

Crypto Is Coming of Age: The Case of Bitcoin's Rising Beta

**Alejandro H. Drexler, Andre Guettler, and
Angela Sun**

August 13, 2026

WP 2026-16

<https://doi.org/10.21033/wp-2026-16>

FEDERAL RESERVE BANK *of* CHICAGO

*Working papers are not edited, and all opinions are the responsibility of the author(s). The views expressed do not necessarily reflect the views of the Federal Reserve Bank of Chicago or the Federal Reserve System.

Crypto is coming of age: The case of Bitcoin's rising beta *

Alejandro H. Drexler[†]

Andre Guettler[‡]

Angela Sun[§]

August 13, 2026

Abstract

This paper shows that Bitcoin has transitioned from a largely idiosyncratic crypto asset into a risk-on asset with returns resembling that of the broad U.S. stock market. We estimate time-varying Bitcoin betas with respect to a tech-heavy stock index (NASDAQ), a broader economy equity index (Dow Jones), and the 10-year Treasury bond returns. Across all beta specifications, multi-factor regressions, and structural break tests, we find that Bitcoin's equity exposure rises substantially over time, turning statistically larger than zero around 2020. In contrast, the betas for the Treasury bond returns are not distinguishable from zero. Surprisingly, after controlling for the exposure to the Dow Jones Index, the exposure to NASDAQ is small and statistically insignificant throughout our sample period. This last finding is at odds with the common wisdom that Bitcoin behaves like a decentralized tech asset and points towards Bitcoin being mostly driven by broad stock-market sentiment.

Keywords: Bitcoin, NASDAQ, market beta, time-varying beta, structural breaks, financialization

JEL Codes: G12, G14, E42

*The views stated herein are those of the authors and are not necessarily the views of the Federal Reserve Bank of Chicago or the Federal Reserve System.

[†]Federal Reserve Bank of Chicago, alejandro.h.drexler@chi.frb.org

[‡]Ulm University, andre.guettler@uni-ulm.de

[§]University of California, Berkeley, sunangela@berkeley.edu

1 Introduction

Bitcoin entered the financial markets with a narrative of separation. It was framed as an alternative to sovereign money, a payment system outside conventional intermediaries and eventually a new asset class insulated from the forces driving stocks and bonds. For that reason, much of the early discussion around Bitcoin emphasized novelty, idiosyncrasy, diversification, and potential to replace mainstream currencies. That framing is harder to sustain today. Bitcoin is now widely traded by institutional and macro-oriented investors, embedded in benchmark-aware portfolios, and increasingly discussed alongside other highly volatile assets. In practice, large Bitcoin moves are often read through the same macro-financial lens used to explain moves in mainstream asset classes. In this paper, we use a simple but economically meaningful object: Bitcoin’s beta to different financial instruments to empirically answer the question of what Bitcoin really is.

The main research question we ask is whether Bitcoin over time has become correlated with the broad equity market, therefore losing its initial hedging characteristic. A second question is whether Bitcoin has idiosyncratic exposure to the tech industry. We answer these questions by studying the evolution of Bitcoin’s return sensitivity to US equities over time, and in particular its sensitivity to a tech-oriented equity index (NASDAQ) and a broad equity market index (Dow Jones).

Our central empirical fact is straightforward. Bitcoin’s beta to U.S. equities rises over time, and the increase is most informative when the benchmark is a broad equity index rather than a high tech index. For example, in one-break Bai–Perron specifications, the estimated Dow beta rises from roughly .4 before 2020 to roughly 1.5 after 2021, with the break being significant at the 95% level. After controlling for Dow Jones returns, the corresponding NASDAQ beta is small and indistinguishable from zero throughout the observation period. Taken together, these results indicate that Bitcoin has become more equity-like in general and less of a diversifying financial asset.

Our paper speaks to several strands of the literature. A first strand asks what kind of asset Bitcoin is, emphasizing whether it behaves like money, a speculative vehicle, or a hedge. Early work argues that Bitcoin looks less like a conventional currency and more like a speculative asset ([Yermack, 2013](#); [Baur et al., 2018](#)),

while evidence on hedge and safe-haven properties is generally limited and state dependent (Bouri et al., 2017; Smales, 2019). More recently, Makarov and Schoar (2020) document large and persistent price dislocations across Bitcoin exchanges, suggesting that market segmentation and limits to arbitrage remain important features of crypto trading infrastructure even as Bitcoin matures.

