Original Research Article

The Effect of Trade Policy Uncertainty on Digital Asset Price: An Event Analysis of Tariff Announcement under the Second Trump Administration and Bitcoin Price Movement

Gyumin Gam

Nord Anglia International School Dublin, South County Business Park, Carmanhall and Leopardstown, Dublin, Dublin, D18 T672, Republic of Ireland

ABSTRACT

Bitcoin has emerged as a major financial asset, characterized by its distinctive price movements. Thus, many studies have attempted to explore which market and non-market factors may influence volatility and returns, and to understand the nature of Bitcoin as an asset class. In particular, while many market factors, such as trading volume or cryptocurrency-related events, have been extensively explored, limited research has examined whether policy uncertainties that significantly influence real assets also affect digital assets, including Bitcoin. To answer the question, this study employs unexpected tariff announcements made during the second term of the Trump Administration in 2025 as a source of policy uncertainty and tests whether such uncertainty influences Bitcoin's volatility and returns. This study uses t-tests and regression analysis using daily Bitcoin price data and an event-study framework focusing on tariff announcements. Three different time windows (same day, 1-day, and 3-day) before and after tariff events are used to test volatility fluctuations, while the regression analysis controls for market conditions using VIX (stock market volatility), Gold (gold price volatility), and EPU (Economic Policy Uncertainty). The results show that, in principle, tariff announcements do not significantly affect Bitcoin volatility or returns. However, Bitcoin volatility is largely driven by its own persistence, as lagged volatility significantly predicts future volatility. These effects are also evident for specific types of tariff announcements, such as those related to China and technology. Overall, the findings suggest that Bitcoin is not significantly affected by trade-specific uncertainty but rather by internal market dynamics. This study contributes by revealing the nature of Bitcoin price movement and its connection to economic policy uncertainties.

Keywords: Bitcoin; Volatility; Return; Policy Uncertainty; Tariff Announcement; Digital Asset; Technology Tariff; China Tariff

INTRODUCTION

In the modern economic landscape, Bitcoin, a cryptocurrency, has emerged as a major financial asset. Today, Bitcoin has a market value larger than that of many large, publicly traded firms and is often compared to assets such as commodities and equities. However, despite its growing popularity, Bitcoin is extremely volatile, which has driven the interest of many

Corresponding author: Gyumin Gam, E-mail: leo.gyumin.gam@gmail.com.

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policymakers, academic researchers, and investors. Furthermore, unlike traditional asset markets, Bitcoin operates globally 24 hours a day without oversight and market closures.

At the same time, trade uncertainty has become a major driver of global economic uncertainty. This trade uncertainty primarily stems from the 2nd Trump Administration's tariff escalations, particularly with China, resulting in a significant trade war with global economic implications. Tariffs are import taxes that often result in trade being redirected to inefficient producers and encourage smuggling; both distortions lower welfare. Additionally, there is "deadweight loss" when a tariff hurts consumers more than it helps producers (1). The Trump Administration's 2025 tariff announcements were often abrupt and highly publicized, driving market uncertainty.

A significant body of literature shows that trade policy uncertainty is a key driver of volatility in traditional financial assets. However, Bitcoin differs from traditional financial assets in several respects. Unlike equities, Bitcoin is not tied to corporate profits and is not directly involved in trade flows. It is a speculative asset driven by investor sentiment, prompting inquiries into how Bitcoin responds to trade-policy uncertainty. Does it respond in a similar way to traditional assets, or is it largely protected from trade shocks? Hence, this study aims to answer this question by testing whether U.S tariff announcements in 2025 increased Bitcoin volatility and negatively impacted returns. Additionally, it further examines whether China or Technology sector-related announcements generated stronger market responses than general tariff announcements due to their implications on global trade and supply chains.

This study explores four hypotheses. The first posits that the 2025 U.S tariff announcements are expected to increase Bitcoin volatility after announcement. Second, the announcements are also expected to lower Bitcoin returns on announcement days and short-term windows post-announcement. Third, China-related tariff announcements were expected to produce larger Bitcoin-volatility responses than non-China-related announcements. Finally, technology-sector tariff announcements are expected to generate stronger Bitcoin volatility responses compared to non-technology-sector announcements.

This study contributes to existing research by isolating the Trump Administration's 2025 tariff announcements and examining their effects on Bitcoin returns and volatility. Using daily Bitcoin data, this study employs t-tests and regression analysis to evaluate the impact of general tariff announcements, China-related announcements, and tech-sector-related announcements on Bitcoin volatility and returns. The paper begins with a review of relevant literature on trade policy uncertainty, cryptocurrencies, and Bitcoin characteristics (Section 2). Then, Section 3 explains the data collection and R analysis. Section 4 presents empirical results. Next, Section 5 presents a discussion of the results and their economic implications. Finally, Section 6 summarises and concludes.

LITERATURE REVIEW

Trade Policy Uncertainty and Traditional Asset Prices

Shifts in geopolitical stability, policy decisions, and trade uncertainty can significantly influence economic agents. When trade uncertainty increases, investors face greater difficulty forming precise expectations about future cash flows and macroeconomic outcomes, leading to higher risk premia and increased market volatility. Bianconi *et al*. (2) find a large risk premium associated with exposure to TPU (Trade Policy Uncertainty): investors required an additional 3.6-6.2% return per year on average as compensation for uncertainty about future trade policy. Caldara *et al*. (3) employ a vector-autoregressive (VAR) model of the U.S. economy and find that a shock that is sized to capture the rise in trade policy uncertainty in 2018 induces a decline in aggregate investment of between 1 and 2%. Using three measures of TPU, newspaper coverage, firms' earnings calls, and tariff rates, they also find that increases in TPU often lead to significant decreases in business investment.

The implicit protection, such as a non-tariff trade barrier, that the government offers to the market is likely to lead to large asset price swings when there is political unpredictability. Additionally, it increases the volatility and correlation of equities, particularly in difficult economic times (4). Similarly, Bianconi *et al*. (2) conclude that industries more exposed to trade policy uncertainty also had a larger drop in stock prices when the uncertainty began, and more volatile returns around key policy dates.

Overall, past literature indicates that macroeconomic uncertainty, such as trade policy uncertainty, leads to higher risk premia, influencing asset prices. Tariff announcements, especially those under the Trump administration, are made unexpectedly, resulting in heightened uncertainty. This amplified uncertainty manifests in higher asset price volatility, as markets not only respond to expected costs of the tariffs, but also to the heightened unpredictability of future trade policy.

Bitcoin Volatility and External Information Shocks

Bitcoin, as an asset, tends to reflect market information quickly, which influences macroeconomic conditions and investor sentiment, and adjusts its price accordingly. According to the Efficient Market Hypothesis (EMH), new information is rapidly reflected in asset prices, often causing immediate volatility spikes. Particularly, when policy announcements convey uncertainty, markets respond almost instantaneously, through sharp price movements, resulting in increased short-term volatility. Macro-economic news and earnings announcements are typical causes of increases in volatility over the short term. Trade policy shocks, as a factor of macroeconomic uncertainty, have already been well recognized as a significant source of information that influences asset prices (5). Thus, scholars have attempted to test whether trade policy uncertainties, associated with unexpected tariff announcements, influence Bitcoin volatility and returns, and what types of tariff announcements have the most significant impact. The current study, therefore, explores the influence of tariff announcements under the Trump administration on Bitcoin volatility and return. In addition, this study aims to test whether China- and tech-related tariffs have significant impacts on Bitcoin volatility.

