

## **Frequency-Based Interdependency Volatility Networks for Cryptocurrencies: A TVP-VAR Connectedness Approach**

**Onur Polat**

Bilecik Seyh Edebali University, Turkey  
onur.polat@bilecik.edu.tr

### **Abstract**

Cryptocurrencies are peer-to-peer digital cash mechanisms designed to render direct electronic payments among parties without a financial intermediary. Unlike traditional tangible financial instruments, the price of a cryptocurrency is based on a cryptographic hash function. Besides, cryptocurrencies prone to have excessive price inflation accompanied by extreme volatility. In this study, we structure frequency-based network volatility connectedness among major cryptocurrencies by implementing the time-varying parameter VAR (TVP-VAR) connectedness methodology of Barunik and Ellington (2020). To this end, we estimate short-, medium-, and long-term network volatility connectedness by employing a locally stationary TVP-VAR model using the Quasi-Bayesian Local Likelihood (QBLL) methods. This seminal methodology allows us to incorporate prior shrinkage and to draw the posterior distribution of the dynamic adjacency matrix of the connectedness. Accordingly, we estimate frequency-dependent volatility connectedness networks for cryptocurrencies during financial/geopolitical calm and turmoil episodes.

**Keywords:** TVP-VAR, QBLL, Cryptocurrency, Dynamic Networks

**JEL Codes:** C10, C40, G00