A second strand studies the interdependence between crypto markets and traditional financial assets. This literature shows that Bitcoin and other cryptocurrencies are not fully segmented from stocks, bonds, commodities, and uncertainty measures, and that their connectedness varies over time and often strengthens in periods of stress or broader market repricing (Corbet et al., 2018b; Dahir et al., 2020; Elsayed et al., 2022; Wang et al., 2022). Iyer and Popescu (2023) provide broad-based evidence of increasing return and volatility spillovers between crypto assets and financial markets, with a peak during the COVID-19 pandemic that implies growing interdependence. In related work, Adrian et al. (2022) find that crypto and equity markets have become increasingly correlated across economies since 2020, with roughly 80 percent of the variation in crypto prices coinciding with institutional entry into crypto markets. Conlon et al. (2024) use DCC-GARCH models to show that the correlation between Bitcoin and U.S. equities shifted from near zero to substantially positive after the January 2024 U.S. spot ETF approval, further documenting the narrowing gap between crypto and traditional asset classes.

A third strand brings cryptocurrency into a more standard asset-pricing framework, showing that crypto returns load on systematic risks and can be studied with familiar factor tools even when crypto-specific risks remain important (Liu and Tsyvinski, 2021). Krause (2025) studies Bitcoin’s factor exposures before and after the spot ETF approval and find a dramatic structural break: traditional factor models had limited explanatory power before January 2024 but explained a substantially larger share of Bitcoin’s weekly return variation afterward, with market, size, and momentum factors all becoming statistically significant.

A fourth strand, closely related to ours, examines the role of derivatives and exchange-traded products in accelerating Bitcoin’s integration with traditional markets. The launch of CME Bitcoin futures in December 2017 was a pivotal institutional milestone: Köchling et al. (2019) show that the introduction of futures improved the price efficiency of the Bitcoin spot market by easing access for

institutional investors and allowing short positions for the first time. Subsequent work finds that futures trading contributed to price discovery, altered volatility dynamics, and strengthened the transmission of information between crypto and equity markets (Corbet et al., 2018a; Kapar and Olmo, 2019). More recently, the approval of spot Bitcoin ETFs in January 2024 has been studied as a further structural break. Babalos et al. (2025) find that the introduction of spot ETFs increased Bitcoin returns and reduced spot-market volatility, consistent with a stabilization hypothesis, while Lee and Lee (2025) document a complete trend reversal in Bitcoin’s correlation with equities from declining to increasing after the ETF launch. These studies provide an institutional backstory for the rising beta that we document in this paper.

A fifth strand examines the intraday and high-frequency properties of cryptocurrency markets. Jasiak and Zhong (2024) study the intraday and daily dynamics of cryptocurrency prices and show that Bitcoin’s return behavior differs across time scales, with high-frequency features that carry implications for return measurement and beta estimation. Our data construction, which aligns Bitcoin and equity returns within a common market-hour window, is motivated in part by the insights from this literature.

We contribute to the existing literature that Bitcoin’s beta to U.S. equities trends upward over a long sample, well before the introduction of Bitcoin ETFs. We also contribute by showing that Bitcoin has no idiosyncratic exposure to the tech equity market. In contrast, Bitcoin seems to follow the broader market, suggesting it is moved more by market sentiment than by tech industry fundamentals.

This framing also sharpens the contribution relative to adjacent papers. We do not claim to be the first to identify any link between Bitcoin and equity markets. Rather, the contribution is to show that Bitcoin’s exposure to U.S. equities has increased persistently over time and that the correlation is not driven by the technology or AI booms. First, rolling-beta estimates show that Bitcoin’s sensitivity to all equity indexes is low and unstable early in the sample but rises and remains elevated in later years. Second, multi-factor specifications indicate that the Dow Jones exposure survives alongside broader market and fixed-income controls, and that NASDAQ has no predictive power after controlling for Dow Jones. Third, formal structural break tests identify statistically meaningful regime changes in

Bitcoin’s equity exposure, with later regimes displaying markedly higher betas than earlier regimes.