Crypto markets are highly volatile, primarily due to speculation, market sentiment, and external economic events (6). In particular, Bitcoin's price has exhibited extreme volatility since its inception (7). Hence, scholars have argued that trade policy and geopolitical tensions have a significant influence on volatility increases in the crypto market (8). Bitcoin reacts strongly to geopolitical and policy shocks due to its role as a speculative, sentiment-driven asset. The general sentiment towards Bitcoin, whether positive or negative, can significantly influence its price movements (7). Unlike other traditional assets, Bitcoin isn't driven by macroeconomic fundamentals such as interest rates and earnings, making its valuation highly responsive to shifts in risk perception and narrative-driven trading. Based on the information, the literature suggests that Bitcoin volatility increases post-tariff announcement relative to pre-announcement levels.

However, not all studies display a uniform volatility response of cryptocurrencies to macroeconomic uncertainty. Liu *et al*. (9) find that cryptocurrencies respond to cryptocurrency network factors, momentum, and investor attention. They find that price movements and returns exhibit low exposure to traditional asset-class factors, such as macroeconomic factors. Further, Katsiampa *et al*. (10) suggest that volatility spillovers occur primarily within crypto markets, with little influence from external shocks. They found that all the conditional variances are significantly affected by both previous squared errors and past conditional volatility.

Overall, the literature suggests mixed implications: while Bitcoin, as a speculative asset, may exhibit high volatility following a tariff announcement, the nature of the Bitcoin market may also shield its price movements from external macroeconomic shocks. Thus, it is necessary to test whether Bitcoin's volatility has been influenced by tariff announcements arising from ensuing policy uncertainties.

Tariff Announcements and Bitcoin Returns

Market information about short- or long-term policy uncertainty often leads to changes in asset returns, too. Tariff events appear to trigger short-term market reactions characterized by increased volatility and shifts in asset prices, reflecting concerns about economic growth, trade disruptions, and a preference for safe-haven assets (11). Major tariff announcements often generate risk-off behaviour, which can reduce returns in riskier assets such as cryptocurrencies. Corbet *et al*. (12) show that cryptocurrencies respond to global economic and financial news, particularly during periods of heightened uncertainty, with price adjustments that often reflect shifts in investor risk assessments.

Empirical evidence also indicates that policy uncertainties exert downward pressure on Bitcoin returns. Trade-related uncertainty-induced changes in returns are particularly evident during the U.S.-China trade war, which was associated with negative price pressures in many financial markets, including cryptocurrencies (13). Therefore, the stock of empirical evidence predicts that Bitcoin's returns on tariff announcement days will be lower than normal trading days due to trade-policy-induced market uncertainty.

However, other scholars contend that Bitcoin generally functions as a diversifier rather than a consistent hedge or safe haven, as it is highly context-dependent and unstable (14, 15). For example, Chen *et al*. (13) find that, unlike gold, Bitcoin fails to function as a hedge or safe haven and responds to different economic forces. In addition, Bitcoin returns behave independently of risk perception, as shown by non-negative returns during periods of uncertainty (16).

Overall, the literature indicates that the impact of political uncertainty on Bitcoin returns is uncertain. Some evidence suggests that as a speculative asset, Bitcoin returns fluctuate in line with geopolitical instability. In contrast, others argue that Bitcoin behaves independently of risk, making it imperative to test the influence of tariff-induced uncertainty on Bitcoin returns. Thus, because of the ensuing policy uncertainty, it is vital to determine whether tariff announcements have affected Bitcoin's returns.

China-Related Trade Uncertainty

Among all trade-related policy changes, the U.S.–China trade war was the dominant global economic conflict since the first term of the Trump Administration (2018) because financial markets treated China-related tariffs as high-information, high-impact events. The spillover of the U.S.-China trade war extends to the global economy, given that the two countries are the two largest and most important economies in global trade (17). Particularly, China is central to global supply chains that are critical to technology developments and the supply of intermediary goods. China-related tariffs can thus significantly restructure the global supply chain, resulting in high uncertainty about firm performance and macroeconomic outcomes. In this vein, the literature posits that China-related tariff announcements will have a more profound impact on Bitcoin volatility than tariff announcements from other nations.

Empirically, Bouri *et al.* (18) show that U.S.-China trade-war uncertainty specifically increases forecasts of Bitcoin volatility. Their findings imply that China-specific trade policy uncertainty contains incremental information relevant for Bitcoin volatility beyond general macroeconomic uncertainty. Huynh *et al.* (19) find the existence of pessimistic risk premiums, the theory of deteriorating liquidity, and the widened bid-ask spread, which lead to a decline in trading volume under uncertainties in the Bitcoin market. Given that the China-related tariffs are more uncertainty-inducing in the global economic market, their impact on Bitcoin volatility is expected to exceed that of other tariff announcements on other economies.

However, it should also be noted that some studies point to the limited role of China-related tariffs in Bitcoin volatility. For example, Aysan *et al.* (20) suggest that Bitcoin does show reactions to global geopolitical risks, but country-specific uncertainties, such as China, show inconsistent effects on returns. Further, Kose *et al.* (21)'s analysis revealed that the Bitcoin price was mostly impacted by its own volatility, suggesting that geopolitical trade uncertainty with China likely doesn't influence crypto volatility.

Overall, the literature remains divided on whether China-related tariff shocks influence Bitcoin volatility. While some studies argue that China-specific trade policies generate significant uncertainty that translates to heightened volatility, opposing research suggests that country-specific uncertainties show inconsistent impacts on the crypto market. Consequently, it is imperative to study whether geopolitical trade tensions translate into heightened Bitcoin volatility.

Technology-Sector Tariffs and Cryptocurrency Markets

While tariffs can be announced targeting a specific country, sector-specific tariff schemes can also be introduced to protect a country's industry and related ecosystem. In the context of US tariff announcements, tariff announcements in diverse sectors have created varying impacts on the global economy. Technology-related tariff announcements are expected to generate larger increases in Bitcoin volatility primarily due to their investor overlap, supply-chain linkages, and broader geopolitical implications. Recent literature documents many linkages between the crypto market and the technology sector. For example, Fan *et al.* (22) show that crypto investors and tech-sector investors overlap heavily, causing spillovers from tech policy shocks. This implies that shocks affecting the technology sector can shift onto the crypto market through portfolio rebalancing and sentiment channels. Markets interpret tech tariffs as signals of broader U.S.–China technological competition, increasing uncertainty, and volatility. Demir *et al.* (23) observe that uncertainty regarding government decisions can make investors lose trust in their fiat currencies or worry about the overall economy, in particular after the 2008 financial crisis. Thus, a change in the EPU may cause investors to reconsider their portfolio to avoid potential wealth loss (24).

