ASYMMETRIC VOLATILITY AND RISK ANALYSIS OF BITCOIN CRYPTOCURRENCY MARKET
(Kemeruapan Asimetrik dan Analisis Risiko untuk Pasaran Mata Wang Kripto Bitcoin)

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ABSTRACT

This study provides an estimation of Bitcoin's volatility using a variation of GARCH (volatility) models. The Box-Jenkins Procedure is used throughout the analysis. The volatility clustering effect is found in Bitcoin, which suggests that GARCH models are applicable in its return series. In the empirical analysis, the standard errors of cryptocurrency returns are assumed to follow a Student-*t* distribution for the best fitting model. The Glosten, Jagannathan, and Runkle (GJR)-GARCH(1,1) model shows that Bitcoin's log return series exhibits an inverted leverage effect, where the volatility of Bitcoin's return tends to increase when good news happens. In financial applications, the accuracy of volatility estimation and forecasting is crucial in providing a reliable tool for risk management, option trading, asset pricing, among others. The value-at-risk measurement transforms the estimated GARCH volatility into the maximum potential loss at a certain level of confidence (95% or 99%). By including the COVID-19 period in our empirical study, we found that the pandemic has a positive impact on cryptocurrency markets. This finding provides useful information to investors in their risk management and portfolio analysis.

Keywords: cryptocurrencies return; GARCH; volatility models; value-at-risk

ABSTRAK

Kajian ini menyediakan anggaran pulangan Bitcoin menggunakan variasi model kemeruapan GARCH. Prosedur Box-Jenkins digunakan sepanjang analisis. Kesan pengkelompokan kebolehubah ditemui dalam Bitcoin, yang menunjukkan bahawa model GARCH adalah sesuai dalam model siri pulangan. Dalam analisis empirik, ralat piawai pulangan mata wang kripto dianggap mengikut taburan Student-t bagi model yang paling sesuai. Model Glosten, Jagannathan, dan Runkle (GJR)-GARCH(1,1) menunjukkan bahawa siri pulangan log Bitcoin menunjukkan kesan pembebanan terbalik, di mana kemeruapan pulangan Bitcoin cenderung meningkat apabila berita baik pasaran diumumkan. Dalam aplikasi kewangan, ketepatan anggaran kebolehubah dan ramalan adalah penting dalam menyediakan alat yang boleh dipercayai untuk pengurusan risiko, perdagangan opsyen, penetapan harga aset, dan lain-lain. Pengukuran Nilai Risiko mengubah anggaran kemeruapan GARCH yang dianggarkan menjadi kerugian maksimum potensi pada tahap keyakinan tertentu (95% atau 99%). Dengan menglingkupi tempoh COVID-19 dalam kajian empirik, adalah dapati bahawa pandemik mempunyai impak positif terhadap pasaran mata wang kripto. Penemuan ini menyediakan maklumat berguna kepada pelabur dalam pengurusan risiko dan analisis portfolio.

Kata kunci: pulangan mata wang kripto; GARCH; model kemeruapan; nilai risiko

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