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Money-prospects of Cryptocurrencies - A Bibliometric Review

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Abstract

The status of the money-prospects of cryptocurrencies in both conventional and *Shari'ah* based literature remains hotly debated and largely indecisive. We apply/used the bibliometric approach to review the literature on/regarding the money-prospects of cryptocurrencies. We selected 264 articles published during the years 2011-2021 from Web of Science (WoS) through systematic screening to explore their influential and intellectual aspects. Bibliometric citation analysis was conducted to present/identify influential research categories, leading authors, top articles, prominent countries, and major journals within the sample. We also highlighted the trend of annual scientific production to show sustained growth in the area under research. Furthermore, keyword analysis and bibliometric coupling analysis were applied/carried out to generate networks to highlight the intellectual aspects of the money-prospects of cryptocurrencies. We used the networks of emerging themes and main clusters to conduct content analysis further. We included and reviewed studies which discussed the money-prospects of cryptocurrencies in the light of *Shari'ah* precepts in relevant clusters. We also identified potential future research areas (cluster-wise). Theis study helps the researchers to understand the evolution, dimensions, and emerging themes regarding the money-prospects of cryptocurrencies.

Keywords: bibliometric, bitcoin, cryptocurrencies, Islam, money

Introduction

The COVID-19 pandemic has been instrumental in gearing up the pace of digitalization among/in corporations and societies (Horgan et al., 2020). While the new norm has established its roots, huge disruption has been witnessed in the way of doing things through the process of innovation and invention (Anthony et al., 2021). The financial services industry is not an

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exception to such striking disruption. Over the centuries, money and its technology have remained adaptive to human needs and have been reshaped, accordingly. From commodity money to cryptocurrencies, money has transformed itself from atoms to digits.

While the most trenching financial crisis was taking its toll, a new revolutionary currency took shape and a group or a pseudonymous person calling itself Satoshi Nakamoto published a white paper on 'bitcoin' (Nakamoto, 2008). The tremendous success of bitcoin has paved the way for the cryptocurrency market to flourish and since the noticeable presence/introduction of bitcoin, the launching of various other cryptocurrencies has been observed/various other cryptocurrencies have been launched. Currently, the total market capitalization of cryptocurrencies is about $2.35 trillion, with 405 exchanges and 11,694 cryptos (CoinGecko, 2021).

Cryptocurrencies are becoming popular/gaining popularity and are increasingly beingused in transactions over the globe (Rose, 2015). Bitcoin is the most accepted form of cryptocurrency (Mallqui & Fernandes, 2019). According to CoinMap, a bitcoin acceptance monitor, the acceptance of bitcoin has surged up to 875 percent since December 2013. According to Reuters, there are more than 100000 businesses that accept bitcoin as a medium of exchange for payments. Prominent merchants which accept bitcoin include Paypal, KFC, Subway, Gap, Amazon, Dell, Microsoft, and Expedia, among others (Cuthbertson, 2015). Spendabit[1] is the online store that allows spending bitcoin for more than three million products registered in hundreds of online stores. Recently, bitcoin has been adopted by El Salvador as a legal tender (CoinMarketCap, 2021).

The status of the money-prospects of cryptocurrencies in conventional and *Shari'ah* literature remains hotly debated, largely indecisive, and partially attempted. This study is aimed at conducting a bibliometric review of the literature available on the money-prospects of cryptocurrencies, highlighting emerging themes and trends, and providing an impetus for future empirical and theoretical research. Bibliometric review, being scientometric analysis, remains robust to sample selection bias and offers

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[1] https://spendabit.co/

detailed influential aspects of literature as compared to the systematic literature review (Inamdar et al., 2020; Linnenluecke et al., 2020). We deployed a bibliometric meta-analysis along with content analysis to outline and discuss the influential and intellectual aspects of literature as done by Alshater et al., (2021), Khan et al., (2020) and Nasir et al., (2020).

There are few studies available that have focused on the bibliometric analysis of cryptocurrecnies, such as Merediz-Solà et al., (2019) and Aysan et al., (2021). However, these studies are broad in scope and generic in nature. Our study is the first, to the best of our knowledge, that distinctively staged the bibliometric analysis of literarure on the money-prospects of cryptocurrecnies. Moreover, the study specifically incorporated and reviewed the *Shari'ah* perspective of the money-prospects of cryptocurrencies, which was only marginally attempted, earlier. It uniquely covered 264 articles, retrieved from the ISI Web of Science (WoS) and published during the period 2011-2021. The study further deployed novel bibliometric citation analysis and content analysis based on intellectual streams and network graphs achieved through the co-occurrence analysis (cartographic or keyword analysis) and bibliographic coupling analysis.

Methodology and Data

Methodology

The current study combined bibliometric citation analysis and content analysis to showcase the influential and intellectual aspects of literature in line with Alshater et al., (2021), Khan et al., (2020), Klarin, (2020), Nasir et al., (2020), and Paltrinieri et al., (2019). Bibliometric citation analysis was conducted using the bibliometrix package of R. Bibliometrix, which includes *Biblioshiny* as a graphical interface to illustrate the analysis (Aria & Cuccurullo, 2017). VOSviewer was used to carry/conduct the co-occurrence analysis (cartographic or keyword analysis) and bibliographic coupling analysis was used to establish an outline of research themes and intellectual aspects for conducting content analysis, as done by Alshater et al., (2021) and Khan et al., (2020).