The results have implications for both portfolio construction and asset classification. If Bitcoin increasingly loads on the same shocks as growth-oriented U.S. equities, its diversification value relative to equity portfolios is lower than earlier narratives suggested. The findings also speak to the broader financialization of crypto markets: as institutional participation, macro trading, and benchmark-aware portfolio allocation have expanded, Bitcoin appears to have moved closer to the traditional risk-on asset universe. Our evidence does not imply that Bitcoin is literally another stock or that its pricing is fully explained by equity-market factors. It does imply that, compared with its earlier history, Bitcoin now behaves much more like an asset that belongs in the same broad opportunity set as equities.

2 Data

Our starting point is minute-level data for Bitcoin and traditional financial assets. We use index and Bitcoin pricing data from FirstRate (sourced from major crypto exchanges), and treasury yields from LSEG provided by Thomson Reuters.

The Bitcoin series, the equity, and the Treasury series span April 2013 to March 2026, which defines the start of our common sample. The minute-level structure matters because Bitcoin trades continuously, while the NASDAQ and S&P 500 trade only during U.S. market hours. Even though some ETFs like SPY trade overnight, the market is much thinner after hours. Therefore, for the beta-estimations we construct market-hour 30-minute returns for Bitcoin and the benchmark assets using a common intraday window aligned with U.S. trading hours. We use daily return series for structural break tests that allow the timing and number of breaks to be determined by the data (Bai and Perron, 1998, 2003).

We start with the primary benchmark being the NASDAQ. The initial choice follows directly from the paper’s question: if Bitcoin has become more similar to a tech stock, the relevant comparison is not only to the broad market but more specifically to the growth- and duration-sensitive segment of U.S. equities. The Dow Jones is later included to evaluate whether Bitcoin behaves like a tech-oriented asset or another broad market risk asset class. In some specifications,

we also include Treasury returns to separate changes due to interest rates from changes due to stock cash flows.

3 Empirical Framework

3.1 Baseline Time-Varying Beta Specification

Our main object of interest is Bitcoin’s time-varying exposure to the stock market. At the 30-minute level, the baseline model is

$$r_t^{BTC} = \alpha_t + \beta_t^N r_t^{stocks} + \varepsilon_t, \quad (1)$$

where r_t^{BTC} denotes Bitcoin’s market-hour return and r_t^{stocks} denotes the contemporaneous stock market returns. The coefficient β_t^N summarizes Bitcoin’s exposure to equities at time t . We estimate this exposure in rolling windows on a monthly basis.

3.2 Comparison Benchmark and Multifactor Specifications

To distinguish between broad equity integration and specifically tech-like behavior, we estimate analogous rolling-beta specifications using the Dow Jones as the benchmark. We also estimate richer specifications of the form

$$r_t^{BTC} = \alpha + \beta^N r_t^{DowJones} + \beta^S r_t^{Nasdaq} + \beta^T r_t^{Treasury} + \varepsilon_t, \quad (2)$$

where the additional terms capture broad market and macro-financial conditions. The purpose of these regressions is not to maximize fit, but to test whether the NASDAQ effect remains economically meaningful once broader risk factors are included.

3.3 Structural Break Framework

Rolling estimates are useful descriptively, but do not by themselves establish discrete regime changes. Therefore, we complement the rolling-beta analysis with structural break tests in the daily level following [Bai and Perron \(1998, 2003\)](#).

These methods allow both the number and location of breaks to be determined from the data rather than imposed ex ante.

The corresponding regression takes the form

$$r_t^{BTC} = \alpha_j + \beta_j r_t^{MKT} + u_t, \quad t = T_{j-1} + 1, \dots, T_j, \quad (3)$$

where r_t^{MKT} denotes either the NASDAQ or the Dow Jones return and the coefficients may differ across regimes indexed by j . If Bitcoin increasingly behaves like a tech stock, we should observe low or unstable NASDAQ exposure in early regimes and larger positive NASDAQ exposure in later regimes.

4 Main Results

4.1 Rolling beta towards the NASDAQ

We run specification (1) with the NASDAQ returns. Figure 1 shows the rolling betas on a monthly level, smoothed using a three-month centered moving average. We find that Bitcoin’s beta to the NASDAQ rises over time. In the early part of the sample, the estimated beta is low, unstable, and often close to zero. In the later part of the sample, the beta becomes less noisy, persistently positive, and economically meaningful. This first evidence suggests that Bitcoin has come to behave more like a technology-oriented risk asset than it did in its earlier history.

