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| 2 | The growing interest in cryptocurrencies and its underlying technology – the blockchain – is also reflected in the entry of regular businesses into the crypto-world using the hype of cryptocurrency for their benefit (...)  the introduction of ICOs, also known as token sales, opened up entirely new opportunities for funding blockchain-related projects and start-ups by the issuance of tokens. Recently, this phenomenon has become an alternative source of venture capital financing as it incurs lower costs and provides greater access to crowd investors compared to traditional forms of financing  (...)  One major reason for the increase in token sales was the introduction of so-called smart contracts on the Ethereum blockchain,(...) . Smart contracts automatically execute predefined terms of a contract and play a key role in the progress of digital contracts in both the financial, as well as nonfinancial áreas (Crosby et al., 2016; Glaser, 2017). Unlike Bitcoin, the Ethereum blockchain provides an additional layer, on which decentralized applications and democratic autonomous organizations (DAOs) can be built. Another key feature of the Ethereum ecosystem includes the ERC-20 token protocol, which standardizes the coding of smart contracts and, therefore, allows for the tokenization of assets and rights (Buterin, 2014).  it is significant to differentiate between tokens issued through an ICO and other cryptocurrencies, also called alternative coins or altcoins. As a matter of fact, all cryptocurrencies can be classified as tokens, however, they differ slightly in their objective and design, entailing different legal and fiscal implications. A major distinction can be made between payment tokens (coins) and tokens with other purposes. A coin, such as Bitcoin, is in principle a digital currency that is primarily used as a medium of exchange to transfer value in a peer-to-peer network  Further, other tokens that do not serve as a medium of exchange can be decomposed into utility, equity or asset-backed tokens. As the name already indicates, a utility token provides the investor with specific functionality. Once a utility token is purchased, the user can redeem the token to obtain benefits for products and applications the company will provide in the future. An equity token is similar to securities and common stocks in terms of their properties. Besides, the equity token may include profit sharing or provide voting rights of the company. Finally, the asset-backed token incorporates a claim on an asset of the active side of the balance sheet, i.e. that such a token is backed by a physical asset such as gold or other common assets (Conley, 2017; Catalani and Gans, 2019; Hahn and Wons, 2018) |  |
| 3 | with the introduction of new financing tools and its associated promises, also challenges in terms of regulatory uncertainty, cost level and large risk of scams emerge (Wisniewska, 2018)  (...)  At present, investors keep facing legal, regulatory and fiscal uncertainties, as no comprehensive regulatory frameworks in the cryptocurrency market exist. Chiefly, participating in a token-sale involves tremendous financial risk, as these projects most likely turn out to be scams with the imposter running away with the investor’s money. For this reason, investors are required to be wary before investing in a token-sale  the large volatility in the cryptocurrency market, which represent another dangerous risk for investors. Allocating various cryptocurrencies to a portfolio can reduce the overall risk. Furthermore, the optimal selection of single weights in the portfolio can further enhance performance. The meanvariance model based on the portfolio selection theory introduced by the economist Harry Markowitz (1952, 1959) is a well-established method in finance to optimize a portfolio. |  |
| 4 – 5 | Many cryptocurrencies allow the transfer of virtual money in a peer-to-peer network. To ensure the integrity of the data in a distributed system, cryptographic hash functions are used. Another important feature of cryptocurrency functionality is the consensus protocol, which provides an agreement between anonymous nodes on the current status of the transaction history stored in a distributed ledger, commonly referred to as a blockchain. New blocks are added by certain nodes (miners) on the network and cryptographically linked to previous blocks of data, making the blockchain tamper-proof and accessible to all on the network (Nakamoto, 2008). Given these properties, the need for a centralized and trustworthy third party such as a bank or a state institution becomes obsolete making cryptocurrencies attractive to everyone.  In the past couple of years, public interest in Bitcoin and other cryptocurrencies has vastly grown, which is mainly reflected in the sharp rise of the cryptocurrency market in 2017  The remarkable development of the cryptocurrency market caught the attention of investors, regulators and academics, casting doubts on an emerging bubble across the entire market that menaces the wealth of private and institutional investors  High speculation in the cryptocurrency market creating a huge bubble, in particular, regarding Bitcoin, has been empirically proved by Cheah and Fry (2015), Corbet et al. (2017), Fry (2018) and Bouri et al. (2019d)  findings by Kallinterakis (2019) reveal that the cryptocurrency market is significantly subject to herd behavior of investors, especially during upswings, low volatility and high volume days. Bouri et al. JRF 21,2 130 (2019a) find similar results and conclude that herding specifically occurs when uncertainty increases |  |