Data Selection

Table 1

Query Description and Filters

Query filters		
Category	Criteria	No. of excluded documents
Query outcomes Before search refine		1438
Access	Types including both open access and other journals.	0
Years	Included articles from 2008 to 2021.	(30)
Document type	Limiting the document types to article, early access, and review, while excluding all other types.	(515)
Subject area	Limiting the search to the following subjects: Economics Business Finance Business Management Law Religion We excluded all other categories for being only marginally relevant.	(404)
	We excluded all book series.	(11)
Language	We excluded all languages other than English.	(32)
Final number of documents (after search refine)		446
After careful manual examination of all articles, we were left with 264 articles.		(182)

Bibliometric metadata retrieving process commenced with the selection of the Web of Science (WoS) core database as the first step. WoS was

chosen because of its comprehensive coverage, reliability, popularity, and integration with the tools of the current study intent to deploy for analysis (Khan et al., 2020; Merediz-Solá & Bariviera, 2019; Paltrinieri et al., 2019). Initially, we used the query TI=(bitcoin OR crypto) AND TS=(Islam* OR sharia* "medium of exchange" OR store of value) that yielded 43 documents. These documents were screened for the most relevant keywords, boolean operators, and field tags to tailor the final query. Final query (TI=(bitcoin* OR ether* OR crypto* OR "virtual currenc*" OR "digital currenc*") AND TS=(Islam* OR sharia* OR halal OR "medium of exchange" OR fiat OR Money OR "unit of account" OR "store of value" OR currency) returned 1438 documents published during the years 1994-2021.

Within the database, cleaning was carried out based on different filters registered/depicted in Table 1. We selected the period 2008-2021, as the related literature started rolling out/was produced only after the inception of bitcoin in 2008. We limited our analysis to articles, early access, and reviews, for only these were found to be appropriate and relevant to our research. We covered six subject areas, namely, economics, business finance, business, management, law, and religion. We excluded all other irrelevant categories. We also excluded all book series and languages other than English. Eventually, we selected 446 articles that were manually screened through the bibliometric approach. Only those articles were selected which were deemed most appropriate to the research objectives of the current study. In this process, we excluded further/another 182 articles for being too broad intellectually. Finally, we were left with 264 articles published during the years 2011-2021 to pursue our analysis.

Findings

## Bibliometric Citation Analysis - Influential Aspects

Annual Scientific Production and Category Distribution Analysis

Figure 1 exhibits the annual scientific production and mean total citations (local) per article which signal the striking interest of researchers in money-prospects and allied areas of cryptocurrencies. Research interest in this area has spiked since 2017, following the momentum created in the cryptocurrency market led by the bitcoin price hike. Most of the literature

on cryptocurrencies mainly discusses bitcoin, its analysis, and implications (Burggraf et al., 2020; England & Fratrik, 2018; Nicholas Taleb, 2021; Uddin et al., 2020). The dotted line shows the increasing average trend and the forecast of annual scientific production based on our sample. The mean total citations per article shows a decreasing trend because of fewer citable years and a larger number of articles published in recent years.

Figure 1

Number of Publications and Mean Total Citations Per Article (Year Wise)
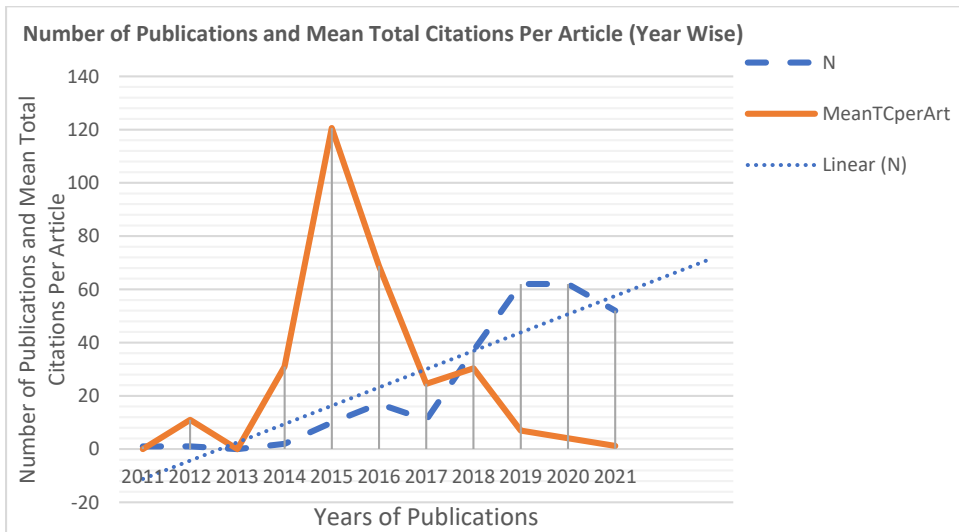

Note. This figure portrays the summary of our sample of papers across time, in terms of both the total annual scientific production per year (N) and mean total citations per article.

Figure 2 showcases the research categories maintained by WoS for our sample. Most of the literature on the money-prospects of cryptocurrencies is concentrated in the fields of business finance (91) and economics (89) as main categories. The legal aspects of cryptocurrencies are significantly discussed as represented by Law (40) (Bal, 2015, 2019; Valente, 2018). However, despite the considerable disruption they create, cryptocurrencies have made to the religious strata. Indeed, the score in the category 'religion' shows that the money-prospects of cryptocurrencies remain marginally attempted and off-focused.

Figure 2

WoS Category Distribution
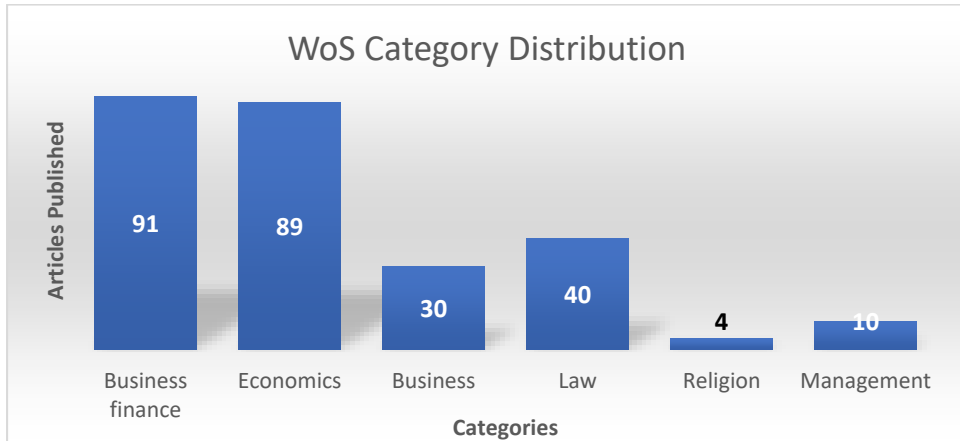
Note. This figure exhibits research category distribution for the selected sample.

