CORRELATION ANALYSIS REPORT

Introduction

This report analyzes the correlation between four key assets—**Gold, Oil, Bitcoin, and ICICI Bank (a NIFTY 50 stock)**—during two distinct periods:

- **COVID Period (2020-2021)**
- **Post-COVID Period (2022-2025)**

The goal is to understand how market dynamics shifted before and after the pandemic and derive actionable insights for investors.

1.Justification for Weekly Returns and Period Selection

In this analysis, we use **weekly returns** instead of daily ones. This choice helps us find a good balance—weekly data smooth out the random, short-term ups and downs we often see from day to day, while still showing the overall direction of the market. Daily prices can be affected by sudden news, weekend changes, or very short-term trading effects, which may not reflect the bigger picture. Weekly returns reduce this kind of "noise" and help us focus on more meaningful trends over time. They also give us enough data points to make reliable comparisons.

To better understand how markets have changed, we split the timeline into two clear periods: **the COVID period (2020–2021)** and the **Post-COVID period (2022–2025)**. The first phase includes the time when the pandemic began and caused major disruptions—such as lockdowns, government relief measures, and dramatic movements in oil and stock markets. The second phase reflects how markets adjusted afterward, including rising inflation, interest rate hikes by central banks, supply chain changes, and other long-term effects. This separation lets us compare how assets behaved during a time of crisis versus a period of recovery and adjustment.

Why ICICI Bank?

ICICI Bank is one of the largest private sector banks in India and a prominent constituent of the NIFTY 50 index. It plays a pivotal role in the Indian financial sector, making it a strong representative of the broader equity market, particularly the banking and financial services domain. The bank's performance is closely tied to macroeconomic indicators like interest rates, credit growth, inflation, and monetary policy—factors that were significantly influenced during and after the COVID-19 pandemic.

2. Pairwise Correlations: COVID vs Post-COVID

Table 1 shows how weekly return correlations between each asset pair changed between the COVID period (2020–2021) and the Post-COVID period (2022–2025). Overall, most correlations remain low, meaning these assets generally moved independently. However, a few pairs show noticeable shifts that reflect changes in market behavior.

Pair	***COVID (2020–21)***	***Post-COVID (2022–25)***
Gold – Oil	0.22	0.02
Gold – Bitcoin	0.23	0.14
Gold – ICICI Bank	0.13	0.25
Oil – Bitcoin	0.09	0.27
Oil – ICICI Bank	0.12	–0.08
Bitcoin – ICICI	0.16	0.03

Analysis of Changes in Correlations:

1. **Gold – Oil:**
   During the COVID period, the correlation between Gold and Oil was moderately positive (+0.22). However, this correlation nearly vanished in the Post-COVID period (+0.02). This suggests that although both assets initially responded to global market instability, their relationship became weaker as oil markets stabilized and gold returned to its traditional role as a safe-haven asset.

2. **Gold – Bitcoin:**
   There was a slight positive correlation between Gold and Bitcoin during the pandemic (+0.23), but this weakened after COVID (+0.14). While Bitcoin was often seen as a "digital store of value" like gold, the two assets did not exhibit a strong relationship after the covid, especially as Bitcoin's market became more speculative and driven by different factors.

3. **Gold – ICICI Bank:**
   The correlation between gold and ICICI Bank rose from 0.13 during COVID to 0.25 post-COVID. This suggests that both assets may have been influenced by similar macroeconomic factors,

such as inflation concerns or liquidity shifts in the Indian economy, post-2021.

4. **Oil – Bitcoin:**
 The correlation between Oil and Bitcoin increased from 0.09 during the COVID period to 0.27 post-COVID. This indicates a stronger relationship between these two assets in the post-pandemic environment, possibly driven by shared investor sentiment or market reactions to global inflationary pressures.

5. **Oil – ICICI Bank:**
 The correlation between Oil and ICICI Bank shifted from a mild positive (+0.12) to a negative value (-0.08). Rising oil prices can lead to inflationary pressures, which could negatively affect India's banking sector, explaining the shift in the relationship.

6. **Bitcoin – ICICI Bank:**
 Bitcoin's correlation with ICICI Bank dropped significantly from 0.16 during COVID to 0.03 post-COVID. This almost negligible correlation suggests that Bitcoin's movements were increasingly decoupled from traditional financial assets, reaffirming Bitcoin's role as an idiosyncratic asset.

3. Visual Support: Correlation Matrices and Trends

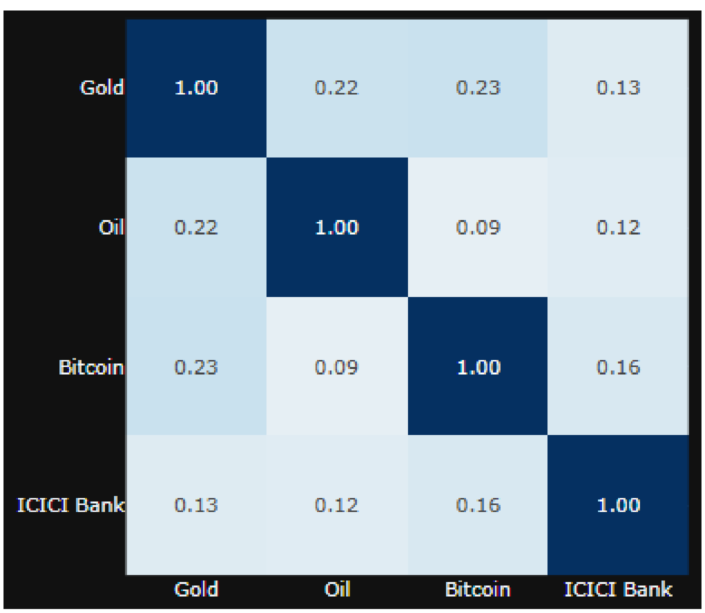


Figure 1: Heatmap of Pairwise Correlations (Weekly Returns) during the COVID Period (2020–2021)