Also, tariffs on semiconductors, electronics, and telecom equipment influence global tech supply chains, which are tightly linked to Bitcoin mining hardware and digital infrastructure. Infrastructure and hardware are as crucial to large-scale Bitcoin mining as the machines themselves. A company's capacity to compete in this energy-intensive sector is strongly impacted by using efficient specialised hardware (25). Hence, tariffs on equipment used to build Bitcoin machines and infrastructure can hinder mining, resulting in fluctuations in the market.

Overall, these two mechanisms support the expectation that technology-sector related tariffs are expected to produce stronger Bitcoin volatility responses than tariffs aimed at non-technology sectors (lumber, copper, etc).

Conversely, other studies show inconsistent effects on technology-related uncertainty on Bitcoin returns. Liu *et al.* (9), as stated previously, argue that most impacts on return/volatility stem from within crypto markets, and respond weakly to external shocks. This applies to industry, specifically the tech industry where price shocks on technology-related products won't largely hinder Bitcoin returns. In addition, technology stocks and cryptocurrencies have limited return and volatility spillovers (26).

Overall, the impact of industry-specific trade policy uncertainty on Bitcoin volatility is highly debatable. Studies argue that cryptocurrencies and technology-related industries are deeply interconnected, with uncertainty spilling over from the technology sector to crypto market volatility. However, other researchers assert that Bitcoin and other cryptocurrencies rarely respond to external uncertainty. Therefore, pursuing further research on the effects of technology-related shocks on Bitcoin volatility is necessary as the technology sector continues to grow.

METHODS AND MATERIALS

Study Design

This study examines the effects of tariff announcement events on Bitcoin volatility using a quantitative empirical design. The empirical analysis utilizes an event-study approach on tariff announcements made during the second Trump administration. The unit of analysis is daily Bitcoin data, enabling assessment of market responses before and after policy events. To evaluate the impact of tariff announcements, the study combines event-study t-tests with regression analysis, examining both univariate and multivariate volatility and return behaviour. This study conducts statistical analysis and graph generation in R (version 4.5.2) with the following packages: readxl, dplyr, lubridate, stringr, ggplot2, lmtest, and sandwich.

Data Sources and Study Sample

The period of analysis covers the 2025 calendar year, beginning with the start of President Trump's Second term. Late-2024 data are included only to construct pre-event windows, particularly from December 29, 2024. The final data set included 20 tariff announcement events during the 2025 calendar year, of which four announcements were classified as China-related tariffs and three were classified as technology-sector tariff announcements. Bitcoin price and volatility were collected from publicly available sources. Bitcoin prices were sourced from Investing.com (27), while volatility was measured using historical indexes from Bitbo.io (28). For the tariff announcement, this study utilized the tariff event dataset compiled and published by the Atlantic Council (29) under the name of Trump Tariff Tracker. This dataset documents the daily tariff rate changes and announcements during the Trump administration, with events classified by country and sector. Control variable data (EPU, VIX, Gold Price/Volatility) were also gathered from credible sources. The Federal Reserve Bank of St. Louis's database provided EPU and Gold data, whereas Investing.com supplied the VIX data. The Economic Policy Uncertainty (EPU) index is typically utilized to forecast an economic recession. It is computed by counting news articles containing pre-defined keywords relating to market uncertainty. The CBOE Volatility Index (VIX) measures the stock market's expectation of volatility from the S&P 500 index options (30). Gold serves as a hedge against stocks and a safe haven option during extreme market conditions. Thus, an index of gold volatility (GOLD) can be used to account for financial market uncertainties (31). These three indices are widely used in the literature to account for factors that influence market uncertainties. By utilizing them as control variables, this study can test the pure influence of tariff announcement on Bitcoin volatility and returns, controlling for other types of market uncertainties.

Variables

The dependent variables of this study were Bitcoin returns and volatility. Daily returns were calculated as the percentage change in Bitcoin prices within a 24-hour time window, as Bitcoin trading takes place for 24 hours. Investing.com uses the industry standard that uses 00:00:00 UTC to track the opening price and 23:59:59 UTC to track the closing price. The independent variable, *Tariff*, is a binary tariff indicator, where it is coded as 1 if there was a tariff change announcement on the day and 0 otherwise. Additional dummy variables are used to identify tariff events relating to the technology-sector and China. The independent variable, *China_Tariff*, takes

1 if there was a tariff change announcement for products and services imported from China and 0 otherwise. In addition, the independent variable, *Tech_Tariff*, takes 1 if there was a tariff change announcement targeting tech sectors, including semiconductors, electronics, and such, on the day and 0 otherwise.

The St.Louis FED's Equity Market-related EPU index was used as the EPU control for this study. Similarly, the Gold volatility data was obtained from the St. Louis FED's CBOE Gold ETF Volatility Index. The VIX data was acquired through Investing.com's CBOE Volatility Index. As both the Gold Volatility and VIX data are derived from the S&P 500 Index, non-trading days provide no data. Hence, the mean between pre-closure and opening was calculated to fill in missing data days.

Event Windows

The event windows were placed symmetrically around the tariff announcement dates to capture the lasting impact of the tariff announcement. A tariff announcement may not impact Bitcoin's volatility within the announcement day time window; instead, it may take time for the market to spread the information and to reflect the impact on Bitcoin price. Thus, for the robustness of the analysis, it was necessary to set a wider time window around the announcement date and used average values to account for such lagged impact. Two windows were used: a smaller 1-day window and a broader 3-day window. Volatility change is computed as the difference between average post-event volatility and average pre-event volatility.

Statistical Analysis

For the empirical strategy, this study used both the t-test and regression analysis. T-tests were used to test whether a tariff announcement, as well as a China- and tech-related tariff announcement, alone had a significant impact on Bitcoin volatility or return. Two-sample t-tests were used to see whether the mean volatility in a given time window after a tariff announcement is significantly different from that before the tariff announcement. The same t-tests were applied to overall tariff announcements, and tech- and China-related tariff announcements.

The baseline regression models used in this study included Bitcoin volatility or returns as the dependent variable, tariff announcements as the independent variable, and other controls. Furthermore, as Bitcoin volatility and return can be highly persistent, lagged volatility was also included. Finally, to address autocorrelation and heteroskedasticity in daily data, Newey–West heteroskedasticity- and autocorrelation-consistent standard errors are applied with a lag length of five days.

RESULTS

The purpose of the study is to identify the potential influence of policy uncertainties, mainly driven by tariff announcements, on Bitcoin price movement. To investigate the phenomenon in detail, this study tests four distinct relationships: the influence of tariff announcements on Bitcoin volatility and returns, and the influence of tech- and China-related tariff announcements on Bitcoin volatility. All relationships include boxplots that display both the mean (diamond-shaped dot) and the median (bold line).

For paired event-window comparisons, Cohen's d_z was calculated as the mean post-minus-pre change divided by the standard deviation of the event-specific changes. For independent-group comparisons, Cohen's d was calculated as the first-named group mean minus the comparison-group mean, divided by the pooled standard deviation. Accordingly, negative values indicate lower values in the first-named group. Welch's two-sample t-tests were used for subgroup comparisons.