Most Relevant and Influential Sources (Journals)

Table 2 exhibits the most relevant and influential journals in our sample based on the number of papers published and the number of local citations in WoS. The results completely reflect the data presented in the WoS category analysis, as business finance and economics remain the most influential categories. We selected journals based on their publishing at least 5 articles on the money-prospects of cryptocurrencies. All selected journals were anchored in 'business finance' and 'economics' categories of WoS. In recent years, the investigation of cryptocurrencies remain/has been a popular and leading interest/subject in various research areas including economics, finance, and business. *Research in International Business and Finance* topped our list by publishing 10 papers throughout the sample period, followed by *International Review of Financial Analysis* (8 papers), *Finance Research Letters* (7), *Journal of Risk and Financial Management* (7 papers), *and Economics Letters* (5 papers). It is also very important to note that out of the eight journals presented, 5 journals also make their presence/appeared among the top 10 journals, which were ranked based on the number of total local citations. The results showed that the researchers

prefer to publish in a journal that has a high number of citations and a higher h-index, mainly because of its ranking and impact factor. *Finance Research Letters* topped our sample with 600 local citations, followed by *Economics Letters* and *International Review of Financial Analysis* with 479 and 403 local citations, respectively.

It is also interesting to note that *China Economic Journal* and *Journal of Political Economy*, despite publishing 5 articles, scored significantly lower in terms of citations, thus limiting the influence of the research published in them. On closer examination, the study found that these two low-cited journals publish largely qualitative articles on nascent themes such as central bank-based digital currencies, cryptocurrencies disrupting monetary policy and financial systems, financial reforms, and financial decentralization, among others. Hence, the journals remain disadvantageous for publishing articles due to having fewer citable years, their qualitative nature, and nascent themes.

Table 2

Most Influential and Relevant Sources

Sources	Articles	Local Citation	Rank (Local Citations)	h-index	Publisher	WoS Category	Research Area
Research in International Business and Finance	10	263	5	8	Elsevier	Business Finance	Business and Economics
International Review of Financial Analysis	8	403	3	5	Elsevier	Business Finance	Business and Economics
Finance Research Letters	7	600	1	4	Elsevier	Business Finance	Business and Economics
Journal of Risk and Financial Management	7	116	Not in Top 10	3	MDPI	Business Finance	Business and Economics
Economics Letters	6	479	2	4	Elsevier	Economics	Business and Economics
China Economic Journal	5	2	Not in Top 10	1	Routledge	Economics	Business and Economics
International Journal of Political Economy	5	27	Not in Top 10	5	Routledge	Economics	Business and Economics
Journal of International Financial Markets Institutions & Money	5	266	6	2	Elsevier	Business Finance, Economics	Business and Economics

Most Influential and Relevant Countries and Authors

Table 3 shows the most influential and relevant authors and countries. Authors were ranked based on their number of publications during the sample period. At the top is William J. Luther from Florida Atlantic with 6 published articles, having 143 local citations and h index 5. He shares the top position with Shaen Corbet from the Dublin City University with the same number of published articles having 121 local citations and h index 4. Hossein Nabilou from the University of Luxembourg is the 3rd leading contributor in terms of the number of articles published.

Table 3 also highlights the ranking of the most influential countries based on the number of articles published. Countries were mapped based on the corresponding author and the score was counted. The USA tops the chart with 68 articles published within the duration of sample selection, followed by the UK, China, and Germany with 18, 16, and 12 articles, respectively. Total local citations of all ranked countries were calculated by summing up the citations (local citations) of all individual articles tagged with a country (within the WoS database) based on the corresponding author. The USA tops the chart again in our sample. Other leading countries in terms of citations are Ireland, UK, Spain, and Australia with 683, 650, 426, and 464 citations, respectively. Interestingly, Ukraine with 11 articles scores comparatively low in terms of total local citations. Table 3 depicts that most of the influential authors have started publishing on the money-prospects of cryptocurrencies very recently, as the publication start year of all influential authors was not earlier than 2016.

Most Influential Articles

Table 4 shows the list of the most influential articles which were ranked based on their local citations within the WoS database. The chart is topped by Cheah and Fry (2015) with 46 local citations, followed by Dyhrberg (2016) with 41 local citations. Baur et al. (2018) retains the third position with 39 local citations. In terms of global citations, Böhme et al. (2015) record the highest score with 428 citations, followed by Dyhrberg, (2016) and Cheah & Fry, (2015) with 411 and 375 citations, respectively.

Table 4 also shows that empirical studies regarding the money-prospects of cryptocurrencies are very popular and influential. In line with

its market dominance, bitcoin sustains its research dominance in the sample as most of the influential articles either studied bitcoin only (Baur et al., 2018; Cheah & Fry, 2015; Ciaian et al., 2016b; Dwyer, 2015) or studied it in conjunction with other cryptocurrencies and commodities (Dyhrberg, 2016; Klein et al., 2018; Luther, 2016). The themes of influential articles adressed mainly the volatility, price fluctuation, price determination, performance, and speculative behavior of bitcoin in particular and cryptocurrencies in general. Volatility and speculation in the cryptocurrency market were labeled as the main hindrances in the adoption and acceptance of bitcoin and other cryptocurrencies (Blau, 2018; Cheah & Fry, 2015; Ciaian et al., 2016b). /Another spectrum of influential studies attempted to address the money-prospects of cryptocurrencies more precisely by discussing their role as the medium of exchange, their adoption, usage, and the challenges faced by them such as network effects, volatility, and switching cost, while invoking comparisons with gold and dollar to establish conclusions (Baur et al., 2018; Dwyer, 2015; Dyhrberg, 2016; Klein et al., 2018; Luther, 2016; Polasik et al., 2015). It is interesting to mention that all influential papers were published in recent years, that is, after 2015 onward. It shows that the interest of researchers is following a thematic evolution and is consistently growing with major themes of money-prospects.