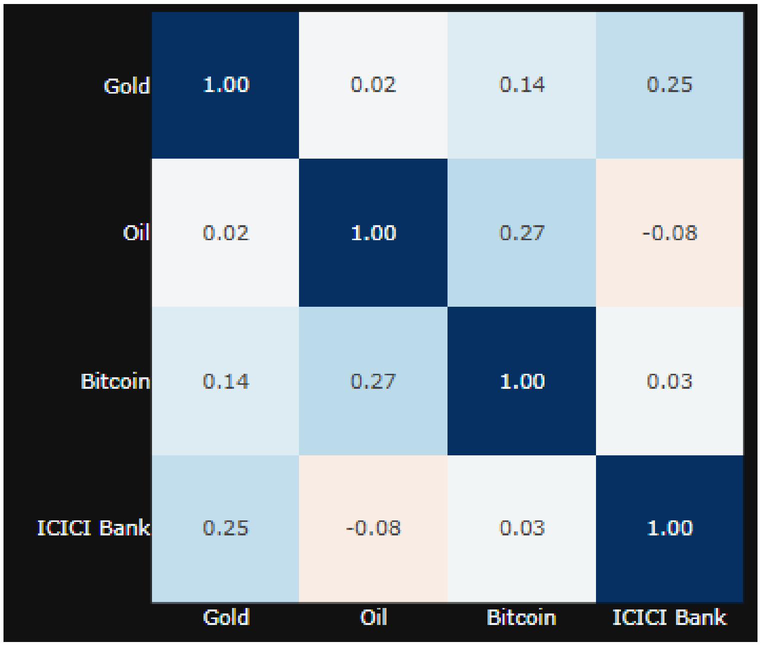


Figure 2: Heatmap of Pairwise Correlations (WeeklyReturns) during the Post-COVID Period (2022–2025)

4. Interpretation of Correlation Changes

Gold

Gold stuck to its reputation as a “safe-haven” asset in both periods, but the reasons behind its demand changed. During COVID, fear and uncertainty pushed investors toward gold, especially as oil crashed and markets turned volatile — leading to moderate correlations with assets like oil and Bitcoin.

Post-COVID, gold's appeal came more from inflation fears and geopolitical tensions. Investors began using it as a hedge against rising prices and currency risks. This shift explains the stronger link between gold and ICICI Bank, as both reacted to similar macro trends like inflation and interest rates. Meanwhile, gold’s correlation with oil faded, reflecting how their drivers had become very different.

Bitcoin

Bitcoin went through a major identity shift between these periods. During the pandemic, people rushed into Bitcoin alongside other speculative assets, hoping for big returns. At that time, it seemed like Bitcoin might be acting like a kind of "digital gold," with a modest positive correlation to gold and even some connection to traditional assets like ICICI Bank.

But after the pandemic, things changed. Regulatory crackdowns, interest rate hikes, and institutional involvement made Bitcoin behave more like its own separate world. It didn't follow the same patterns as gold, oil, or banking stocks anymore. Our data shows Bitcoin's correlations with all other assets dropped, especially with ICICI Bank and gold — indicating that Bitcoin had become more independent, influenced by internal factors like crypto adoption, regulatory news, and market sentiment specific to the digital asset space. So, despite early hopes, it didn't turn into a true hedge like gold — at least not yet.

Oil

Oil had a rollercoaster journey across these two periods. During COVID, oil demand collapsed due to lockdowns, and prices even briefly turned negative — something that had never happened before. This made oil's returns extremely volatile and hard to predict, which is why its correlations with most other assets were relatively weak. It was simply reacting to its own crisis.

But once economies reopened, oil prices recovered quickly, driven by supply chain issues, geopolitical conflicts (like the Russia-Ukraine war), and strong demand during recovery. However, in countries like India, rising oil prices often lead to inflation, hurting businesses and household spending. That's probably why we see a **negative correlation** between oil and ICICI Bank in the post-COVID period — higher oil prices were bad news for the Indian economy, which affected the banking sector. Also, oil's disconnect from gold highlights that these assets were being driven by very different forces after the pandemic.

ICICI Bank (Indian Equities)

ICICI Bank, as a representative of Indian banking stocks, was mainly affected by India-specific economic conditions during both periods. During COVID, Indian markets were shaky but followed global trends somewhat due to liquidity injections and policy support. That's why ICICI Bank showed small positive correlations with various assets — everything was moving in the same general direction.

In the recovery phase, however, Indian markets started responding more to **domestic factors** — inflation, interest rate hikes by the Reserve Bank of India (RBI), and oil price movements. Since India is a major oil importer, high oil prices are usually bad for Indian companies and banks, which explains the negative Oil–ICICI correlation post-COVID. At the same time, ICICI's correlation with gold slightly increased, possibly because both were reacting to inflation news in the same way — investors moving toward assets they believed would perform well in high-inflation environments.

5. Portfolio Implications and Insights

The way correlations between these assets changed before and after COVID tells us a lot about how we should think about building a balanced portfolio — especially for someone investing in India.

Diversification

When assets don't move in sync, that's actually a good thing for investors — it helps reduce risk. For example, gold's correlation with ICICI Bank stayed pretty low even after COVID (rising only from 0.13 to 0.25), which means gold can still play a role in balancing out stock market risks. A lot of experts recommend keeping 5–10% of your portfolio in gold, and the data here backs that up. Bitcoin also showed very low correlation with ICICI, which suggests it might help diversify too — though it's much more volatile, so the risks are higher.