Hypothesis 1: Effects of Tariff Announcements on Bitcoin Volatility

To test if Bitcoin volatility responds to tariff announcements, volatility shifts were analyzed using an event-study framework with a one-sample t-test. Volatility changes were calculated as the difference between average post-announcement volatility and average pre-announcement volatility. For each tariff announcement, two windows were considered: ±1 day and ±3 days.

As seen in Panels A and B of Figure 1, the descriptive results show the difference in Bitcoin volatility between the pre- and post-tariff announcement periods, in both ±1-day and ±3-day time windows. In the ±1-day time window, pre-tariff announcement days exhibited the average volatility of 1.73 (sd= 0.419) while post-tariff announcement days yielded the average volatility of 1.72 (sd= 0.338). Pre-tariff announcement days had an average volatility of 1.73 (sd = 0.436) over a ±3-day window, whereas post-tariff announcement days had an average volatility of 1.70 (sd = 0.323). Descriptively, average Bitcoin volatility was slightly lower after tariff announcements in both event windows, although these differences were small and statistically insignificant. To

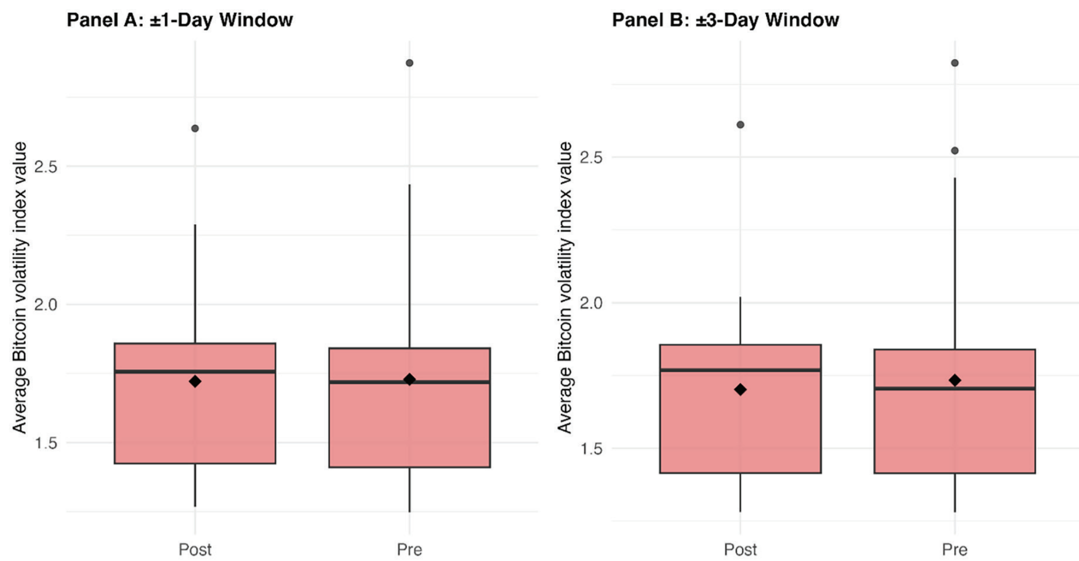

Figure 1. ***Bitcoin Volatility Comparison: ± 1 and ± 3 Day Around Tariff Announcements.*** *(A) compares Bitcoin volatility within a ±1-day event window, and (B) compares Bitcoin volatility within a ±3-day event window around tariff announcement dates. The y-axis displays average volatility. In the boxplot, the bold horizontal line represents the median while the diamond-shaped marker represents the mean. The circular markers denote outliers.*

check the statistical significance of the impact, t-tests were utilized.

For each event window, a one-sample t-test was used to examine whether the mean change of volatility differed from zero. Within the ±1-day window, the mean change in volatility following tariff announcements was not statistically significant *(t = -0.23649, df = 19, p = 0.5922)*. A similar pattern was observed when the event window was expanded to ±3 days, with post-announcement volatility being similar to the pre-announcement volatility *(t = -0.60489, df = 18, p = 0.7236)*. For the ±1-day volatility window, the mean volatility change was not statistically significant, 95% CI *[−0.07199, 0.05738]*, with a small effect size, Cohen's d_z = *-0.05*. For the ±3-day window, the result was also insignificant, 95% CI *[−0.14181, 0.07841]*. The effect size was negligible, Cohen's d_z = *-0.14*

These results indicate that the relationship between tariff announcements and Bitcoin volatility cannot be statistically confirmed, inconsistent with the theoretical expectation that tariff decisions would work as policy-related information shocks to the Bitcoin market.

Hypothesis 2: Effects of Tariff Announcements on Bitcoin Returns

To test if Bitcoin returns respond to tariff announcements, changes in returns were analyzed using t-tests. The core test focused on same-day return fluctuations using a two-sample, two-sided t-test. In addition, changes in returns were calculated as the difference between average post-announcement returns and average pre-announcement returns using one-sample t-tests. For each tariff announcement, two windows were considered: ±1 day and ±3 days.

In Figure 2, panels A and B, the results show the difference in Bitcoin returns between pre- and post-tariff announcements, both in ±1-day and ±3-day time windows. In the ±1-day time window, the average return was -0.0000174 (sd= 0.000295) for pre-tariff announcement days, while the average return was -0.0000005 (sd= 0.000176) post-tariff announcement days. In the ±3-day time window, the average return for pre-tariff announcement days was 0.00000568 (sd=0.0000856) while the post-tariff announcement average return was -0.0000231 (sd= 0.0000837). Figure 3 shows the difference in Bitcoin returns between tariff and non-tariff announcement events on the same day. Tariff announcement days exhibit a mean return shift of -0.00000225 (sd= 0.000219) while non-announcement days have an average shift of -0.0000272 (sd= 0.000268). The descriptive results show that there are only negligible differences in Bitcoin return before and after tariff announcement events.