Table 3

Top Authors and Countries

Top Authors					Top Countries		
Authors	Articles	Local Citations	h-index	Publication Start Year	Countries	Articles	Local Citations
William J. Luther (Florida Atlantic University)	6	143	5	2016	USA	68	1088
Shaen Corbet (Dublin City University)	6	121	4	2018	United Kingdom	18	650
Hossein Nabilou (University of Luxembourg)	4	10	2	2019	China	16	151
Benjamin M. Blau (Utah State University)	3	130	2	2017	Germany	12	139

Top Authors					Top Countries		
Authors	Articles	Local Citations	h-index	Publication Start Year	Countries	Articles	Local Citations
Pavel Ciaian (European Commission)	3	314	2	2016	Ukraine	11	13
d'Artis Kancs (European Commission)	3	32	2	2016	Spain	10	426
Charles Larkin (University of Bath)	3	10	2	2020	Australia	8	464
Brian Lucey (Trinity College Dublin)	3	187	2	2020	Ireland	8	683
Miroslava Rajcaniova (Slovak University of Agriculture)	3	314	2	2016	Italy	7	31

Table 4

Influential Articles

Document	DOI	Journal	Local Citations	Global Citations	Theme	Nature
(Cheah & Fry, 2015)	10.1016/j.econlet.2015.02.029	Economics Letters	46	375	Speculative bubbles in bitcoin market	Empirical
(Dyhrberg, 2016)	10.1016/j.frl.2015.10.008	Finance Research Letters	41	411	Volatility of bitcoin	Empirical
(Baur et al., 2018)	10.1016/j.intfin.2017.12.004	Journal of International Financial Markets Institutions & Money	39	264	Medium of exchange-bitcoin	Empirical
(Böhme et al., 2015)	10.1257/jep.29.2.213	Journal of Economic Perspective	34	428	Governance, economics, and technology-bitcoin	Theoretical
(Dwyer, 2015)	10.1016/j.jfs.2014.11.006	Journal of Financial Stability	30	229	The economics of bitcoin-money-prospects	Empirical
(Ciaian et al., 2016b)	10.1080/00036846.2015.1109038	Applied Economics	26	280	The economics of bitcoin price formation	Empirical

Document	DOI	Journal	Local Citations	Global Citations	Theme	Nature
(Luther, 2016)	10.1111/coep.1 2151	Contemporary Economic Policy	15	49	Network effects and switching cost - cryptocurrencies	Empirical
(Polasik et al., 2015)	10.1080/10864 415.2016.1061 413	International Journal of Electronic Commerce	14	115	Price fluctuations and usage	Empirical
(Blau, 2018)	10.1016/j.ribaf. 2017.05.010	Research in International Business and Finance	13	87	Volatility of bitcoin price	Empirical
(Klein et al., 2018)	10.1016/j.irfa.2 018.07.010	International Review of Financial Analysis	13	165	Volatility and performance of bitcoin with gold	Empirical

Network and Content Analysis - Intellectual Aspects of Literature

In line with Khan et al., (2020), Nasir et al., (2020), and Paltrinieri et al., (2019), we present the network analysis formulated with VOSviewer in this section to identify and outline major themes of the sample literature. Then, we conduct content analysis based on themes and clusters to showcase the intellectual aspects of the literature in detail.

Keyword (Cartographic) Analysis

We conducted keyword network analysis based on the number of occurrences to identify and outline different themes available in the literature and how these themes evolved over the period of our study. To obtain a meaningful analysis, we applied three filters. Firstly, we defined the keyword inclusion criteria as at least 5 occurrences to identify and network the most influential themes within our sample (Paltrinieri et al., 2019). Secondly, we used the "thesaurus file" option to merge and clean resembling keywords, for instance, "bitcoins" was merged with "bitcoin" and "safe-haven" was merged with "safe haven". Thirdly, we excluded irrelevant keywords (Khan et al., 2020). This generated the network diagram presented in Figure 3, highlighting the different themes and intellectual connections within our sample literature.

Figure 3 contains a network of 37 refined keywords, 4 clusters, and 311 links with the total ink strength of 1190. It illustrates "bitcoin", "cryptocurrencies", "virtual currencies", "medium of exchange", "blockchain", "volatility" and "efficiency" as the most prominent keywords shaping the network of themes in sample literature. Most of the sample literature studied bitcoin and cryptocurrencies empirically, in terms of the volatility of returns and prices with their determinants (Andrade & Brandalise, 2019; Klein et al., 2018; Miglietti et al., 2020; Pichl & Kaizoji, 2017). Going further, the discussion on volatility gets connected with market impact, market efficiency (inefficiency), financial bubbles, the status of bitcoin as a hedge, risk diversifier, and safe haven (Agosto & Cafferata, 2020; Cheah & Fry, 2015; Ehlers & Gauer, 2019; Gómez & Demmler, 2018; Shahzad et al., 2019). Comparisons of cryptocurrencies (bitcoin in particular) were made with gold and dollar in terms of the volatility of returns and prices (Aloui et al., 2021; Dyhrberg, 2016; Nugroho, 2021; Uddin et al., 2020). Connectedness and contagion of cryptocurrencies were evaluated and examined within the cryptocurrency market and with forex and other commodity markets to explore their spillover effects (Andrada-Félix et al., 2020; Chemkha et al., 2021). The money-prospects of cryptocurrencies were also examined in terms of the functions of money, such as money acting as the medium of exchange, store of value and unit of account along with the theoretical features of the decentralized blockchain technology (Ammous, 2018; Baur et al., 2018; Baur & Dimpfl, 2021; Hazlett & Luther, 2020; Kher et al., 2020; Low & Marsh, 2019). Macro-debates regarding the money-prospects of cryptocurrencies such as central bank based digital currencies, implications on the tax system, monetary policy efficiency, money laundering, implications of decentralization on financial institutions of a monetary system, trust on governments, and regulatory issues were also attempted (Caliskan, 2020; Caton, 2020; Dow, 2019; Fama et al., 2019). Moreover, the efficiency of cryptocurrencies and markets amid the COVID-19 pandemic was also examined (Corbet et al., 2020; Kim, 2021; Neslihanoglu, 2021).