Hedging

The whole point of hedging is to have something in your portfolio that goes up when other things go down. But that gets harder when assets start moving together more. That's what happened with gold and ICICI after COVID — they became slightly more connected, which weakens gold's role as a hedge for banking stocks. On the other hand, oil and ICICI actually developed a slight negative correlation. That means when oil prices went up (usually bad for India's economy), ICICI tended to dip — so oil could act as a basic hedge against banking stocks. Bitcoin, though, didn't really show any consistent hedging behavior — it's still pretty much doing its own thing.

Asset Allocation

All of this just reinforces the idea that having a mix of different types of assets is important — and that mix needs to be updated as market conditions change. Based on what we saw, a good portfolio for an Indian investor could include some gold (through ETFs or gold funds), some equities like ICICI Bank, and maybe a small position in crypto if you're okay with the risks. Gold still looks like a good hedge during uncertain times, Bitcoin might help with diversification (but adds risk), and oil is a bit trickier — it can act as an inflation signal or a sector-specific hedge depending on the situation.

Final Thoughts

The big takeaway? Asset correlations are not fixed — they change depending on what's happening in the world. During COVID, everything kind of moved together because of panic and uncertainty. But after that, individual factors like inflation, supply chains, and sector trends started to matter more. So, if we want our portfolios to stay strong and balanced, we need to keep tracking these shifts and adjust our allocations from time to time. That's how we stay ready — in both crisis and recovery.

Conclusion

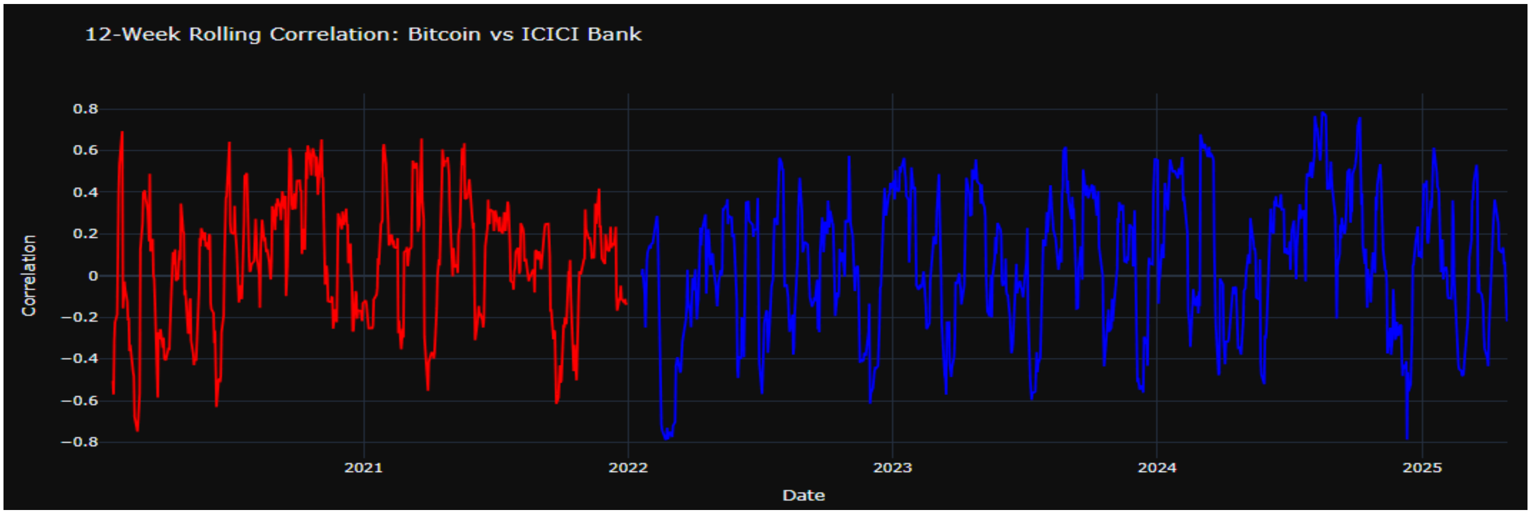
This analysis showed how correlations between key assets — Gold, Oil, Bitcoin, and ICICI Bank — shifted between the COVID-19 period and the post-COVID recovery. During the pandemic, broad market fear and liquidity drove many assets to move in similar directions. But in the years after, those relationships changed as inflation, geopolitical tensions, and sector-specific trends took over.

Gold stayed a reliable safe-haven, though its role shifted slightly from crisis protection to an inflation hedge. Oil's correlation with Indian stocks turned negative, reflecting its impact on costs and earnings in an import-heavy economy. Bitcoin continued to behave independently, offering diversification potential — but with high risk. ICICI Bank, like other financial stocks, remained sensitive to macroeconomic changes, especially inflation and energy prices.

