

# Tracking pure systematic risk with realized betas for Bitcoin and Ethereum

Bilel Sanhaji<sup>1</sup> and Julien Chevallier<sup>2</sup>

Date : March 2023 -- *For conference selection.*

## **Abstract** :

Within the capital asset pricing model, this article critically assesses the relative importance of computing realized betas from 60-minute returns for Bitcoin and Ethereum - the two major cryptocurrencies - against their classic counterparts using the 1-day and 5-day return-based betas. The sample includes intraday data from 2018-05-15 until 2023-01-17. The primary driver for very short-term volatility in financial markets is the systematic (downside-)risk, which we aim to track here in its pure form based on high-frequency data. An optimal beta calibration appears crucial to asset managers to decide whether to hold or rebalance portfolios, and it can trigger several trading orders to unwind a position. In theory, higher frequency information should yield more precise estimates (Andersen (2000), Bollerslev and Wright (2001)). Shorter intervals can also prove more valuable than daily data, particularly when investors need to rebalance their portfolio in the wake of crypto-market crashes such as the recent FTX exchange fallout. We flag the minimal Tracking Errors at the hourly and daily frequencies. The dispersion of rolling betas is higher for the monthly frequency. The monthly frequency is thus revealed as being less precise to capture the pure systematic risk for Bitcoin and Ethereum. For Ethereum in particular, the availability of high-frequency data tends to produce, on average, a more reliable inference (the deviations are more pronounced for monthly data than for hourly or daily sampling). Optimal weights of cryptocurrencies in the investor portfolio range from 60% to 120% for Bitcoin (-20% to 45% for ETH). In the age of financial data feed immediacy, our results strongly suggest to pension fund managers, hedge fund traders and investment bankers to include realized versions of CAPM betas into their dashboard of indicators for portfolio risk estimation.

**Keywords** : realized beta; Bitcoin; Ethereum; capital asset pricing model

---

<sup>1</sup> Université Paris 8, Vincennes Saint-Denis, Laboratoire d'Économie Dionysien, EA 3391

<sup>2</sup> Université Paris 8 (LED) and Ipag Business School (IPAG Lab). Email : [julien.chevallier04@univ-paris8.fr](mailto:julien.chevallier04@univ-paris8.fr)