SHIFTING CORRELATION STRUCTURES IN FINANCIAL MARKETS: GOLD, OIL, EQUITIES, AND BITCOIN

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Introduction

The increasing integration of global economies has strengthened the interdependence of financial markets. Shocks originating in one sector or region often transmit rapidly across borders, influencing asset prices and investor sentiment worldwide. This phenomenon has been particularly evident during major financial crises, when investors simultaneously reallocate their portfolios across equities, bonds, commodities, and alternative assets such as cryptocurrencies. Understanding correlations between financial markets is therefore of crucial importance for policymakers, institutional investors, and private traders.

The aim of this study is to analyze the nature and strength of correlations between key financial markets, with a special focus on gold, the U.S. dollar index (DXY), crude oil, stock market indices (S&P 500, Nasdaq), and Bitcoin. The period of analysis covers 2015–2025, which allows the inclusion of several important macroeconomic shocks, including the 2015–2016 oil crisis, the COVID-19 pandemic, and the subsequent recovery marked by monetary tightening in 2022–2023.

The objectives of this article are threefold:

1. To define and conceptualize correlation in financial theory.
2. To empirically evaluate the correlations between selected financial instruments.
3. To discuss the implications of these relationships for risk management and investment strategies.

Keywords: Financial markets, correlation, gold, U.S. dollar, oil, S&P 500, Nasdaq, Bitcoin, diversification, risk management

Theoretical Foundations

In finance, correlation is a statistical measure that describes the degree to which two variables move in relation to each other. It is most commonly quantified by the Pearson

correlation coefficient, which ranges from –1 to +1[1]. A value close to +1 indicates a strong positive correlation, meaning that assets tend to move in the same direction. Conversely, a value near –1 implies a strong negative correlation, meaning that assets tend to move in opposite directions. Three principal types of correlation are relevant for financial markets:

- **Positive correlation**: When two assets increase or decrease simultaneously. For example, the S&P 500 and the Nasdaq Composite generally exhibit a strong positive correlation due to their shared dependence on the U.S. economy and technology sector performance.

- **Negative correlation**: When one asset rises while another falls. A classic example is the relationship between the U.S. dollar index and gold prices.

- **Low or no correlation**: When two assets move independently of each other. Some emerging market currencies and cryptocurrencies have historically shown weak correlations with developed market equities.

From a methodological perspective, correlation analysis is widely used in portfolio theory, especially within the framework of modern portfolio theory. Investors seek to combine assets with low or negative correlations in order to maximize diversification and reduce overall risk. More advanced econometric techniques, such as rolling correlation, vector autoregression (VAR), and copula models, are often employed to capture dynamic relationships that change over time[2].

Empirical Analysis of Market Correlations (2015–2025)

Gold and the U.S. Dollar Index (DXY)

The relationship between gold and the U.S. dollar index remains one of the most studied examples of negative correlation in financial markets. Gold is priced in U.S. dollars, which creates an inverse dynamic: when the dollar strengthens, gold tends to lose value, as it becomes more expensive for non-dollar investors Empirical studies covering 2015–2025 confirm that this negative correlation persists, although its magnitude fluctuates across time. During periods of financial stress, such as the COVID-19 pandemic in 2020, the inverse relationship intensified, as investors fled towards safe-haven assets. Conversely, in times of economic stability, the strength of

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[1] Bodie, Z., Kane, A., & Marcus, A. (2018). *Investments* (11th ed.). McGraw-Hill Education.

[2] Engle, R. (2002). Dynamic conditional correlation: A simple class of multivariate GARCH models. *Journal of Business & Economic Statistics*, 20(3), 339–350.

the correlation weakens, reflecting the impact of other macroeconomic factors such as inflation expectations and monetary policy.