Figure 3

*Keyword Analysis-network Visualization*
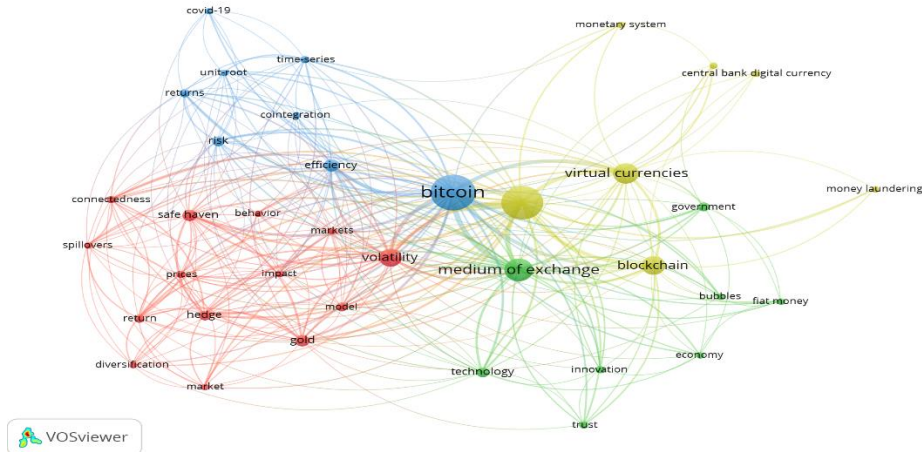
Note. Figure 3 highlights the network of different themes in sample literature based on the occurrence of keywords.

Based on the keywords and the network achieved in Figure 3, Figure 4 presents the evolution of the themes and interest of the researchers, based on the average number of publications (remains highest in 2019-2020) per year. It depicts that at the beginning, most of the literature was focused on bitcoin; studying bubbles, speculative behavior, volatility, and money-prospects in contrast with other asset classes (Baur et al., 2018; Böhme et al., 2015; Dyhrberg, 2016; England & Fratrik, 2018; Zhu et al., 2017). The discussion on bitcoin then evolved to incorporate the themes of efficiency, spillover, and connectedness, among others (Al-Yahyaee et al., 2018; Chemkha et al., 2021; Hsu et al., 2021; Vidal-Tomás & Ibañez, 2018; Yi et al., 2018). Meanwhile, the researchers tend to study other cryptocurrencies and blockchain technology with reference to the above mentioned themes, which have maintained their popularity over time (Caliskan, 2020; Kirchner, 2021; Klarin, 2020; Low & Marsh, 2019; Malherbe et al., 2019; Meegan et al., 2021; Yadav et al., 2020). The comparisons have evolved to cover the commodity and forex markets (Aloui et al., 2021; Uddin et al., 2020). Most recently, the themes have evolved to incorporate "safe haven",

"hedge", "risk", and "COVID-19" (Corbet et al., 2020; Hsu et al., 2021; Iqbal et al., 2021; Kim, 2021).

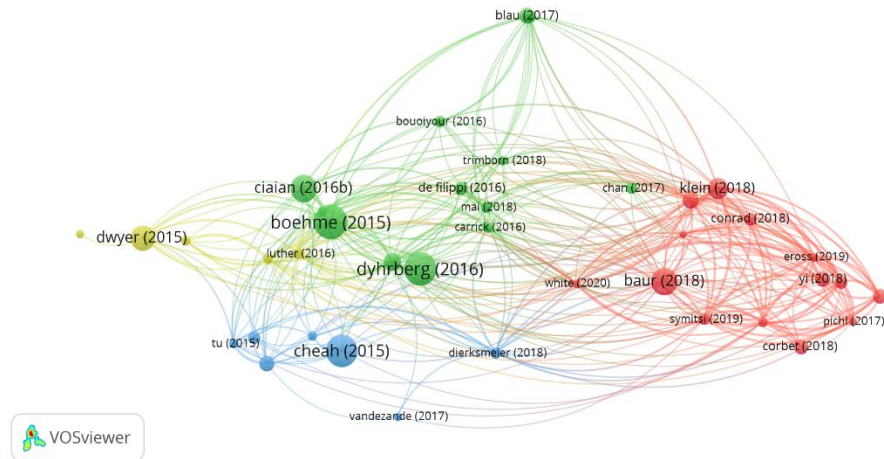**Figure 4**

Keyword Analysis-overlay Visualization
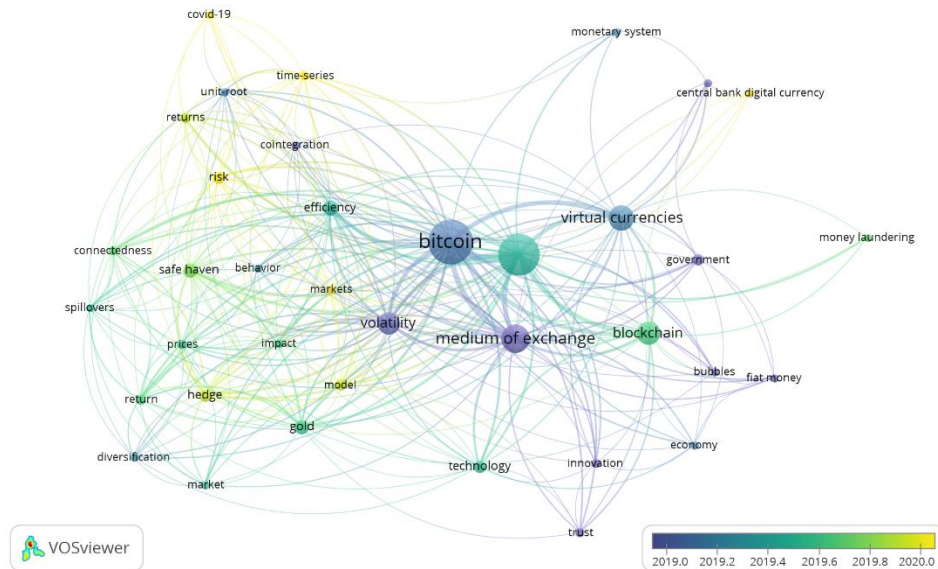
Note. Figure 4 explains the evolution of different themes over recent years based on the keywords selected in Figure 3.