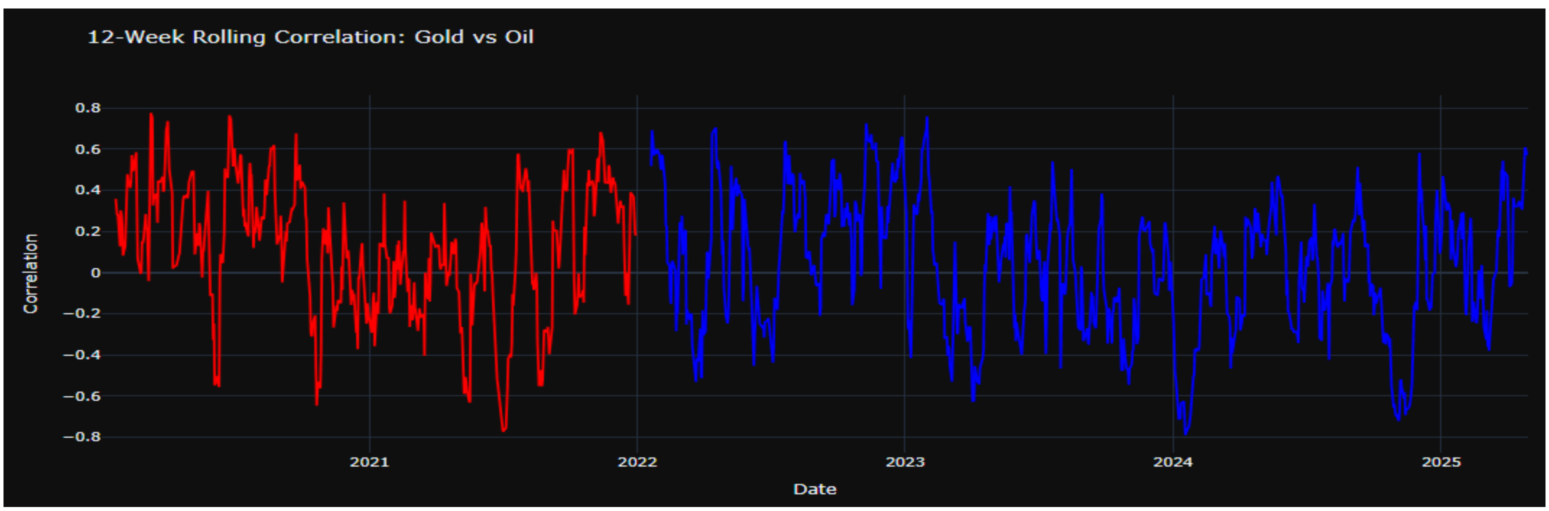
For investors, the main lesson is that **diversification is dynamic** — not static. Asset relationships evolve with the global and local environment, and portfolio strategies need to keep up. Regularly monitoring correlations and adjusting allocations accordingly can help manage risk and build a more resilient investment approach.

Rolling Correlations Visualisation

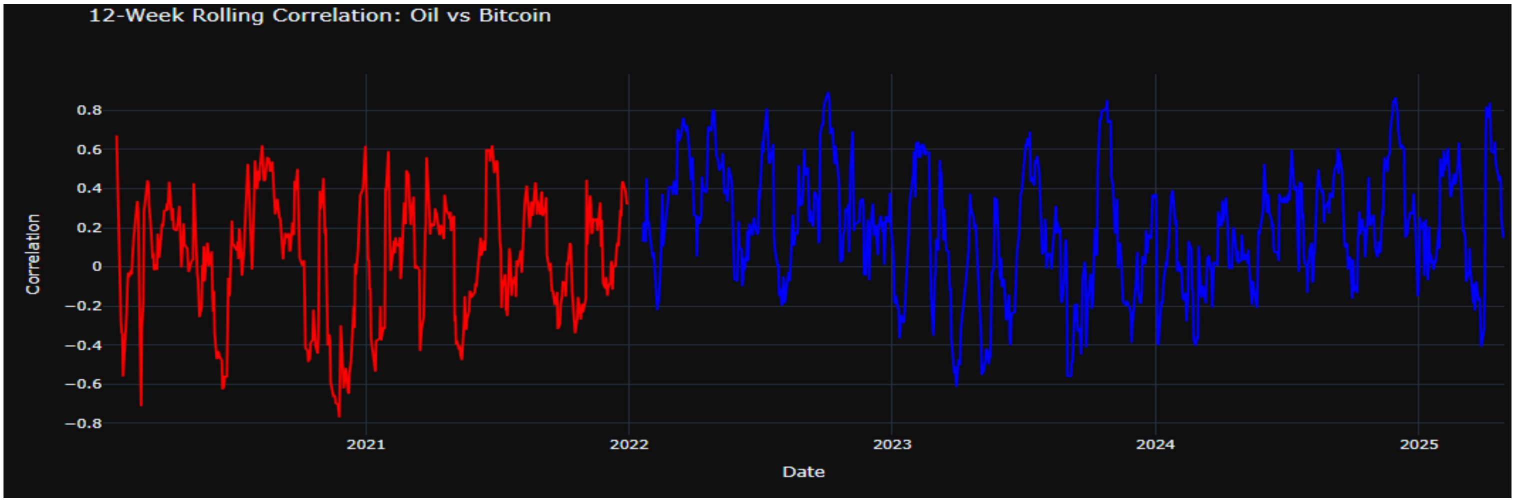
Visualizing rolling correlations over time can provide further insight into how these relationships evolved.



