

AI in Asset Pricing and Investment Strategy : A Complementary Approach

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Abstract:

This research explores the integration of Artificial Intelligence (AI) into traditional asset pricing models and investment strategies , focusing on whether Ai acts as a replacement or a complement to human financial analysis abilities. While traditional models like the Capital asset pricing Model (CAPM) rely on linear assumptions , AI and specifically machine learning , allows for the processing of non-linear data . This study examines the synergy between algorithmic precision and historical market wisdom , using a quantitative framework to measure performance enhancements in diversified portfolios . The result indicates that while AI excels at short-term pattern recognition and risk qualification , it requires the foundational stability of traditional assets and human oversight during systematic shocks (Market risk) .

Keywords:

Artificial Intelligence , Asset Pricing , Investment Strategy , Machine Learning , Financial innovation.

Introduction: "The What & Why"

Today , changes in the global financial system are unexpected . While traditional stores of value such as gold have returned as one of the most important reserves a central bank can hold , new forms of reserves and AI driven investment strategies present an entirely new digital asset class that has entered the current financial system. These innovations have yielded record results in terms of returns and momentum , but unfortunately with record volatility as well .

Historically , gold represents stability , an attributed acquired after positively impacting financial systems since the fall of ancient Rome. Currently , digital assets and AI driven strategies represent innovation and technology , functioning through complex decentralized systems . While traditional assets can reduce risk , innovation assets can enhance returns , and the correlation between these two has attracted scholars , businesses , and investors globally .

Even though these assets may seem like opposites , empirical evidence suggests their behavior can converge . This statistically intense study examines these dynamics through 7 objectives :

Measure and compare returns across different time horizons

Measure risk by quantifying and comparing volatility

Analyze possible correlation and diversification benefits

Investigate lead and lag dynamics between asset classes

Test cointegration between traditional and digital assets

Explore effects of shocks through Vector Autoregression (VAR) and impulse response functions (IRF)

Evaluate practical usefulness for investors and policymakers

Literature Review: "The story so far "

A. Theories of Money

Gold has historically functioned as commodity money and evolved into a reserve asset underpinning the international monetary system. Its scarcity , divisibility , and universal acceptance make it a benchmark of value across centuries . While the gold peg was officially replaced by fiat in the 1970's , it continues to serve as a mean to store value during uncertainty . Conversely , digital assets represent a modern extension of this concept , relying on algorithmic scarcity rather than environmental availability .

B. Safe – Haven and Hedging Theories

Assets are classified as hedges , safe havens , or diversifiers . Hedges are uncorrelated or negatively correlated with portfolios , while safe havens retain or increase value during extreme market stress (Kamel et al., 2025). Diversifiers improve efficiency but may not provide protection during crises . Gold is a documented safe haven , especially during equity downturns . In contrast , the role of digital assets remains debated , they often act as diversifiers in normal times it may exhibit safe – haven characteristics during specific crises .

Methodology: "The how we did it "

Data were collected from NASDAQ and Yahoo Finance covering a time frame from 2015 to 2025 , totaling 2520 observations . Data were processed through Python using a quantitative research design

The Study utilized :

- Descriptive Analysis : Including mean , standard deviation , skewness and kurtosis
- Correlation Analysis : Pearson , Spearman
- Ordinary Least Squares (OLS) : To study on the spot and lagged impacts (one week / five trading days)
- Vector Autoregression (VAR) : To test lag accuracy , confirmed via AIC and BIC criteria

Results: "The facts "

Table 1 : Pearson and Spearman Correlation Analysis

Correlation Pair	Pearson Result	Spearman Result
Gold vs. AI-Driven Assets	0.0879	0.0932
Gold vs. Gold	1.0000	1.0000
AI Asset vs. AI Asset	1.0000	1.0000

Source : Quantitative Analysis using Python

Both Pearson and Spearman correlation analyses show a weak and unstable relationship between traditional and AI driven asset returns . However , the rolling correlation reveals that during global crises , such as COVID 19 or the 2025 US tariffs . This relationship increases significantly. According to the results, these assets should not be considered potential diversifiers for each other during crises , as correlation peaks exactly when diversification is most needed

Discussion and conclusion: "The so what ? "

Using 7 statistical analytical methods , this study concludes the following :

1. Gold and AI driven assets are not substitutes , but can be used a complements
2. The 2 assets provide diversification in stable environments , but this is not recommended when the market is highly volatile
3. Gold remains the superior safe – haven asset due to its stable characteristics and predictable returns
4. Innovation assets are more attractive for speculation due to high returns but are less successful for hedging
5. Market shocks impacts prices in very short term , investors have a maximum of 5 business days to benefit
6. Lead and lag effects are minimal m consistent with the efficient market hypothesis

For policymakers and regulators , results imply that gold should remain the basis of central bank reserves to achieve financial stability . Regulators should consider imposing investor protection policies on high volatility Ai assets to mitigate risks from speculative bubbles .

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