Bibliographic Coupling and Content Analysis

In this section, bibliographic coupling analysis in VOSviewer is used to develop the clusters of literature on the money-prospects of cryptocurrencies based on citations filter. We used at least twenty citations per article to form the inclusion criteria, which yielded 41 articles. We chose "document" as the unit of analysis. Further, we removed the articles having 0 links and retrieved 39 articles to pursue the analysis.

Figure 5 outlines the results of the bibliographic coupling analysis on VOSviewer for the sample. It registers 39 documents in 4 clusters, with 336 links and 868 total link strength.

Figure 5

Bibliographic Coupling Analysis-intellectual Clusters

Note. Figure 5 portrays intellectual clusters for the money-prospects of cryptocurrencies over the period of our study.

Table 5 gives the description and details of the research clusters for literature published on the money-prospects of cryptocurrencies, identified and outlined through the bibliographic coupling analysis. It also maps research clusters with prominent themes and future research areas.

Cluster 1 - Nature of Cryptocurrencies and their Volatility. Cluster 1 (in red color) discusses the money prospects of cryptocurrencies by identifying the nature of cryptocurrencies and their volatility. It encapsulates (Al-Yahyaee et al., 2018; Baur et al., 2018; Conrad et al., 2018; Corbet et al., 2018; Klein et al., 2018; Pichl & Kaizoji, 2017; Shahzad et al., 2019; Symitsi & Chalvatzis, 2019; White et al., 2020; Yi et al., 2018) as influential studies. In line with the previous findings, most of the above mentioned studies focused on the volatility of cryptocurrencies, bitcoin in particular, and compared it with other asset classes such as gold, stocks, and commodities to draw inferences (Conrad et al., 2018; Corbet et al., 2018; Dyhrberg, 2016; Klein et al., 2018; Mokni & Ajmi, 2021; Pichl & Kaizoji, 2017; Shahzad et al., 2019; Symitsi & Chalvatzis, 2019). Pichl and Kaizoji

(2017) studied the volatility of bitcoin and sustained that bitcoin is volatile and yields 0.328% day-to-day return, averagely. They argued that the *Heterogeneous Autoregressive Model for Realized Volatility* by Andersen et al. (2007) fits well to BTCUSD data. Moreover, they advocated that feed-forward neural networks are capable of making a reasonable prediction of bitcoin logarithmic returns. Further, while forecasting efficiency, Conrad et al. (2018) investigated the relationship of bitcoin volatility with the US stock market and global economic activities and found them closely linked. Yi et al. (2018) revealed that the volatility of cryptocurrencies is connected across the market but bitcoin is not the major contributor. The studies in clusters maintained the safe haven role and the diversification benefit of bitcoin along with gold and commodities (Ehlers & Gauer, 2019; Shahzad et al., 2019; Symitsi & Chalvatzis, 2019). However, the study of Klein et al. (2018) remains an exception which claims that bitcoin could barely be more different from gold and correlates positively with the downward market, thus limiting its role in diversification and as a better safe haven against gold. The rest of the studies focused on determining the nature of bitcoin and concluded that it behaves more likely as a speculative financial asset or a technology-based product, rather than as a currency due to speculation and volatility concerns (Baur et al., 2018; Corbet et al., 2018; White et al., 2020).

It is interesting to note that most of the literature focused on bitcoin' volatility to discuss the money-prospects of cryptocurrencies. Different emerging genres including CBDC, stable coins or other Decentralized finance (defi), and cryptocurrencies' index remain marginally discussed in terms of their volatility to conclude the money prospects of cryptocurrencies. Similarly, more detailed comparisons and analyses with fiats, especially with the most volatile fiat currencies, has received little attention.

Cluster 2 - Governance of Cryptocurrencies and their Price Dynamics. Cluster 2 (in green color) discusses the money prospects of cryptocurrencies in terms of their price dynamics and governance-related issues. The main studies in this cluster include (Blau 2018; Böhme et al. 2015; Bouoiyour & Selmi 2016; Carrick, 2016; Ciaian et al., 2016; de Filippi & Loveluck, 2016; Mai et al., 2018; Polasik et al., 2015; Trimborn

& Härdle, 2018). Most of them were published at the beginning of the mainstream research on bitcoin and cryptocurrencies. The prominent findings of this cluster include the fact that the price of bitcoin is largely dependent on the demand and supply of bitcoin, awareness of the users of bitcoin, and social media sentiments, while macro-factors contribute only passively to price discovery (Ciaian et al., 2016b, 2016a; Mai et al., 2018). However, Polasik et al. (2015) found that the size of the official and unofficial economy is a significant driver of bitcoin's price. Speculative drivers of bitcoin add to its volatility and limit its role as a medium of exchange (Ciaian et al., 2016). Contrastingly, Blau (2018) did not find that speculative trading is causing bitcoin's volatility or crashes. Carrick (2016) revealed that bitcoin has characteristics that enable it to complement emerging market currencies and there are strategies available to control the related risks. Bitcoin follows a self-sustaining and self-governing approach based on social trust sustained through following technical protocols; however, its design and maintenance depend upon a small core of highly technical developers, albeit it being open source (de Filippi & Loveluck, 2016). Böhme et al. (2015) discussed the properties and the design principle to draw out regulatory and governance-related implications, as bitcoin interacts with the existing financial system. A ray of studies also examines price bubbles and price explosiveness in the cryptocurrency market (Agosto & Cafferata, 2020; Gronwald, 2021; Kyriazis et al., 2020; Lambrecht & Larue, 2018; Wei & Dukes, 2021).