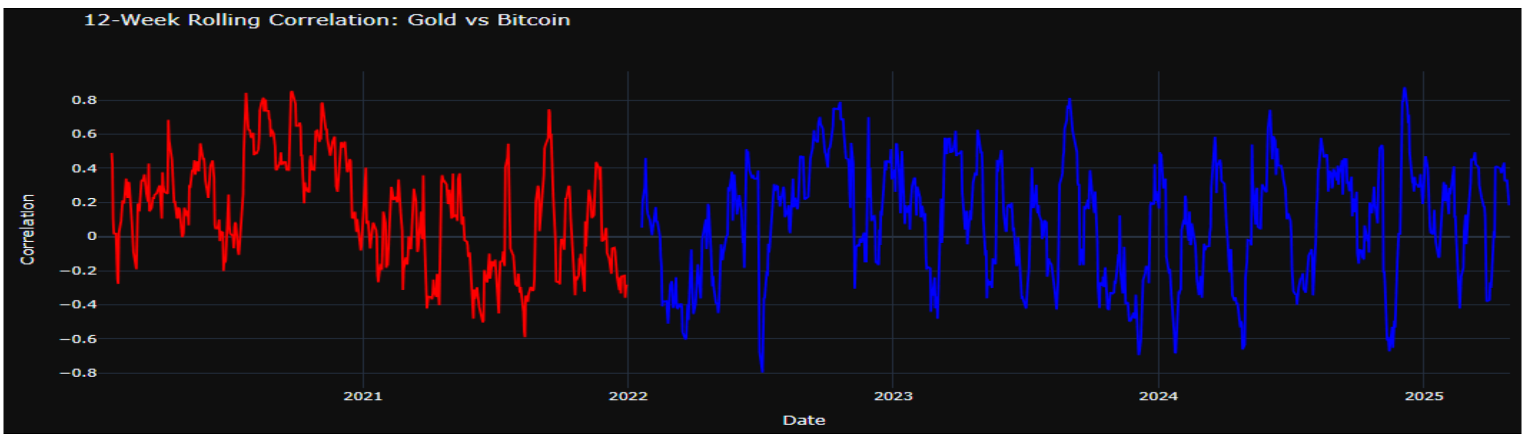
—The rolling correlation between Bitcoin and ICICI Bank stays close to zero and fluctuates randomly, showing **no stable relationship**. This means they move **independently**, offering potential diversification benefits — but Bitcoin's high volatility adds risk.



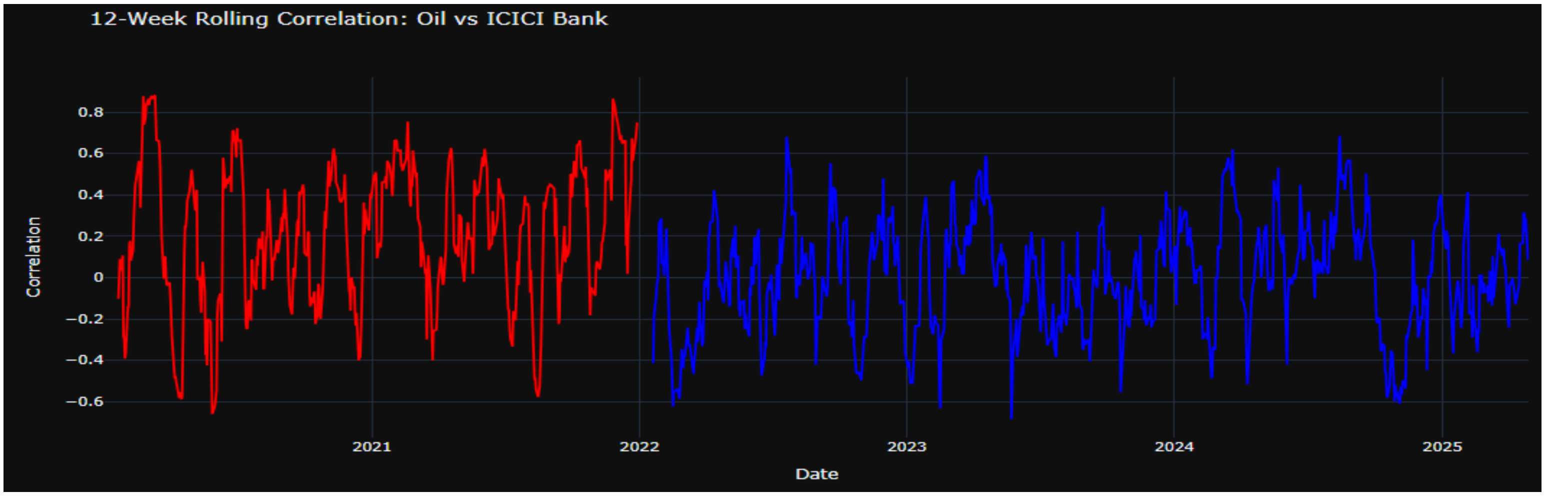
–The rolling correlation between gold and oil shows **significant variation over time**. During the COVID period, it was **moderately positive**, but **dropped close to zero** post-COVID. This shift suggests that while both assets reacted similarly during global uncertainty, they later followed **separate economic drivers** — gold reacting to inflation and risk sentiment, and oil to supply-demand factors.



