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Uncertainty and Risk in the Cryptocurrency Market

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Abstract: Cryptocurrency investments are often perceived as uncertain and risky. In this study, we assessed if this is indeed the case, using a sample of seven cryptocurrencies and considered a period that encompassed the first real global shock in the life of these relatively new financial assets, the COVID-19 pandemic. Uncertainty was evaluated using Shannon's symbolic entropy. To measure risk, we use value-at-risk and conditional value-at-risk. The results indicate that, except for Tether, the analyzed cryptocurrencies' returns exhibited similar patterns of uncertainty and risk. Levels of uncertainty were close to the maximum values, but high uncertainty is not always associated with high risk. During the pandemic crisis, uncertainty increased while risk decreased, suggesting that the considered assets may have safe haven properties.

Keywords: risk; uncertainty; cryptocurrencies; symbolic entropy; value-at-risk; conditional value-at-risk

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1. Introduction

In the last decade, the cryptocurrency market experienced notable growth. Created as an alternative to fiat monies, cryptocurrencies quickly became a new asset class (Katsiampa 2017; Corbet et al. 2018, 2019), displaying higher volatility, risk and returns than more traditional assets (Ji et al. 2019; Chaim and Laurini 2019). Globalization and financial liberalization have boosted the integration of financial markets but have also reduced diversification opportunities (Mensi et al. 2019). Thus, investors increasingly turn to this new market in search of diversification and hedging options.

Investment in cryptocurrencies is subject to uncertainty and several specific and systematic risks, assessed inter alia by Fry and Cheah (2016), Ardia et al. (2019), Borri (2019), Wei (2018) and Syuhada and Hakim (2020). Uncertainty and risk, though conceptually distinct, are often used as synonyms, perhaps because they are associated with imperfect knowledge (Knight 1921). In this study, we assess, first, uncertainty using Shannon's symbolic entropy, and then risk, with value-at-risk (VaR) and conditional value-at-risk (CVaR), two statistics often used in the context of the cryptocurrency market (see, for instance, Likitratcharoen et al. 2018; Trucíos et al. 2020).

The contribution of our study is twofold. We add to current knowledge by developing a complementary analysis of uncertainty and risk using data for a set of cryptocurrencies and adopting a robust methodology that considers these assets' complex dynamic behavior. Similar studies are rare, and the few that exist are solely focused on the Bitcoin (BTC) (a specificity that also applies to other analyses of the cryptocurrency market-see, inter alia Katsiampa 2017; Ardia et al. 2019; Bouri et al. 2018).

The remainder of the paper is organized as follows: after this introduction, Section 2 briefly reviews the relevant literature; Section 3 presents the data and methodology; results are shown and discussed in Section 4; Section 5 concludes.