In line with our previous findings, most of the influential literature on price dynamics and governance focus bitcoin and emphasizes less on the cryptocurrency market, including altcoins and stable coins. Also, social media sentiments and the digital interest of users and investors reflected through Wikipedia, Google and Twitter can be further explored. The revalidation of price analysis in post-COVID-19 scenario may also have interesting implications. The application of machine learning, artificial intelligence, big data, and natural language processing may be tested for better prediction and price forecasting.

Table 5

Intellectual Aspects - clusters, Themes, and Future Research Areas

Cluster color and tag	Influential references	Major themes	Future research areas
Cluster1 (Red) Money prospects-Nature of cryptocurrencies and their volatility	(Al-Yahyaee et al., 2018; Baur et al., 2018; Conrad et al., 2018; Corbet et al., 2018; Klein et al., 2018; Pichl & Kaizoji, 2017; Shahzad et al., 2019; Symitsi & Chalvatzis, 2019; White et al., 2020; Yi et al., 2018).	Volatility of bitcoin and other cryptocurrencies, connectedness, forecasting, portfolio performance and safe haven properties, nature, and status of bitcoin as a currency or speculative financial asset (money-prospects)	The COVID-19 crisis and its digitalization's effect on the volatility of cryptocurrencies Volatility of cryptocurrencies' index in comparison with other indexes of asset classes Expanding bitcoin's analysis of safe havens, properties, hedge, and portfolio diversification to altcoins and stable coins Modeling volatility behaviors of CBDC Using recurrent neural networks, long and short memory techniques, artificial intelligence, and machine learning for efficiency in forecasting and analyzing volatility
Cluster 2 (Green) Money prospects-governance of cryptocurrencies and their price dynamics	(Blau, 2018; Böhme et al., 2015; Bouoiyour & Selmi, 2016; Carrick, 2016; Ciaian et al., 2016b, 2016a; de Filippi & Loveluck, 2016; Mai et al., 2018; Polasik et al., 2015; Trimborn & Härdle, 2018).	Governance of cryptocurrencies, determinants of price dynamics, adoption and awareness factors in relation to the money-prospects	Expanding price discovery analysis to altcoins and stable coins Exploring social media sentiments and the data for price determinants of major cryptocurrencies Using machine learning and natural language processing in price prediction and determination Modelling a comprehensive and efficient model of price determination that may fit major cryptocurrencies Revalidation of price dynamics in post-COVID-19 scenario

Cluster color and tag	Influential references	Major themes	Future research areas
Cluster 3 (Blue) Money prospects-social, ethical, and legal aspects of cryptocurrencies	(Bryans, 2014; Cheah & Fry, 2015; Dierksmeier & Seele, 2018; Kiviat, 2015; Tu & Meredith, 2015; Vandezande, 2017; Weber, 2015).	Fundamental value of bitcoin, anti-money laundering, regulating bitcoin and cryptocurrencies, business ethics, stance of Islamic instruction *(Shari'ah)* in relation to the money-prospects	Standardizing the money recognition criteria in the *Shari'ah* and applying it to cryptocurrencies to validate their *Shari'ah* compliance Antisocial and prosocial effects of cryptocurrencies Regulatory disruption of cryptocurrencies and need assessment of new legislation across regions and jurisdictions
Cluster 4 (Yellow) Money-prospects-miscellaneous debates	(Ammous, 2018; Dwyer, 2015; Hendrickson et al., 2016; Hendrickson & Luther, 2017; Luther, 2016).	Economics of bitcoin, cryptocurrencies and functions of money, network effects, switching cost, banning	Linking functions of money with the ontology and philosophy of money evolution to handle the money-prospects of cryptocurrencies

Cluster 3 - Social, Ethical, and Legal Aspects of Cryptocurrencies. Cluster 3 (in blue color) portrays the money prospects of cryptocurrencies discussed in terms of their legal, social, and ethical aspects. The most influential studies were (Bryans, 2014; Cheah & Fry, 2015; Dierksmeier & Seele, 2018; Kiviat, 2015; Tu & Meredith, 2015; Vandezande, 2017; Weber, 2015). Some authors incorporated an emerging debate on the issues and challenges faced in bringing bitcoin and other cryptocurrencies under anti-money laundering regimes by analyzing whether the existing legislation of e-money and payment services is sufficient for regulating cryptocurrencies (Bryans, 2014; Vandezande, 2017). Contrary to this approach, Tu and Meredith (2015) proposed that the existing legal framework for payment systems is insufficient and weak for innovative cryptocurrencies. They emphasized the need to involve stakeholders, develop a more global perspective, and the need to rethink policy objectives for cryptocurrenciesMoreover, Kiviat (2015) drew the focus of researchers beyond bitcoin and toward blockchain as the main infrastructure for cryptocurrencies in order to realize a more efficient digital asset transfer. He also documented preliminary advancement in blockchain technology for lawmakers. The literature on the ethical dimensions of cryptocurrencies as

payment alternates or transactional systems is evolving. Dierksmeier and Seele (2018) highlighted the effect of blockchain on the nature of payment systems in an ethical perspective at micro, meso and macro levels of business and society, in order to determine the benefits/detriments of their implications. Similarly, Weber (2015) assessed the potential of bitcoin and its features in bridging the trust deficit caused by the legitimacy crisis of money after the financial turmoil of 2008. Cheah and Fry (2015) contended that the economic value of bitcoin is zero because of irrational bubbles prevalent in the market. No economic value diminishes the ethical leverage of bitcoin. Literature does not give a holistic view of social and antisocial aspects of cryptocurrencies and blockchain technology, neglecting privacy, dark web transactions, consumer rights, conflict resolution, and inflationary (deflationary) effects, among others.