Another important factor shaping this relationship is U.S. Federal Reserve policy. Periods of monetary tightening, such as the interest rate hikes in 2018 and again in 2022–2023, strengthened the dollar and put downward pressure on gold prices. In contrast, expansive monetary policy—characterized by near-zero interest rates and large-scale asset purchases during 2020–2021—supported gold's rally to historical highs above $2,000 per ounce. Furthermore, inflation expectations often act as a mediating variable: higher inflation reduces the real return on dollar-denominated assets, increasing the attractiveness of gold as a store of value.
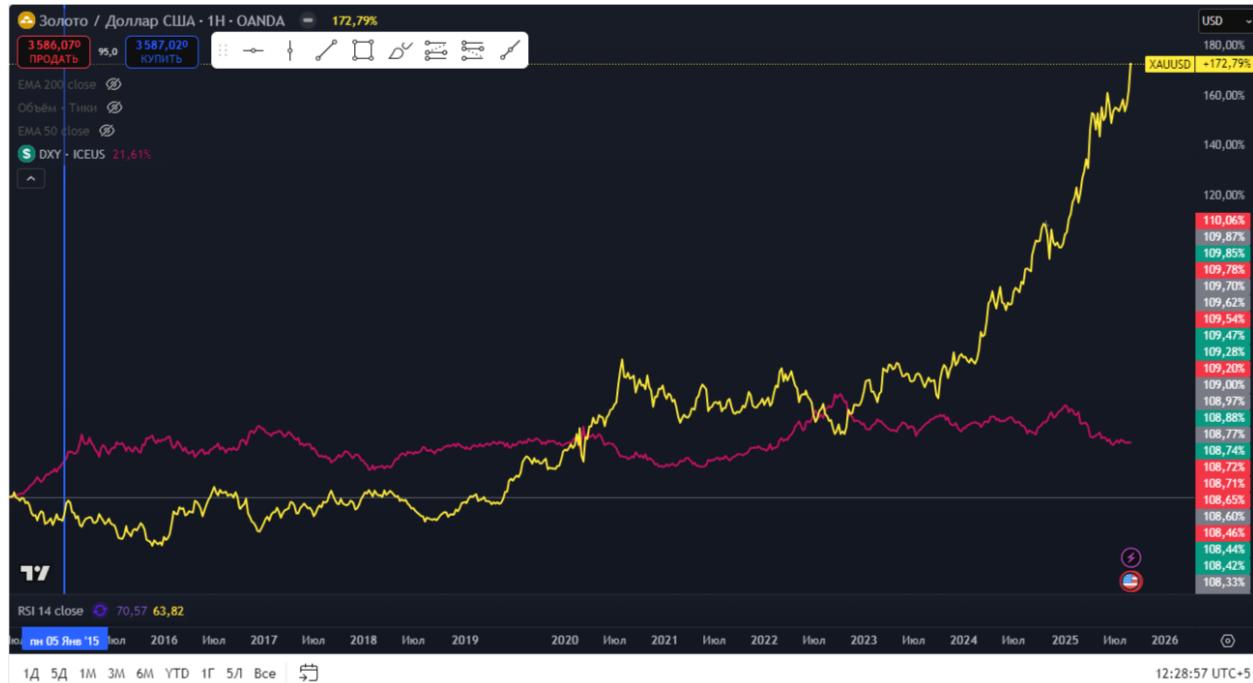

Figure 1: Correlation of Gold with U.S. Dollar (2015-2025)[3]. Yellow line is Gold and Red line is U.S. Dollar.

Crude Oil and Stock Market Indices (S&P 500, Nasdaq)

Crude oil prices have a significant impact on stock markets, particularly in the United States, given the economy's dependence on energy consumption. The correlation between crude oil (WTI and Brent) and stock indices such as the S&P 500 and Nasdaq is generally positive, but it is highly sensitive to the macroeconomic context. However, during the oil price collapse in 2015–2016, stock markets showed resilience, leading to a temporary breakdown in the correlation. In 2020, when the oil market experienced an unprecedented crash with futures trading at negative prices, the correlation

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[3] https://ru.tradingview.com/chart/0t3E75rF

temporarily turned negative, highlighting the exceptional conditions of that crisis. From 2021 to 2023, as the global economy recovered and energy demand surged, oil and stock indices again moved in tandem, reinforcing their positive relationship[4].

Figure 2: Correlation of S&P 500 with Brent Crude Oil(2015-2025)[5]

Bitcoin and Traditional Markets

Bitcoin has emerged as a unique asset class over the past decade, attracting increasing attention from both institutional and retail investors. Initially, Bitcoin was considered largely uncorrelated with traditional financial markets, which reinforced its reputation as a diversification tool. However, from 2018 onwards, and particularly during the pandemic years, Bitcoin's correlation with major stock indices such as the S&P 500 and Nasdaq began to increase significantly. From 2020 to 2022, Bitcoin demonstrated a strong positive correlation with technology stocks, particularly those represented in the Nasdaq index, as both asset classes became highly sensitive to monetary policy decisions and liquidity conditions[6]. While some periods suggested that Bitcoin might

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[4] World Bank. (2023). *Global Economic Prospects*. Washington, D.C.