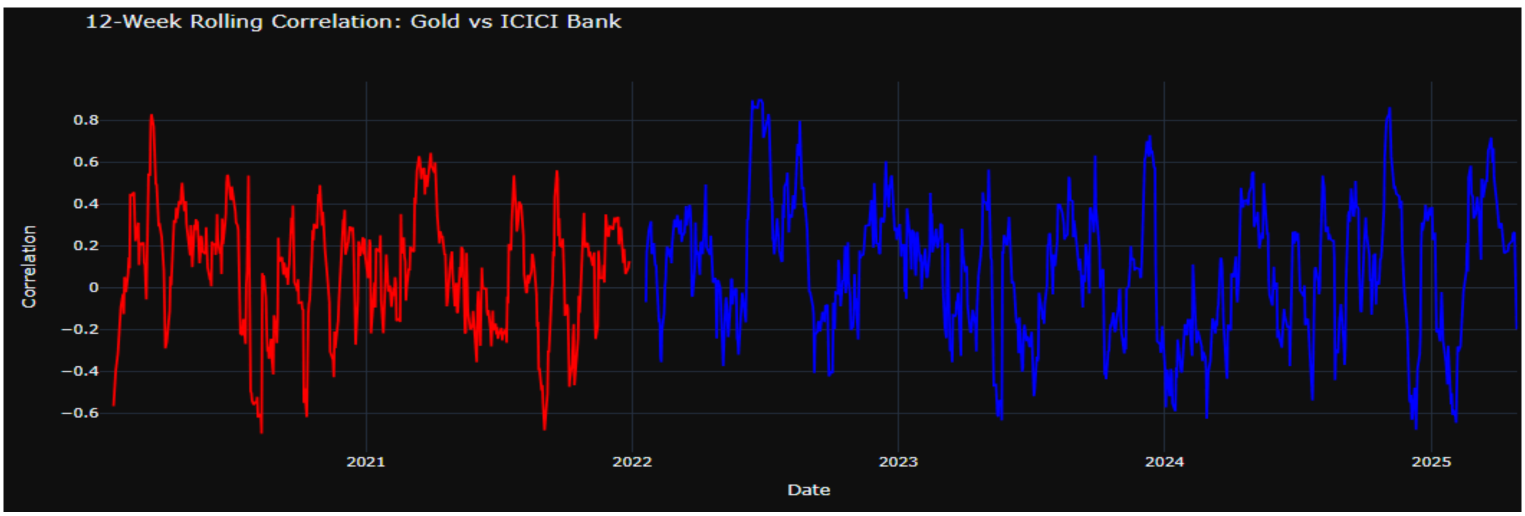
—The rolling correlation between oil and Bitcoin has been **unstable**, with **occasional spikes** during major market events. In the post-COVID period, their correlation **increased slightly**, possibly because both reacted to inflation and liquidity shifts. However, they still mostly move **independently**, as oil follows real economy trends while Bitcoin is driven by sentiment, regulation, and adoption.



–The correlation between gold and Bitcoin **spiked during the COVID-19 period (2020–21)** as both were seen as alternative assets in a high-uncertainty environment. However, **post-COVID, their correlation weakened again**, reflecting their **distinct roles** — gold as a traditional hedge and Bitcoin as a speculative asset.



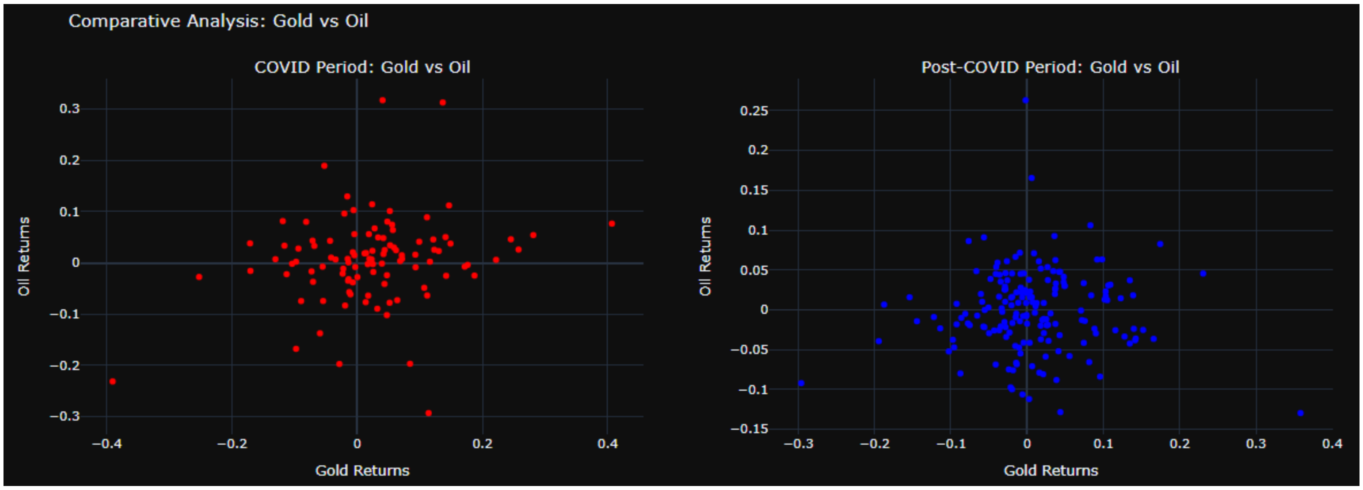
—In this as we can visualize negative movement of correlation post-covid Since India is a major oil importer, high oil prices are usually bad for Indian companies and banks, which explains the negative Oil–ICICI correlation post-COVID