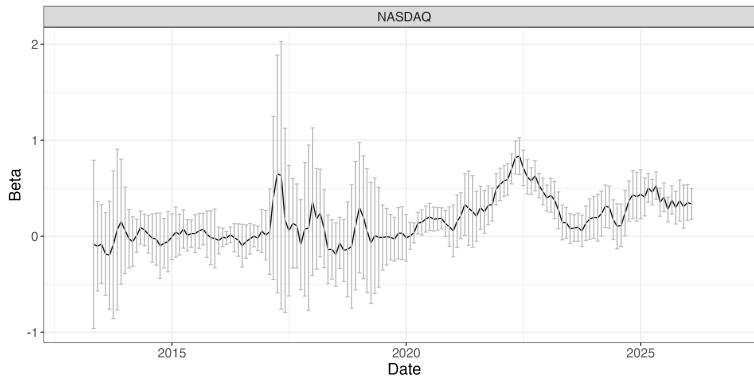


Figure 1: Rolling Bitcoin beta to the NASDAQ

4.2 Rolling beta towards the Dow Jones

We next run the one-factor CAPM regression against the Dow Jones as a comparison benchmark. Figure 2 shows that Bitcoin also becomes more exposed to the broad equity market over time. In absolute numbers, Bitcoin’s beta is higher towards the broad equity market compared to a tech-heavy benchmark. This matters because it suggests that the increase in beta is not only about one sector-specific benchmark, but rather to the broad stock market.

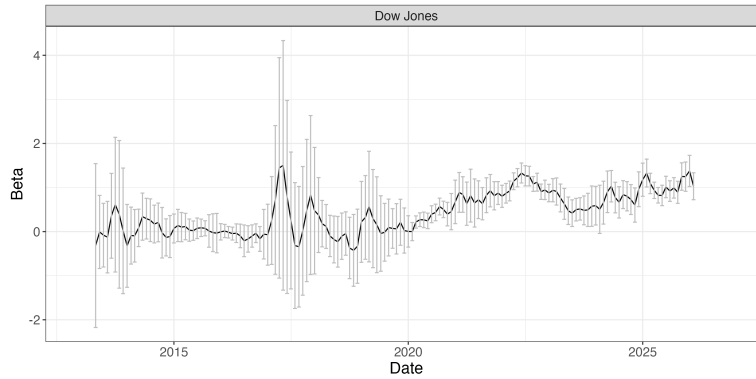


Figure 2: Rolling Bitcoin beta to the Dow Jones

4.3 Rolling beta - Multi-factor evidence

Figure 3 reinforces the central claim of the paper in a richer empirical environment. The NASDAQ beta decreases and becomes indistinguishable from zero after adding the Dow Jones as a factor.¹ This difference is important because it suggests that the changing behavior of Bitcoin is not best understood as a response to tech-oriented stocks. Instead, the strongest exposure of Bitcoin’s returns is to a broad stock market index. The multi-factor evidence also indicates that the beta on the 10-year Treasury is small and indistinguishable from zero, consistent with Bitcoin value not being derived from a stream of cash flows.

¹The high correlation between NASDAQ and the Dow Jones indices raises multicollinearity concerns. However, the maximum monthly VIF in the multi-factor specification is four.

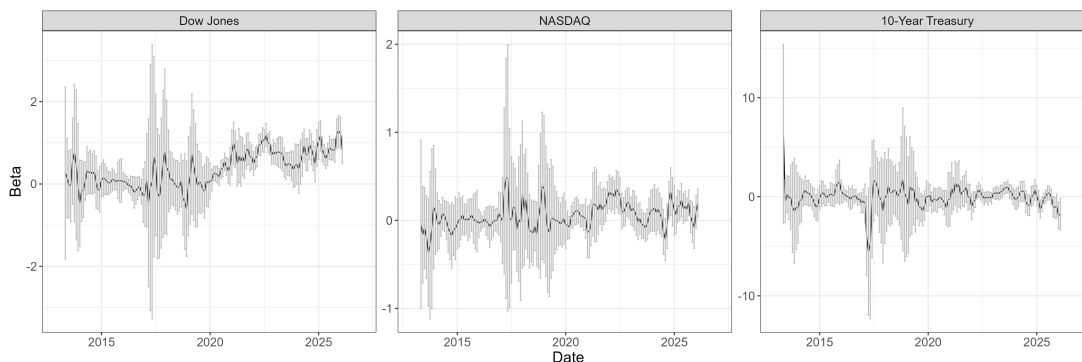


Figure 3: Rolling Bitcoin beta - multivariate setting with NASDAQ as additional equity factor