[5] https://ru.tradingview.com/chart

[6] Baur, D.G., Hong, K., & Lee, A.D. (2018). Bitcoin: Medium of exchange or speculative assets? *Journal of International Financial Markets, Institutions and Money*, 54, 177–189.

function as a "digital gold," the data from 2015–2025 reveal that Bitcoin is far more volatile and less reliable as a safe haven compared to traditional gold markets.

Figure 3: Correlation of Nasdaq Index with Bitcoin (2020-2025)[7]

Summary of Findings

The empirical evidence from 2015–2025 highlights several key points. First, the gold–dollar relationship remains a textbook example of stable negative correlation, intensifying during times of crisis. Second, oil and stock markets generally move together, though the strength and direction of this correlation depend heavily on the macroeconomic context. Third, Bitcoin has transitioned from being largely uncorrelated to becoming more closely tied to equity markets, particularly technology-driven indices, reducing its value as a diversification instrument. These findings illustrate the dynamic nature of financial market correlations and their sensitivity to global events, monetary policy, and investor behavior.

Discussion

The findings of this study underscore the complexity and dynamism of financial market correlations. First, the negative correlation between gold and the U.S. dollar confirms gold's status as a traditional hedge against currency fluctuations and macroeconomic uncertainty. However, the intensity of this correlation varies depending on global financial conditions. For example, during the COVID-19 pandemic in 2020, investors intensified their demand for gold as a safe haven, leading

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[7] https://ru.tradingview.com/chart/0t3E75rF/?symbol=BINANCE%3ALTCUSDT.P

to stronger inverse movements relative to the dollar[8].

Second, the oil–equity relationship illustrates how correlations can shift depending on the balance between supply shocks and demand shocks. When oil prices rise due to stronger global demand, stock markets often rally simultaneously, reflecting higher expected corporate earnings. Conversely, when oil price volatility is driven by supply disruptions or geopolitical events, higher energy costs may depress equity performance, leading to weaker or even negative correlations.

Third, Bitcoin's evolution highlights how new asset classes gradually integrate into the broader financial system. Initially uncorrelated, Bitcoin's increasing alignment with equities—particularly technology stocks—suggests that it is increasingly perceived as a speculative risk asset rather than an independent store of value. This convergence reduces its diversification benefits, challenging the narrative of Bitcoin as "digital gold".

Overall, the results demonstrate that correlations are not static but context-dependent. Investors relying on historical relationships for risk management must consider how correlations evolve in response to crises, policy shifts, and innovations in financial markets.

Conclusion

This article has examined the correlations between major financial markets—gold and the U.S. dollar, crude oil and equity indices, and Bitcoin and traditional assets—over the period 2015–2025. The analysis confirms three central conclusions.

1.   **Gold remains a consistent hedge against the dollar**, especially in times of financial instability, reaffirming its safe-haven role.

2.   **Oil and equity correlations are highly sensitive to macroeconomic context**, with positive relationships during demand-driven booms and weaker or negative linkages during supply shocks.

3.   **Bitcoin has transitioned from being an uncorrelated asset to one that increasingly mirrors equity markets**, particularly in periods of abundant liquidity, thereby reducing its effectiveness as a portfolio diversifier.

These findings have important implications for portfolio management. They suggest that diversification strategies must be dynamic, continuously adjusting to evolving

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[8] Reboredo, J.C. (2013). Is gold a hedge or safe haven against oil price movements? *Energy Economics*, 40, 38–49.

market conditions. Moreover, they highlight the need for policymakers and institutional investors to monitor cross-market linkages as potential channels of systemic risk.

Future research should extend the analysis by applying advanced econometric models such as time-varying copulas and machine-learning–based predictive analytics. Such approaches would help capture nonlinearities and structural breaks in correlations, especially as new asset classes such as digital currencies and carbon credits gain prominence in global portfolios.

References

1. International Monetary Fund (IMF). (2023). *World Economic Outlook: Navigating Global Divergences*. Washington, D.C.

2. Bodie, Z., Kane, A., & Marcus, A. (2018). *Investments* (11th ed.). McGraw-Hill Education.

3. Engle, R. (2002). Dynamic conditional correlation: A simple class of multivariate GARCH models. *Journal of Business & Economic Statistics*, 20(3), 339–350.

4. World Bank. (2023). *Global Economic Prospects*. Washington, D.C.

5. Baur, D.G., Hong, K., & Lee, A.D. (2018). Bitcoin: Medium of exchange or speculative assets? *Journal of International Financial Markets, Institutions and Money*, 54, 177–189.

6. https://ru.tradingview.com/chart/0t3E75rF/?symbol=BINANCE%3ALTCUSD T.P