T-tests were also employed to confirm statistical

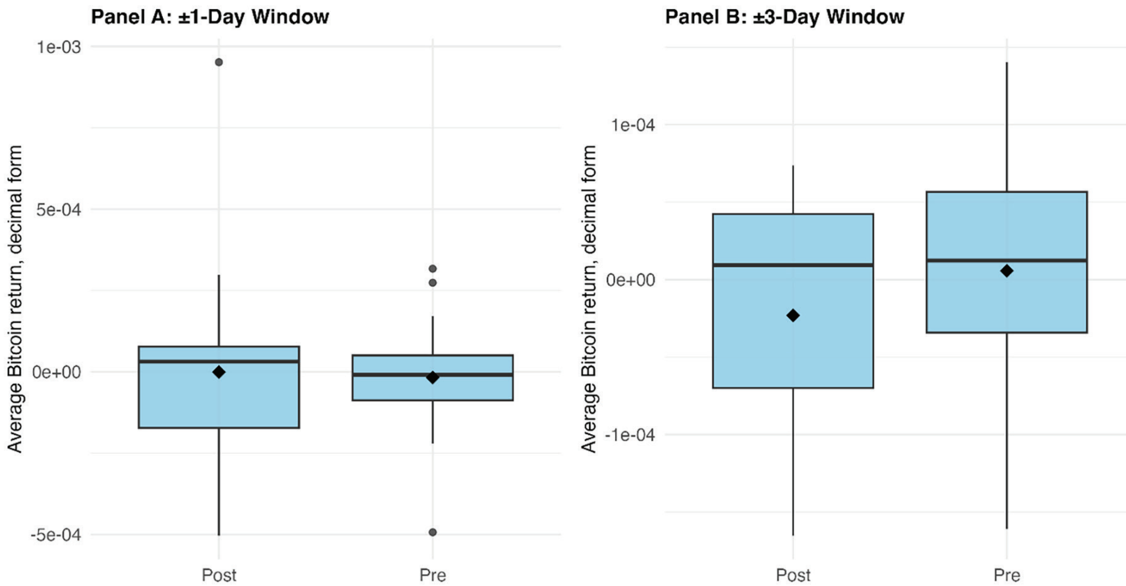

Figure 2. ***Bitcoin Return Comparison: ± 1 and ± 3 Day Around Tariff Announcements.*** *(A) compares Bitcoin returns within a ±1-day event window, and (B) compares Bitcoin returns within a ±3-day event window around tariff announcement dates. The y-axis displays average return. In the boxplot, the bold horizontal line represents the median while the diamond-shaped marker represents the mean. The circular markers denote outliers.*

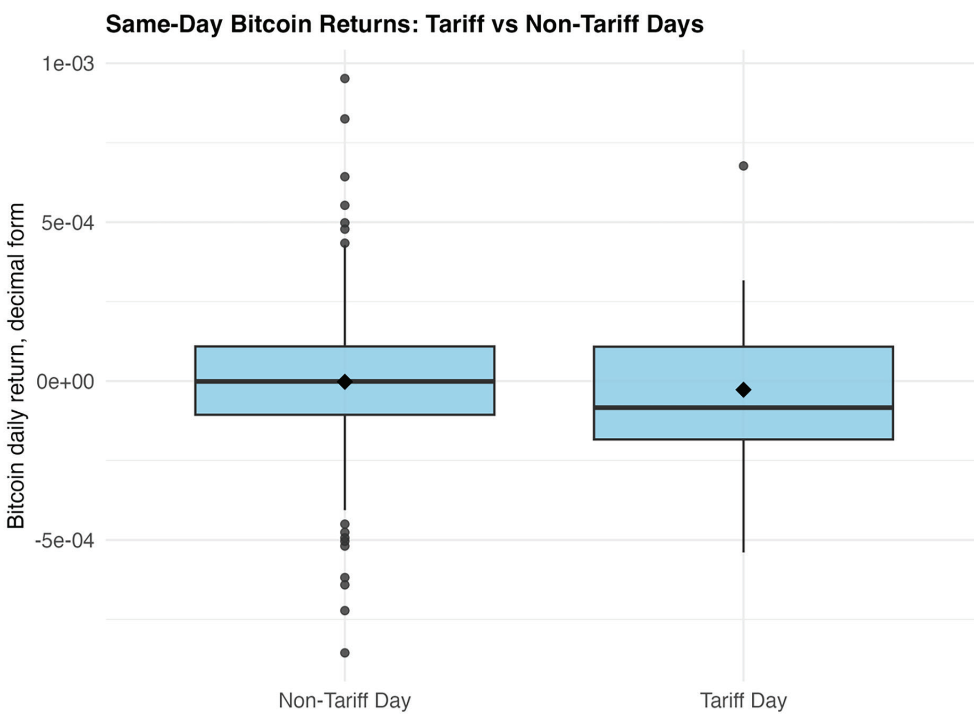

Figure 3. ***Same-day Bitcoin returns on days with and without tariff announcements in 2025.*** *The boxplots compare daily Bitcoin returns on tariff-announcement days and non-announcement days. The bold horizontal line indicates the median, the diamond-shaped marker indicates the mean, and the circular markers represent outliers. The substantial overlap between the two distributions and medians near zero indicate no clear difference in same-day Bitcoin returns between tariff and non-tariff days.*

significance in the mean values of Bitcoin return before and after tariff announcement events. The results *($t = 0.40545$, $df = 20.805$, $p = 0.6893$)* for same-day returns indicate no evidence of a same-day return effect. Further, the results show that in the ±1-day window, tariff announcement events did not display significantly large increases in returns *($t = -0.37557$, $df = 19$, $p = 0.7114$)*. This result remained statistically insignificant in the ±3-day window as well: *($t = -0.64589$, $df = 18$, $p = 0.5265$)*. The return change in the ±1-day window was not statistically significant, 95% CI *[−0.0000988, 0.0000687]*. The effect size was small, Cohen's $d_z = -0.08$, suggesting that tariff announcements had little practical effect on same-day returns. For the ±3-day window, the result was also insignificant, 95% CI *[−0.0000436, 0.0000231],* Cohen's $d_z = -0.15$. In the same day window, the results were also statistically insignificant, 95% CI *[−0.0001029, 0.0001527],* Cohen's $d = 0.09$.

Hypothesis 3: China-Related versus Non-China Tariff Announcements

To determine whether China-related tariff announcements generate stronger volatility responses than non-China tariff announcements, volatility changes were compared across these two groups. China-related Bitcoin volatility shocks were computed as post-pre differences using ±1-day and ±3-day event windows.

Figure 4 panels A and B display the differences in volatility responses between pre- and post-tariff announcements for both China and non-China-related tariff announcements, for both the ±1-day and ±3-day time windows. In the ±1-day time window, the average volatility for China-related tariffs was -0.112 (sd= 0.204) while the average volatility was 0.0189 (sd= 0.111) on non-China-related announcement days. For the ±3-day time window, the average volatility for China-related tariffs was -0.236 (sd= 0.352) while the average volatility was 0.00653 (sd= 0.190) on non-China-related announcement days.

Panel A compares China- and non-China-related Bitcoin volatility within a ±1-day event window, and Panel B compares China- and non-China-related Bitcoin volatility within a ±3-day event window around tariff announcement dates. The y-axis reports the change in Bitcoin volatility index value, calculated as average post-announcement volatility minus average pre-announcement volatility. In the boxplot, the bold horizontal line represents the median while the diamond-