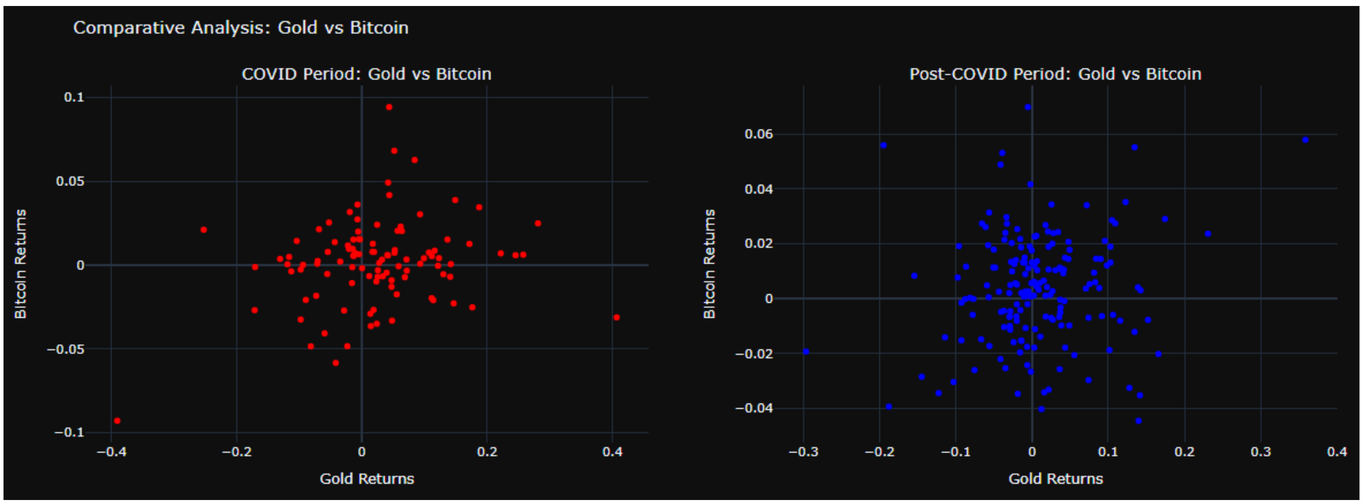


—In this correlation, we can visualize that gold and bitcoin correlation are increased as the shift(2022-2023) explains the stronger link between gold and ICICI Bank, as both reacted to similar macro trends like inflation and interest rates. Meanwhile, gold's correlation with oil faded, reflecting how their drivers had become very different.

Scatter Plot:

Scatter plots can also be used to visualize the relationships between pairs.


Comparative Analysis: Gold vs Oil
COVID Period: Gold vs Oil
Post-COVID Period: Gold vs Oil
Oil Returns
Gold Returns
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
−0.4
0.4
0.25
0.15
0.05
−0.05
−0.15