| 5 | According to studies by Karalevicius et al. (2018), the Bitcoin price is sensitive to media sentiment, leading to the overreactions of investors in the short-term  Early tests on the market efficiency of Bitcoin resulted in the assumption that the efficient market hypothesis is not satisfied over long-term periods (Urquhart, 2016). However, later studies by Nadarajah and Chu (2017) find that simple power transformation of the Bitcoin returns leads to market efficiency without loss of information, especially, in recent years. Further authors, as Vidal-Tomás and Ibañez (2018) prove evidence that monetary policy news does not affect Bitcoin price, but events in cryptocurrency markets do, concluding that efficiency has improved over time. Similarly, Brauneis and Mestel (2018), Khuntia and Pattanayak (2018), Tiwari et al. (2018) and Othman et al. (2019) discover that market efficiency has considerably evolved with time.  In general, the literature on forecasting volatility of Bitcoin returns is expanding to a large extent at the moment. Urquhart (2018) identify that the attention of Bitcoin is boosted, chiefly, by previous day volatility and volume, as well as two days previous returns. Yu et al. (2019) investigate the dynamic volatility of Bitcoin using high-frequency data. The author’s findings show that the leverage effect considerably affects future volatility, thus making it more powerful in forecasting Bitcoin volatility  More recent academic work of Katsiampa (2018) studies the volatility dynamics of Bitcoin and Ether, noticing that conditional volatility and correlation of both react to major news. Furthermore, he infers that Ether serves as an effective hedge against Bitcoin in a portfolio.  Early works of Dyhrberg (2016b) suggest that Bitcoin represents something between gold and currencies. However, subsequent studies (Baur et al., 2018a; Stavroyiannis, 2018) reject this hypothesis, as Bitcoin’s returns, standard deviation and correlation differ clearly from that of gold, the S&P 500 and the American dollar.  current research (Corbet et al., 2019b) confirms that Bitcoin is a speculative asset even after the introduction of futures trading. Further evidence (Haiss and Schmid–Schmidsfelden, 2018) corroborate previous studies that found cryptocurrencies are more of a token and extremely volatile asset class of their own, however, indicate that Bitcoin cash may best meet the properties of a currency at the moment. Primarily, due to the decentralized design, Ram (2019) classifies Bitcoin as a distinct alternative asset class  Unlike Dyhrberg (2016a) and Klein et al. (2018) find differences in the structure of Bitcoin against gold and other assets and, therefore, Bitcoin does not provide stable hedging capabilities, as does the gold in a global portfolio.  Against this background, a broad range of academic work has focused on the inclusion of cryptocurrencies to a global portfolio and its effects on portfolio diversification. Initial studies (Wu and Pandey, 2014; Eisl et al., 2015) use slightly different versions of the meanvariance framework for optimizing a globally diversified portfolio and find positive effects on the overall portfolio performance when including Bitcoin. Different studies (Brière et al., 2015; Carrick, 2016; Pinudom et al., 2018; Symitsi and Chalvatzis, 2019) confirm the benefits of including Bitcoin as a complement to a well-diversified portfolio. Furthermore, several works aim at examining the positive impact of portfolios, including Bitcoin and other altcoins using a classical Markowitz model (Markowitz, 1952, 1959) |  |
| 7 | . Kristjanpoller and Bouri (2019) examines cross-correlations between traditional currencies and cryptocurrencies and identify “significant asymmetric characteristic from the cross-correlation, that is, found to be persistent and multifractal in most of the cases.” Further studies reveal considerably negative dependencies between currencies and cryptocurrencies (Baumöhl, 2019; Uyar, 2019)  Regarding the transaction costs of cryptocurrencies, especially, those of Bitcoin, Kim (2017) indicate lower levels of fees compared to retail foreign exchange markets and Dyhrberg et al. (2018) to major equity exchanges. |  |