We assess robustness to the high correlation between Dow Jones and NASDAQ returns by re-estimating a two-factor model under two orthogonalizations. When NASDAQ is residualized on Dow Jones (assigning all shared variation to the latter), the post-2020 Dow Jones beta averages 0.87 and the residualized NASDAQ beta averages 0.11. In the symmetric specification with Dow Jones residualized on NASDAQ (assigning all shared variation to NASDAQ), the post-2020 NASDAQ beta averages 0.35 while the residualized Dow Jones beta still averages 0.79, economically larger by more than a factor of two. The broad-market exposure is therefore robust to which factor absorbs the shared variation, whereas the tech exposure depends critically on this assignment.

4.4 Structural Break Evidence

The structural break tests reinforce the rolling-beta evidence. The beta on the Dow Jones switches from close to zero before the December 2020 break point to above one in the subsequent regime. The beta on the NASDAQ also has a significant breaking point, however the change is more moderate and the breaking date is more difficult to identify.

The estimated break point in late 2020 is consistent with a cluster of contemporaneous events that may have contributed to Bitcoin’s integration into mainstream corporate finance. On August 11, 2020, MicroStrategy announced its initial 250 million US-Dollar Bitcoin purchase, becoming the first publicly listed U.S. company to adopt Bitcoin as a primary treasury reserve asset. Tesla

Table 1: One-break structural break estimates

Benchmark	Early-regime beta	Late-regime beta	Break date
NASDAQ	-7.96e-05	0.428***	2020-06 [2018-07 to 2022-02]
Dow Jones	-8.33e-04	1.317***	2020-12 [2020-08 to 2021-09]

Notes: Confidence intervals are provided in square brackets. * = 0.1, ** = 0.05, *** = 0.01

followed on February 8, 2021, disclosing a 1.5 billion US-Dollar Bitcoin allocation, extending the treasury-allocation narrative to one of the largest firms in the S&P 500. Two months later, on April 14, 2021, Coinbase went public at a roughly 100 billion US-Dollar valuation, providing investors with a liquid, regulated equity vehicle directly tied to crypto market activity. While we do not establish a causal link between these events and the estimated break, their timing offers a plausible institutional backdrop against which the documented regime shift can be interpreted.

The key takeaway is not only that Bitcoin’s beta looks higher in later rolling windows, but that the data support a statistically meaningful transition from a low-beta regime to a higher-beta regime. Second, the increase in exposure does not seem to derive from correlation with the tech industry, but rather from a relationship with a broad stock market index. All in all, Bitcoin appears to have crossed into a different equilibrium relationship with U.S. equity markets.

5 Conclusion

This paper argues that crypto is coming of age, with Bitcoin providing the clearest case through its rising beta to the U.S. stock market. Using market-hour return comparisons, rolling betas, multi-factor regressions, and structural break tests, we show that Bitcoin’s exposure to U.S. equities has risen over time and that a broad market index like the Dow Jones is a more informative benchmark for understanding this change compared with a tech index. Specifically, after controlling for the Dow Jones returns, the NASDAQ has no explanatory power

over Bitcoin returns. This indicates that against conventional wisdom, Bitcoin is perceived as a broad risky asset that moves based on market sentiment more than on technology fundamentals.

These results also help clarify the economics behind the pattern. A natural interpretation is financialization: as Bitcoin became easier to hold through institutional custody, listed vehicles, and benchmark-aware portfolio mandates, it increasingly entered the same opportunity set as equities. More broadly, unlike technology stocks, Bitcoin appears to be insensitive to changes in interest rates, consistent with its value not being derived from a stream of cash flows. The point is not that Bitcoin is literally another stock or that crypto-specific drivers have disappeared. Rather, the point is comparative and dynamic. Relative to its earlier history, Bitcoin has become much more correlated with the overall stock market, which lowers its diversification value against equity portfolios and changes how investors should classify it within broader asset-allocation decisions.