In our sample, some very recent studies debate the money-prospects of cryptocurrencies in terms of Islamic law (*fiqh*) and Islamic instruction (*fatwa*). Baker and Semai (2020) advocate that cryptocurrency holds currency value (*thamniyat*) only if it is customarily accepted, legally validated, and demonstrates reasonable stability in value over time. Selcuk and Kaya (2021) discuss the legitimacy of cryptocurrencies in light of Islamic law and present the various features of Islamic cryptocurrencies. Mostly, cryptocurrencies have been declared impermissible in the Islamic perspective for not being state-backed, being excessively volatile, for having no intrinsic value, less acceptability, and for being used largely in speculation and criminal activities (Assaf, 2019; Kirchner, 2021; Siswantoro et al., 2020). However, Kirchner (2021) shows the *Shari'ah* compliance of leading cryptocurrencies in light of the Islamic precepts of wealth, trade, and currencies by responding to the concerns of Muslim jurists about their speculation, volatility, and lacking an intrinsic value. An ample gap exists to develop an acceptable criterion to recognize the currency value of anything through a rigorous analysis of Islamic law and jurisprudence.

Cluster 4 - Miscellaneous Debates. Cluster 4 (in yellow color) outlines the miscellaneous debates on the money-prospects of cryptocurrencies. Influential studies include (Ammous, 2018; Dwyer, 2015; Hendrickson et al., 2016; Hendrickson & Luther, 2017; Luther, 2016). Ammous, (2018),

Dwyer, (2015) and Luther, (2016) discussed the money-prospects of cryptocurrencies. Luther (2016) argued that in the absence of government support and value stability, bitcoin cannot become the mainstream currency because of network externalities and switching costs. Ammous (2018) and Dwyer (2015) maintained that almost all cryptocurrencies work as a medium of exchange; however, only bitcoin has strict protocols that ensured low supply to enable its role as a store of value. Further, because of fluctuating demand and inflexible prices, cryptocurrencies are too unstable to be used as a unit of account. Dwyer (2015) further argued in favor of bitcoin by stating that the lowest average monthly volatilities are lesser than the highest average monthly volatilities of gold and other currencies. He also contended that bitcoin technology and its inelastic supply create an equilibrium in which bitcoin gains a positive value. Hendrickson et al., (2016) and Hendrickson & Luther, (2017) discussed the banning effects and why and when a state should intervene to impose a ban on cryptocurrencies.

The link between the function of money and the ontology of money is missing, while the literature discusses the money prospects of cryptocurrencies. Being evolving and innovative, it is imperative to link cryptocurrencies to the philosophy and evolution of money to understand what enables anything to act as a medium of exchange. Only one study in our sample marginally attempted to explicate this missing link (Smit et al., 2016).

Future Research Areas

Table 5 records some important future research areas, cluster wise. These research areas are presented following the analysis of the literature on the money-prospects of cryptocurrencies. The major gap in empirical studies that relates the analysis with the money-prospects of cryptocurrencies is the coverage of cryptocurrency market. Research on volatility, price dynamics, safe haven, efficiency, bubbles, spillovers, hedge, and portfolio diversification largely stages bitcoin and marginally covers the rest of the genres in the crypto-market, such as altcoins and stable coins. There is a need to validate and expand the analysis about the growing genres of cryptocurrencies. Another potential area is methodological advancement, where machine learning, big data, artificial intelligence, and natural language processing may be utilized to increase the prediction

accuracy of the prices and returns of cryptocurrencies. Further, as digitalization and economic turmoil cast a significant effect on the retail adoption of cryptocurrencies, it would be interesting to revalidate prices and volatility dynamics in the post-COVID-19 scenario. Literature also highlights that "recurrent neural networks" and the "long and short term memory" (LSTM) technique may be tested for making better volatility predictions. Similarly, comparisons of the leading index of cryptocurrencies with that of other asset classes may yield interesting inferences.

Cryptocurrencies are recognized as a financial asset, private money, property, or legal tender in many jurisdictions. Detailed deliberations can be invoked to understand whether they can be regulated under the existing legal framework. Moreover, discrepancies and challenges in this regard can be explored across regions and the need for new (re)regulations may be examined. Islamic legal perspective on cryptocurrencies is also evolving. Hence, there is an immense need to establish an acceptable standardized criterion to recognize the currency value in light of modern and classical legal discourse and to apply it to decide their permissibility and potential characteristics. Prosocial and antisocial effects of cryptocurrencies may also be examined. There is an ample need to link the functions of money to its ontology and evolution in order to understand what enables anything to work as a medium of exchange, and that understanding may be extrapolated to the advent of cryptocurrencies.

Conclusion and Limitations

This study conducted a bibliometric review of cryptocurrencies for their money-prospects using 264 carefully selected articles published from 2011 to 2021, systematically filtered from WoS. Bibliometric citation analysis was conducted to showcase the influential aspects of literature. In terms of the number of articles published, the study found 2019, business finance, USA, *Research in International Business and Finance*, William J. Luther and Cheah and Fry, (2015) as the leading and influential year, research category, country, journal, author, and article, respectively. The results showed that research interest in the money-prospects of cryptocurrencies has been growing invariably over the sample period and is expected to sustain. Further pursuing intellectual aspects, keyword analysis was run that showed "bitcoin", "cryptocurrencies", "virtual currencies", "medium of

exchange", "blockchain", "volatility" and "efficiency" as the most occurring keywords having sustained popularity over time. Furthermore, the current study executed bibliographic coupling analysis and highlighted 4 clusters of articles discussing money-prospects, each given a specific color. These clusters included the nature of cryptocurrencies and volatility (red), governance and price dynamics (green), social, ethical, and legal aspects (blue), and miscellaneous debates (yellow). Content analysis was performed on the clusters and the themes identified through bibliographic coupling analysis were used to shed light on the intellectual aspects of sample literature. Lastly, future research areas were identified.

As the current study ranked the results based on citations and scientific production, some important theoretical and intellectual contributions might have been overlooked due to low scores on filters and criteria. Moreover, the study intended to highlight the Islamic perspective on the money-prospects of cryptocurrencies, which is inherently capped as the number of relevant articles addressing the Islamic perspective is very low. However, we incorporated such articles in cluster 3.

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