodities like Gold. Again, this had to do with the economic expansion periods which pushed higher energy commodity prices linked to more intense industrial activity and consumption. The preliminary data analysis established the existence of meaningful relationships between commodity markets and financial market performance. These findings provided the

foundation for the detailed results and discussion presented in the subsequent section.

V. RESULTS AND ANALYSIS

➤ *Commodity Price Trends*

Over the time period studied, though, there was large price variability in commodities. Crude oil was the most volatile commodity - driven by geopolitical events, supply interruptions and changes in global energy demand [12]. The long-term performance of gold has been comparatively stable, similar to the role it is playing as a safe-haven asset. Silver and natural gas saw big swings in prices, driven largely by industrial demand and the economy. Agricultural Commodities were marked with seasonality influenced by weather, supply chain and global consumption habits [7].

➤ *Relationship Between Commodities and Financial Markets*

Results of correlation analysis showed statistical associations among commodity prices and the performance of some international financial markets. Gold acted as a safe-haven amid high uncertainty in times with an inverse relationship to equity market volatility; reinforcing its status as an effective hedge. Gold prices usually had an upward impact and the level went up, as investors searched for a low-risk alternative investment on stock markets which were declining sharply. Crude oil had a more complicated relationship with the financial markets. As in the previous decades, relatively modest increases in prices occurred mainly in an environment of economic growth and bullish market sentiment. Regardless for sharp increases creating fears of inflation and economic slowdown which brought instability on the markets.

➤ *Impact on Investor Behavior*

These results indicate that commodity market changes are important determinants of investor behaviour. In times when the economy is not performing as well, investors prefer to put money into commodities considered safe-haven [1] [6] [4]. In contrast, investor appetite for gold rose at times of round-the-clock market turbulence and commodities such as

oil, natural gas and coal received speculative investment flowing into them during recovering economics. The broader behavioral pattern is better understood using commodity analysis.

➤ *Portfolio Diversification Benefits*

It was concluded that commodities are diversification instruments in investments. Given that the commodities have different levels of risk and returns, they serve as instruments for reducing the risk in a portfolio. The commodity found to be the best diversification instrument was gold, but energy commodities were characterized by higher levels of returns but at greater risks [13] [14] [15].

VI. DISCUSSION AND IMPLICATIONS

The conclusions correspond to common financial theories of how asset diversification and risk management works. Commodity markets play several roles in the financial system: they are economic indicators, investment instruments, and hedging vehicles [3] [4] [1] [10]. The growing interdependent nature of historical commodity and finance performance data has made monitoring commodity pricing a crucial task. Investors that add commodity analysis to their arsenal of decision-making tools may be better positioned, both to predict changing global market dynamics and hedge against risks within their portfolios [1]. The paper also stressed the role of macroeconomic variables in determining commodity market behavior. Commodities end up moving with interest rates, geopolitical developments and global economic growth - all primarily related to domestic inflation expectations [16]. Additionally, technology advancement and enhanced access to markets has led to widespread adoption of commodity investing [17]. Consequently, we can expect commodity markets continue to play a significant role in the global centre of financial systems and investment planning.

VII. LIMITATIONS OF THE STUDY

➤ *While the Research Provides Valuable Insights, Certain Limitations should be Acknowledged:*

- Mainly, secondary data sources are used in the study.
- Findings may only be applicable during certain market conditions which may change over time.
- Factors from external events like geopolitical conflict and changes to policy will also induce price spikes in commodities which we cannot anticipate.
- The analysis is restricted to selected financial market indicators and commodities.

Long-term, future studies can involve more exhaustive primary data collection, use of more comprehensive econometric modelling and larger geographical scope in order to provide additional insights into the relationship between commodity and financial markets.

VIII. CONCLUSION

Commodity markets remain a key determinant not only of actual prices but also of expectations, whether around inflation or cryptocurrency; they have helped to shape the long goods market cycle and its impact on investment [3] [14] [1]. This paper shows that changes in commodity prices have a significant impact on investor sentiment, market volatility and the performance of portfolios. Gold continues to be attracted as the traditional safe haven asset and high-beta energy commodities are extremely highly correlated with economic and geopolitical developments. These findings support the inclusion of commodities within diversified portfolios and demonstrate that commodities need to be analysed if financial market participants wish to anticipate commodity-related events. As global economic circumstances become progressively integrated, the relationship among commodities markets and financial markets will remain important in assessing portfolios and for understanding key aspects of policymakers and banking institutions worldwide [9] [12] [2]; this is while most commodities assets are significantly grounded in their relations through developed markets. In conclusion, the research contributes to the wider body of knowledge in regards to commodity market behaviour and offers practical implications for constructive decision making when investing and managing risks.

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