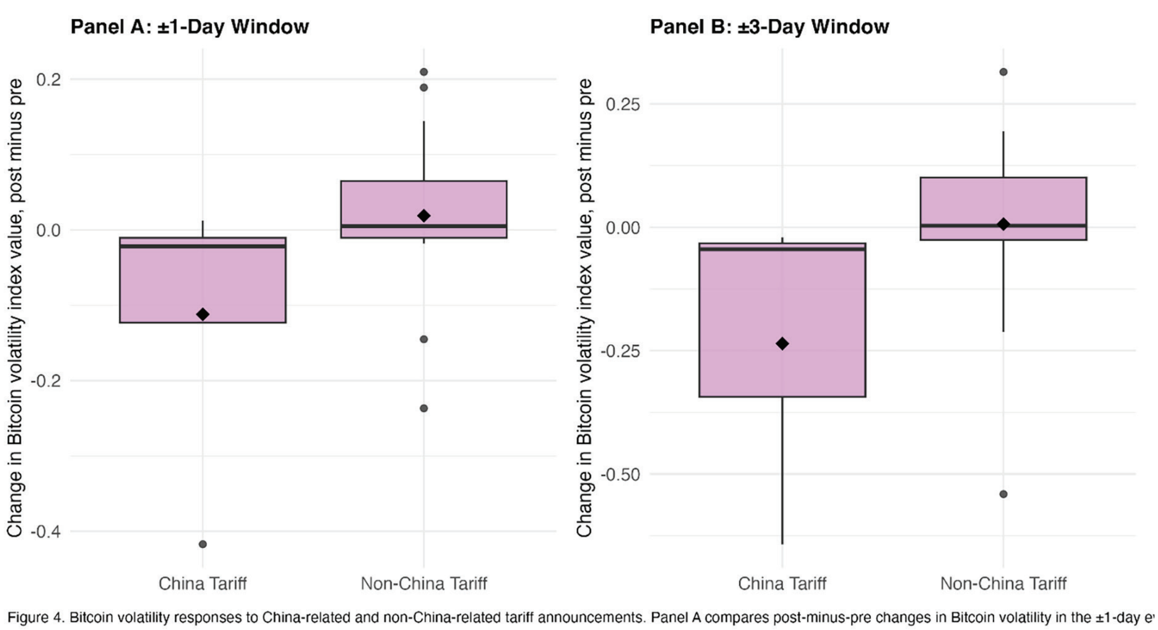

*Figure 4. **Comparison of Bitcoin volatility responses to China- and non-China-related tariff announcements within ±1-day and ±3-day event windows.** (A) compares volatility changes within the ±1-day window, and (B) compares changes within the ±3-day window. The y-axis shows the change in the Bitcoin volatility index, calculated as the average post-announcement volatility minus the average pre-announcement volatility. In each boxplot, the bold horizontal line represents the median, the diamond-shaped marker represents the mean, and the circular markers indicate outliers.*

shaped marker represents the mean. The circular markers denote outliers.

For both time windows, a two sample t-test was conducted which compared volatility changes with China-related tariff announcements and non-China-related tariff announcements. In the ±1-day window, China-related tariffs did not display significantly large increases in volatility *(t = -1.2374, df = 3.4524, p = 0.8533)*. This result remained statistically insignificant in the ±3-day window *(t = -1.1592, df = 2.224, p = 0.8222)*. For the ±1-day China volatility window, the mean volatility change was not statistically significant, with 95% CI *[−0.44362, 0.18200]*, Cohen's *d = -1.00.* For the ±3-day window, the result was also insignificant, with 95% CI *[−1.05937, 0.57515]*, Cohen's *d = -1.12*.

Corresponding box plots show nearly identical dispersion and central tendency across the two groups, with overlapping interquartile ranges and no visible post-event volatility premium associated with China-specific measures.

These results show that Bitcoin shocks are mainly internal, with foreign policy uncertainty not playing a large role in volatility changes, including China-related ones.

Hypothesis 4: Technology-Sector versus Non-Technology Tariff Announcements

Finally, the volatility effects of technology-sector tariff announcements were compared with those of non-technology tariff announcements in Figure 5. Volatility changes were computed using the same post-pre framework and ±1-day and ±3-day event windows. The average volatility for tariffs related to the Tech sector in the ±1-day time window was -0.0432 (sd= 0.089), whereas the average volatility for announcement days unrelated to the Tech sector was -0.000970 (sd= 0.146). The average volatility for tariffs related to Tech was -0.182 (sd= 0.311) over the ±3-day period, whereas the average volatility for announcement days unrelated to the technology sector was -0.00352 (sd= 0.211).

In each time window, a two sample t-test was conducted to compare volatility changes after technology-sector tariff announcements with those after non-technology tariff announcements. The results of the two t-tests show that technology-sector tariff announcements produced insignificant increases in Bitcoin volatility in the ±1-day window *(t = -0.67667, df = 4.2417, p = 0.7331)*. This difference persisted when the window was expanded to ±3 days *(t = -0.95485, df*

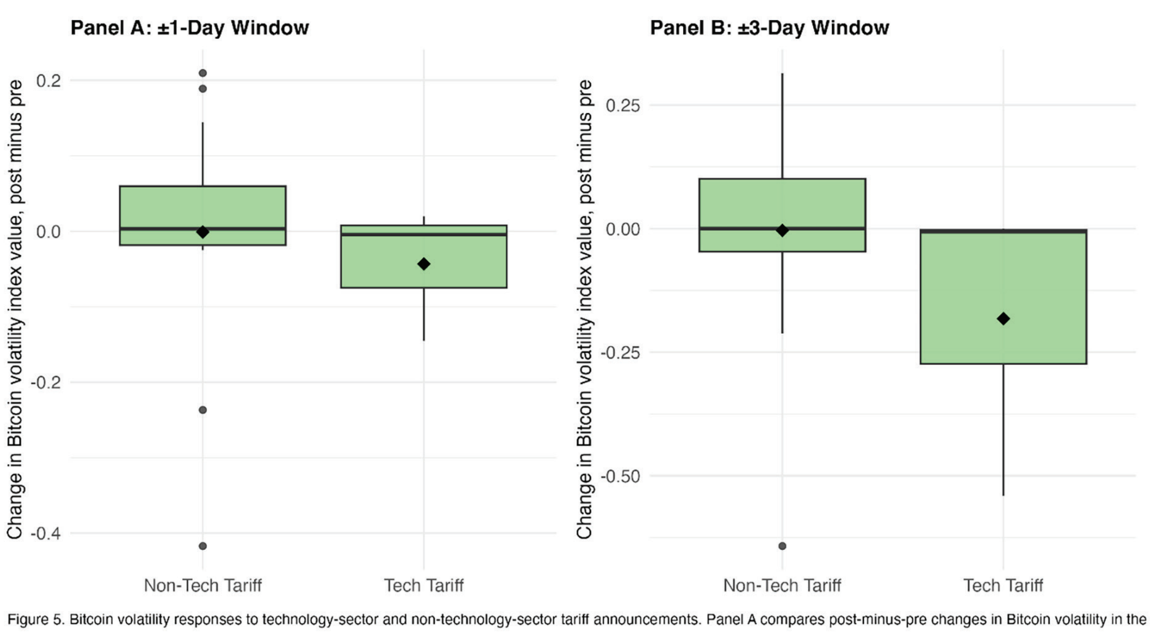

***Figure 5.* Comparison of Bitcoin volatility responses to technology- and non-technology-sector tariff announcements within ±1-day and ±3-day event windows.** *Panel A compares volatility changes within the ±1-day window, and Panel B compares changes within the ±3-day window. The y-axis shows the change in the Bitcoin volatility index, calculated as the average post-announcement volatility minus the average pre-announcement volatility. In each boxplot, the bold horizontal line represents the median, the diamond-shaped marker represents the mean, and the circular markers indicate outliers.*

= 2.3577, p = 0.7865). For the ±1-day technology sector volatility window, the mean volatility change was not statistically significant, 95% CI *[−0.21183, 0.12731],* Cohen's $d = -0.30$. For the ±3-day window, the result was also insignificant, 95% CI *[−0.87629, 0.51937],* Cohen's $d = -0.79$.