References

- Adrian, T., Iyer, R., and Qureshi, M. S. (2022). Crypto prices move more in line with stocks, posing new risks. In *Global Financial Stability Report*, chapter 3. International Monetary Fund. January 2022.
- Babalos, V., Bouri, E., and Gupta, R. (2025). Does the introduction of US spot Bitcoin ETFs affect spot returns and volatility of major cryptocurrencies? *The Quarterly Review of Economics and Finance*, 102:102006.
- Bai, J. and Perron, P. (1998). Estimating and testing linear models with multiple structural changes. *Econometrica*, 66(1):47–78.
- Bai, J. and Perron, P. (2003). Computation and analysis of multiple structural change models. *Journal of Applied Econometrics*, 18(1):1–22.
- Baur, D. G., Hong, K., and Lee, A. D. (2018). Bitcoin: Medium of exchange or speculative assets? *Journal of International Financial Markets, Institutions and Money*, 54:177–189.

- Bouri, E., Molnár, P., Azzi, G., Roubaud, D., and Hagfors, L. I. (2017). On the hedge and safe haven properties of Bitcoin: Is it really more than a diversifier? *Finance Research Letters*, 20:192–198.
- Conlon, T., Corbet, S., Hou, Y. G., Hu, Y., and Oxley, L. (2024). The impact of Bitcoin ETF approval on Bitcoin’s hedging properties against traditional assets. *Working paper, Washington University in St. Louis*.
- Corbet, S., Lucey, B., Peat, M., and Vigne, S. (2018a). Bitcoin futures—what use are they? *Economics Letters*, 172:23–27.
- Corbet, S., Meegan, A., Larkin, C., Lucey, B., and Yarovaya, L. (2018b). Exploring the dynamic relationships between cryptocurrencies and other financial assets. *Economics Letters*, 165:28–34.
- Dahir, A. M., Mahat, F., Abdul-Rahman, A., and Razak, N. A. (2020). Dynamic connectedness between bitcoin and equity market information across BRICS countries: Evidence from TVP-VAR connectedness approach. *International Journal of Managerial Finance*, 16(3):357–371.
- Elsayed, A. H., Naifar, N., Nasreen, S., and Tiwari, A. K. (2022). Risk transmissions between bitcoin and traditional financial assets during the COVID-19 era: The role of global uncertainties. *The North American Journal of Economics and Finance*, 62:101706.
- Iyer, R. and Popescu, A. (2023). New evidence on spillovers between crypto assets and financial markets. Technical Report Working Paper 2023/213, International Monetary Fund.
- Jasiak, J. and Zhong, C. (2024). Intraday and daily dynamics of cryptocurrency. *International Review of Economics & Finance*, 96:103658.
- Kapar, B. and Olmo, J. (2019). An analysis of price discovery between Bitcoin futures and spot markets. *Economics Letters*, 174:62–64.
- Köchling, G., Müller, J., and Posch, P. N. (2019). Does the introduction of futures improve the efficiency of Bitcoin? *Finance Research Letters*, 30:367–370.

- Krause, T. (2025). The institutionalization of Bitcoin: An analysis of post-ETF approval factor exposures. *Working paper*.
- Lee, S. and Lee, J. (2025). Shifting dynamics: Bitcoin spot ETF approval and Bitcoin’s relationships with financial markets. *Applied Economics Letters*. Forthcoming.
- Liu, Y. and Tsyvinski, A. (2021). Risks and returns of cryptocurrency. *Review of Financial Studies*, 34(6):2689–2727.
- Makarov, I. and Schoar, A. (2020). Trading and arbitrage in cryptocurrency markets. *Journal of Financial Economics*, 135(2):293–319.
- Smales, L. A. (2019). Bitcoin as a safe haven: Is it even worth considering? *Finance Research Letters*, 30:385–393.
- Wang, P., Liu, X., and Wu, S. (2022). Dynamic linkage between bitcoin and traditional financial assets: A comparative analysis of different time frequencies. *Entropy*, 24(11):1565.
- Yermack, D. (2013). Is Bitcoin a real currency? an economic appraisal. Technical Report Working Paper 19747, National Bureau of Economic Research.