Comparative Analysis: Gold vs Bitcoin
COVID Period: Gold vs Bitcoin
Post-COVID Period: Gold vs Bitcoin
Bitcoin Returns
Gold Returns
0.1
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0
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−0.1
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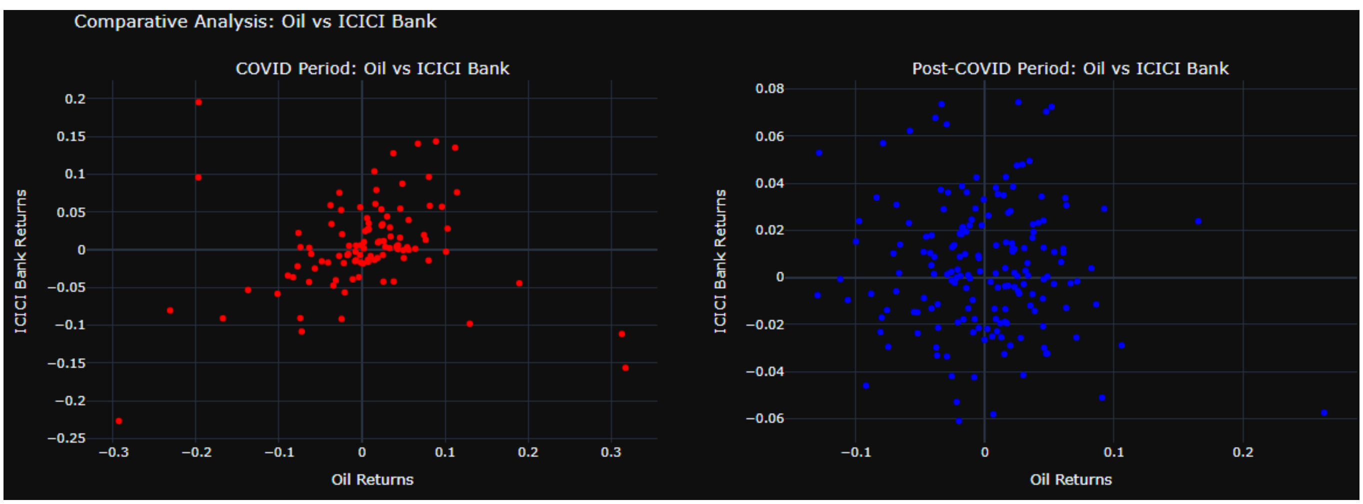
−0.02
−0.04
−0.3
0.3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Post-COVID Period: Oil vs ICICI Bank
ICICI Bank Returns
Oil Returns
0.2
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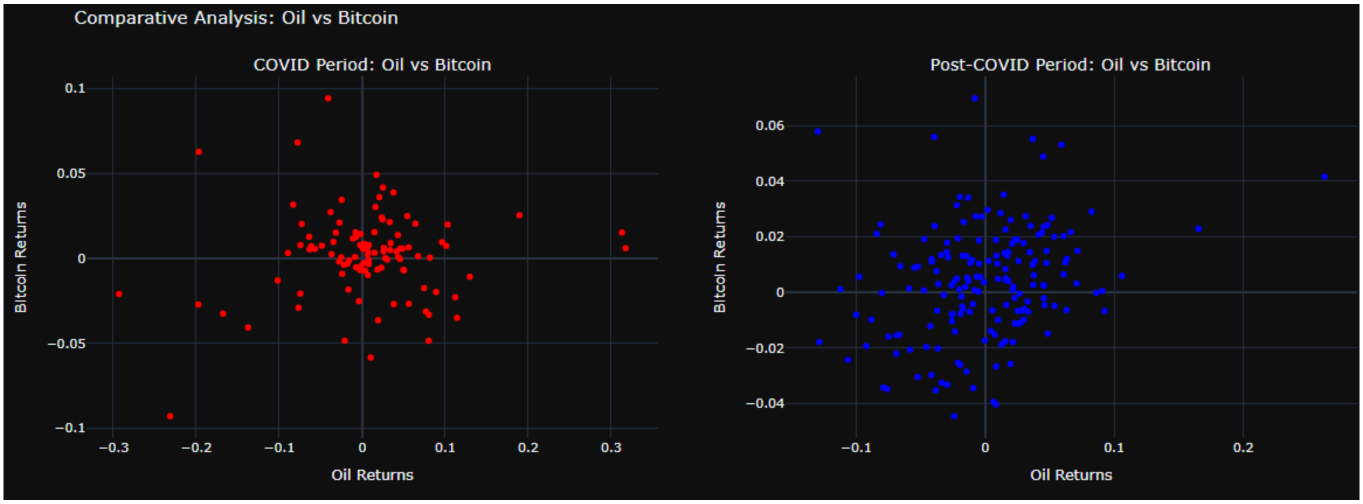
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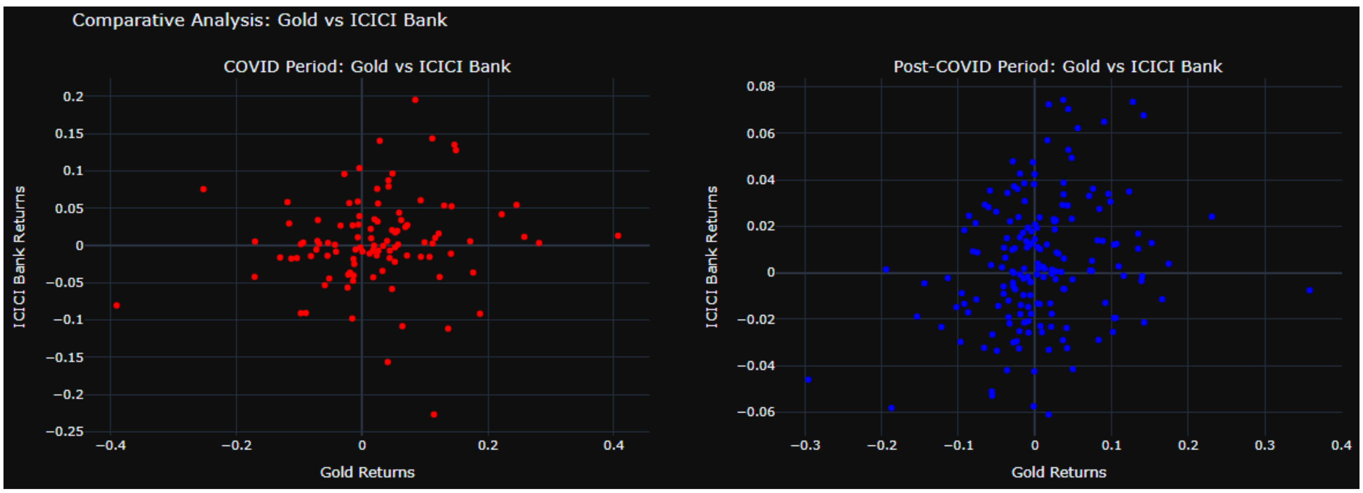
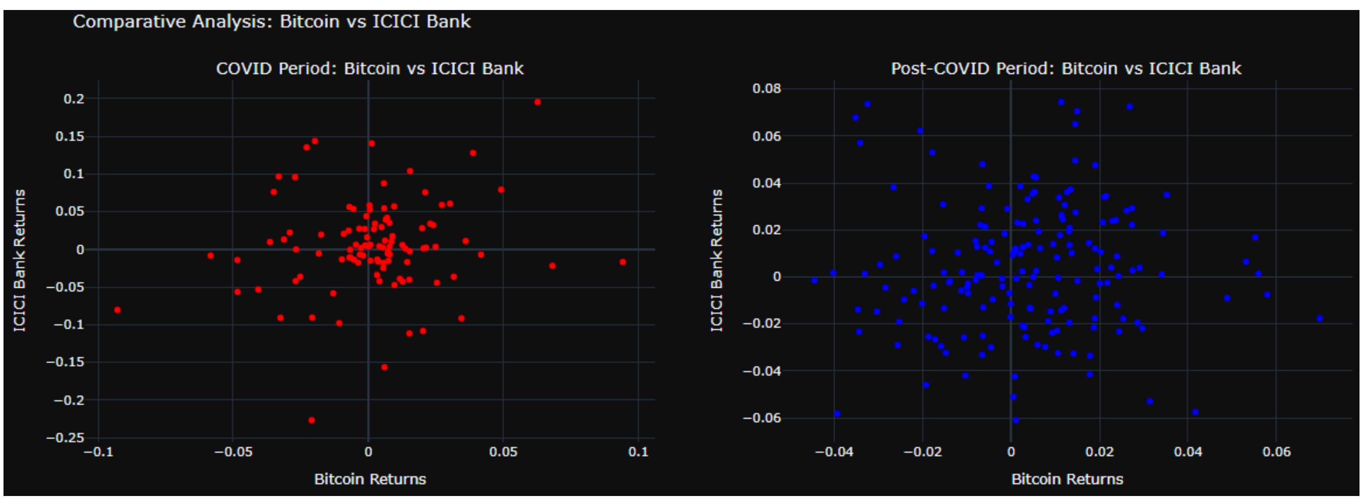
Post-COVID Period: Oil vs Bitcoin
Bitcoin Returns
Oil Returns


Comparative Analysis: Gold vs ICICI Bank
COVID Period: Gold vs ICICI Bank
Post-COVID Period: Gold vs ICICI Bank
ICICI Bank Returns
Gold Returns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ICICI Bank Returns
Bitcoin Returns