The box plots were consistent with the statistical results and showed substantial overlap between the groups. With both groups exhibiting similar volatility distributions and medians clustered near zero, the results indicate no heterogeneous response across tariff categories.

Hence, based on the comparisons of tariff and non-tariff events, it can be seen that tariffs targeting technology-related industries do not generate heightened uncertainty that is translated into increased Bitcoin volatility. Although some standardized effect-size, Cohen's *d*, estimates were moderate to large in magnitude, these estimates are unstable because the China-related and technology-sector event groups contained very few observations. Therefore, the effect-size results should be interpreted cautiously and do not provide reliable evidence of heterogeneous tariff effects.

Although some standardized effect sizes were moderate or large in magnitude, the estimates were highly unstable because only four China-related and three technology-sector events were available for analysis in the 2025 calendar year timeframe. Additionally, all corresponding confidence intervals included zero. Hence, these effect sizes should be interpreted as imprecise descriptive estimates rather than reliable evidence of differences between subgroups.

Regression Analysis

To test whether different types of tariffs (general, China- and tech-related tariff) influence Bitcoin volatility and return after controlling for EPU, VIX, and GOLD, which contribute to macroeconomic uncertainty, this study employed several regression models. The regression models included a one-day lag of the dependent variable to capture persistence in Bitcoin volatility and returns and to complement the event-window t-tests. All models used Newey–West heteroskedasticity- and autocorrelation-consistent standard errors with five lags to account for serial correlation in the daily observations.

Table 1 Column 1 summarizes the impact of tariff events on bitcoin volatility controlling for lagged Bitcoin volatility and several macroeconomic conditions, including, EPU, Gold, VIX. For volatility following tariff events, announcements are statistically insignificant ($\beta = -0.00294$, $p = 0.739$). These values indicate that even after controlling for macroeconomic conditions, tariff announcements still don't have a significant impact on Bitcoin volatility.

However, the lagged volatility term is large and statistically significant ($\beta = 0.981$, $p < 0.001$), suggesting that Bitcoin volatility is largely impacted by its own day-to-day volatility. Control variables — EPU, gold, VIX — are all statistically insignificant, indicating that macroeconomic uncertainty does not play a role in volatility variations.

Table 1 Column 2 summarizes the impact of tariff events on Bitcoin returns, controlling for lagged Bitcoin returns and several macroeconomic conditions, including EPU, Gold, VIX. Results for tariff event's impact on Bitcoin returns show no evidence of a tariff effect once return persistence and controls are included. The tariff coefficient is negative but statistically insignificant ($\beta = -4.68\times10^{-5}$, $p = 0.378$). The effects of past returns are small and insignificant ($\beta = -0.104$, $p = 0.152$). However, among the control variables, EPU remained positive and statistically significant ($\beta = 1.73\times10^{-7}$, $p = 0.0097$). This implies that economic policy uncertainty is associated with Bitcoin returns.

Table 1 Column 3 summarizes the impact of China-related tariff events on Bitcoin volatility, controlling for lagged Bitcoin volatility and several macroeconomic conditions, including EPU, Gold, VIX. For China-related tariff announcement shocks, a lagged-volatility model was estimated, where the tariff indicator is replaced with a China-tariff dummy. Results show that China-related announcements are statistically insignificant ($\beta = -0.0189$, $p = 0.100$). The coefficient did not meet the prespecified 5% significance threshold and therefore did not provide evidence of a distinct China-related effect.

Similar to non-China-related announcements on volatility, lagged volatility remains dominant and highly significant ($\beta = 0.981$, $p < 0.001$) for China-related events. This reinforces the conclusion that Bitcoin volatility changes are driven primarily by internal persistence rather than tariff-related policy shocks.

Table 1 Column 4 summarizes the impact of tech-sector tariff events on Bitcoin volatility, controlling for lagged Bitcoin volatility and several macroeconomic conditions, including EPU, Gold, VIX. A regression analysis was conducted for tech sector-related events using a lagged-volatility model. The tech-tariff coefficient is statistically insignificant ($\beta = -0.0356$, $p = 0.174$), indicating that technology-related tariffs do not generate heightened uncertainty that translates into increased

Bitcoin volatility. Again, lagged volatility remains and explains volatility variation (β = 0.981, p < 0.001).

Furthermore, because the confidence intervals for tariff, China-tariff, and tech-tariff have coefficients that all include zero, the regression results do not display statistically significant results that tariff announcements affected Bitcoin returns and volatility. The confidence interval for lagged volatility is positive and does not contain zero, reinforcing the significance of volatility persistence. Additionally, the confidence interval for EPU is also positive and does not contain zero, making it statistically significant.

Table 1. Regression results for the associations of general, China-related, and technology-sector tariff announcements with Bitcoin volatility and returns. *Regression coefficients are reported with Newey–West heteroskedasticity- and autocorrelation-consistent standard errors in parentheses and 95% confidence intervals in square brackets. Statistical significance is indicated as follows: *p<0.10, **p<0.05, and ***p<0.01.*

	H1: Volatility (Lagged)	**H2: Return (Lagged)**	**H3: Volatility-China (Lagged)**	**H4: Volatility-Tech (Lagged)**
Tariff	-0.003 (0.009) [-0.020, 0.015]	-4.68e-05 (5.48e-05) [-1.55e-04, 6.11e-05]		
China tariff			-0.019* (0.011) [-0.041, 0.003]	
Tech tariff				-0.036 (0.026) [-0.088, 0.016]
Volatility (t-1)	0.981*** (0.014) [0.953, 1.009]		0.981*** (0.014) [0.953, 1.010]	0.981*** (0.014) [0.953, 1.009]
Return (t-1)		-0.104 (0.073) [-0.249, 0.040]		
EPU	-1.04e-05 (2.15e-05) [-5.28e-05, 3.20e-05]	1.73e-07*** (6.67e-08) [4.19e-08, 3.04e-07]	-1.05e-05 (2.16e-05) [-5.31e-05, 3.20e-05]	-7.38e-06 (2.29e-05) [-5.24e-05, 3.76e-05]
VIX	8.92e-04 (0.001) [-0.002, 0.004]	-4.50e-06 (3.09e-06) [-1.06e-05, 1.58e-06]	9.04e-04 (0.001) [-0.002, 0.004]	8.33e-04 (0.001) [-0.002, 0.004]
Gold	0.002 (0.002) [-0.001, 0.005]	-4.50e-06 (2.91e-06) [-1.02e-05, 1.23e-06]	0.002 (0.002) [-0.001, 0.004]	0.002 (0.001) [-0.001, 0.004]
Constant	-0.015 (0.032) [-0.077, 0.048]	1.31e-04* (7.57e-05) [-1.83e-05, 2.80e-04]	-0.014 (0.031) [-0.076, 0.047]	-0.014 (0.032) [-0.077, 0.048]
Num.Obs.	301	301	301	301
R2	0.972	0.040	0.972	0.972
R2 Adj.	0.971	0.023	0.971	0.971

DISCUSSION

This study set out to examine whether tariff announcement events under the Trump administration generated detectable changes in Bitcoin volatility and returns. The regression and t-test analyses provide rigorous evidence that Bitcoin volatility is mainly dominated by its own persistence: lagged volatility terms are highly significant, while tariff indicators are not. Neither the paired t-tests nor the regression results show statistically significant volatility effects of tariff announcements. Additionally, both Bitcoin volatility and returns do not show significant differences on tariff announcement days. Likewise, in China-related and tech sector-related tariff announcements, volatility does not appear to generate a significant response, beyond its internal time-series dynamics. Overall, trade-related policy events by the Trump Administration do not appear to exert significant effects on Bitcoin volatility and return at a day-to-day frequency.

These findings are consistent with current literature documenting persistence in cryptocurrency volatility. Kang *et al*. (32) provide a comprehensive survey of the finance literature on Bitcoin, documenting its highly complex asset characteristics, including persistent volatility, speculative behaviour, and occasional safe-haven properties. Other works suggest that cryptocurrencies may be less affected by traditional macroeconomic and policy uncertainty compared to traditional assets. Omrane *et al*. (33), using intraday data, show that cryptocurrency volatility responds selectively to macroeconomic news—most strongly to U.S. monetary policy announcements—while many other macroeconomic news have limited or no impact, particularly for Bitcoin. This study's current results align with these conclusions, showing that trade-uncertainty from the Trump administration's tariffs is too narrow to produce significant fluctuations in Bitcoin volatility.

From a theoretical perspective, the insignificance of trade uncertainty from tariff announcements is plausible. This is because the price movements of Bitcoin have typically been influenced by speculative capital flows rather than Bitcoin's technical characteristics or actual acceptance as a payment method. BTC's independence from the global financial system as a means of transferring capital is more theoretical than realistic, and it appears to be a liquidity asset rather than a structural haven because it depends on the flow and availability of global capital (31).

This contrasts with equities and foreign exchange markets, where trade uncertainty affects foreign direct investment, portfolio flows, and exchange rate movements, as well as the mediating role of institutional quality and macroeconomic fundamentals (32). Cryptocurrency prices, on the other hand, are governed by investor speculation and intra-market dynamics opposed to trade policy. EPU was statistically significant only in the return model, whereas VIX was nonsignificant across the reported models. This selective pattern was broadly consistent with prior evidence that broad uncertainty measures may be more informative than narrow policy indicators. Wu *et al*. (36) documents that broad uncertainty measures dominate narrow policy indicators in explaining crypto volatility.

The results can also be interpreted through the Efficient Market Hypothesis. If cryptocurrency markets rapidly absorb new market information constantly, a discrete tariff announcement may fail to leave a significant trace daily. In markets that trade continuously with a large population, trade-policy-related information can be absorbed in minutes to hours, making it difficult to make a large impact on volatility. Furthermore, Bitcoin markets may follow an adaptive market process, where traders incorporate many information sources simultaneously. In such situations, incremental tariff announcement information may be negligible compared to the broad information sets when driving prices.

Unlike stocks or commodities, Bitcoin may react less to trade policy because the Bitcoin price does not directly reflect supply chain disruption, future corporate cash flows, and thus is not directly tied to trade flows. Broader literature on Bitcoin's volatility drivers shows that macro uncertainty, investor sentiment, and search activity drive volatility more than trade policy. For example, Kang *et al*. and Bystrom *et al*. (32,37) find that Google search trends display a stronger positive correlation than the trade-weighted USD currency index.

The findings presented in this study have numerous implications for both theory and practice. From a theoretical standpoint, tariff uncertainty may be too narrow or too frequent to matter for Bitcoin on a daily level. Instead, Bitcoin may be more closely tied to liquidity-related policy changes, such as the FED's interest rate announcement, than to specific trade policy events.

For investors, Bitcoin acts as a global risk barometer rather than an asset that responds directly to region-specific trade news. Hence, for those attempting to model Bitcoin volatility, it would be better to incorporate measures of overall global uncertainty, market stress, and past persistence than only regional tariff events.

Several limitations should be acknowledged for this particular study. Firstly, the tariff announcement data used is from only one calendar year, meaning the number of tariff events for statistical power is limited. The numbers of China and technology-sector tariffs were small, limiting the statistical power for analysis. Second, the use of day-to-day data may overshadow the short-term reactions that follow immediately (within hours) after a tariff event. Finally, Bitcoin's naturally high baseline volatility may hide small effects from certain events.

In the future, studies can extend this investigation in several ways. Higher frequency data, such as intraday data, can capture immediate responses. Broader uncertainty indices or composite news-based sentiment measures could also be incorporated. This allows for the assessment of whether media coverage of trade disputes and changes in public sentiment influence cryptocurrency markets more strongly. Moreover, conducting a comparative study of responses across different assets, such as Bitcoin and commodity prices, can show whether trade policy shocks have different effects across asset markets. Finally, extending the study period to multiple years and incorporating additional geopolitical shocks can provide more insight into how Bitcoin and other cryptocurrencies respond to trade policy announcements.

CONCLUSION

This study investigated the association between tariff announcements during the second Trump administration and Bitcoin volatility and returns. Using an event-study framework with t-tests and regression models, the analysis examined general tariff events, China-related events, and technology-sector events while adjusting for broader market conditions.

The results showed little evidence that tariff announcements influenced Bitcoin price dynamics. Across the same-day, 1-day, and 3-day window analyses using t-tests, volatility and returns were not significantly influenced by tariff announcements. The regression analysis findings further confirm this conclusion, showing that Bitcoin volatility is largely explained by its own persistence rather than by discrete trade-policy shocks. The China-related and technology-sector comparisons were also nonsignificant, although their estimates were unstable because only four and three events, respectively, were available. Overall, the findings indicate that Bitcoin markets are largely unaffected by trade-policy shocks. Unlike traditional financial assets, Bitcoin is not directly tied to corporate cash flows or international trade flows, which limits its sensitivity to international trade policy shocks.

Since the emergence of digital assets, represented by Bitcoin, investors and policymakers have likely attempted to understand the nature of such digital assets by investigating their dynamics and connection to traditional financial markets and economic policies. Although many argue that, as a class of asset, digital assets are strongly connected to traditional financial markets and economic policies, and thus seek to explain their movement by using traditional economic and finance theories, there has been a large debate as to whether digital assets' dynamics should be interpreted by using the same logic. As digital assets currently take up a large portion of the investment portfolios of individual and institutional investors, the debate is critical to predicting the entire financial market dynamics and establishing relevant financial policies. This study contributes to the debate. The findings suggested that conventional macroeconomic explanations alone may not fully account for short-term Bitcoin dynamics. In conclusion, as new asset classes are introduced in the future, targeted studies for each asset class are necessary, and this practice will help better establish investment decisions, economic policies, and new economic theories.

CONFLICT OF INTEREST

The author declares no conflicts of interest related to this work.

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