CBDCs: A Comprehensive SLR on Worldwide Research Emergence and Methods Used

Paper for ANU Islamic Finance Conference, Canberra, Australia, 30 November 2023.

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Abstract

This study conducts a comprehensive systematic literature review (SLR) on Central Bank Digital Currencies (CBDCs) in response to the escalating global demand for digital payments. As CBDCs become increasingly prominent, there is a crucial need to examine the worldwide research landscape, research methodologies employed, and the data utilized in CBDC research studies. Using the Scopus database, a total of 323 articles were initially identified using the keywords "Central Bank Digital Currency" OR "CBDC" in the title. Following a meticulous manual screening process, 169 articles were finalized for inclusion. To assess global research emergence, the study employed R, Biblioshiny, and Excel within the SLR framework. To delve into the research methods and data employed in the literature, the selected studies were categorized into quantitative, qualitative, and mixed-methods approaches. Despite the limitations, this systematic and transparent approach establishes a foundational basis for synthesizing insights into CBDC research trends. By categorizing studies based on their research approaches, this study provides a panoramic view of the CBDC research landscape. The findings contribute valuable insights for researchers, policymakers, and stakeholders, serving as a resource for understanding the dynamics of CBDC research.

Keywords: Central Bank Digital Currency (CBDC), Digital Payments, Systematic Literature Review (SLR), Research Methods, Global Research Trends.

Introduction

Central Bank Digital Currencies (CBDCs) are digital versions of fiat currencies that are issued and backed by central banks. CBDCs have gained importance in recent years due to the growing demand for digital payments, the emergence of private digital currencies, and the need to modernize the payment systems (Alonso-Robisco & Carbó, 2023). Several central banks around the world are currently exploring the possibility of issuing CBDCs, with some already in the advanced stages of development. For example, the People's Bank of China has been testing its digital yuan in several pilot programs, while the European Central Bank has launched a public consultation on the possible issuance of a digital euro. The Bank of Japan, the Bank of England, and the Federal Reserve are also actively researching and experimenting with CBDCs (Maruo & Sugino, 2023a). Chiu et al. (2023a) suggested that CBDCs have the potential to improve the efficiency of the banking sector and promote financial inclusion. Chiu et al. (2023a) also noted that the implementation of CBDCs raises important policy questions related to monetary policy, financial stability, and privacy. Therefore, further research and careful consideration are needed to fully understand the potential benefits and risks of CBDCs and their role in the world economy.

Despite the emergence of CBDCs and growing number of studies on CBDCs, there is still a high demand for knowledge on this topic. A systematic literature review is necessary to identify major research patterns being used for the explorations of this field to understand the developments of research dimentions. Only few studies are found that explored the research emergence in this field such as (Hoang et al., 2023a, 2023b; Themistocleous et al., 2023).

This study mainly focuses on the world wide research trends, emerging sources, countries and authors using R, Biblioshiny, and Excel along with an in depth manual exploration of research methods used in CBDC literature. In this study, using Scopus database, 169 articles were finalized after comprehensive screening process as shown in figure 1. The study categorized the literature based on research approaches, revealing 78 quantitative, 73 qualitative, and 18 mixed-methods studies. This methodological overview ensures a comprehensive exploration of the CBDC landscape, setting the stage for a subsequent analysis and synthesis of findings. By synthesizing the existing body of knowledge, this study seeks to inform policymakers, researchers, and stakeholders about the evolving research patters and methods used in CBDC research.

The study began with a thorough introduction, providing context and background on the subject. Subsequently, an analysis of previous studies was conducted to identify existing gaps and areas for further exploration. The process of data selection and screening was meticulously carried out, ensuring the inclusion of relevant studies. The chosen method, guided by systematic principles, allowed for a structured and objective evaluation of the selected literature. The results obtained from this SLR provide valuable insights into the current state of CBDC research, highlighting research trends, methods and potential future developments. The study concludes by summarizing key takeaways and discussing implications for researchers, policymakers and practitioners in the evolving landscape of CBDCs.

Previous Studies

Few studies were found systematically delving into the literature on CBDCs and their implications, offering insights into various facets. These studies, conducted between 2013 and 2022, used bibliometric citation analysis, text mining, systematic review, and content analysis.

A recent study by Alrawashdeh (2023) offered a comprehensive review spanning from 2013 to 2022, analyzing 293 documents from scientific journals indexed by the Scopus database. Employing a bibliometric citation analysis approach with tools such as RStudio, VOSviewer, and Excel, the authors focused on the intellectual structure and key influences in the literature on CBDCs and monetary policy. The study identified the Journal of PAYMENTS STRATEGY AND SYSTEMS as the most cited source. However, the authors underscored the rarity of research in this domain and positioned their work as a guide for future endeavors. Hoang et al. (2023a) applied a combination of text mining and systematic review methods to assess 191 academic papers on CBDCs. The study identified seven primary research themes, including the central bank, CBDC design and technologies, and CBDC's impact on monetary policy and financial stability. By employing these methods, the authors aimed to address knowledge gaps and suggest future directions for research. This work contributed to the understanding of the current state of research in digital fiat currency topics.

Bhaskar et al. (2022a) used bibliometric and content analysis of 174 documents retrieved from Scopus to explore publication trends in CBDCs since 2018. This study not only highlighted influential studies but also outlined important themes, intellectual structures, and recent research trends. The authors emphasized the need for theoretical development, contextual coverage, and methodology contributions in understanding the structural implications of CBDCs. The study conducted by Elsayed and Nasir (2022a) underlined the limited

understanding of CBDCs and the urgency of further research. It advocated for exploration beyond the economic rationale of CBDCs to encompass their impact on monetary policy transmission, financial and price stability, and ethical considerations. The impending implementation of CBDCs accentuated the necessity of addressing unsettled questions, including issues related to ethics, privacy, and environmental and technological constraints.

While acknowledging the valuable contributions of these previous studies, this SLR stood out in several aspects. Firstly, its inclusive and rigorous screening process, coupled with the incorporation of diverse document types, ensured a comprehensive overview of the literature landscape on CBDCs. Additionally, this analysis extended beyond traditional bibliometric methods, incorporating a wide array of analytical tools and approaches to offer a nuanced understanding of CBDCs' multifaceted dimensions. Moreover, by presenting a holistic view of production analysis, relevant sources, affiliations, impact, and global reach, this study served as a valuable resource for scholars, practitioners, and policymakers engaging with the evolving landscape of Central Bank Digital Currencies.

Data Selection and Screening

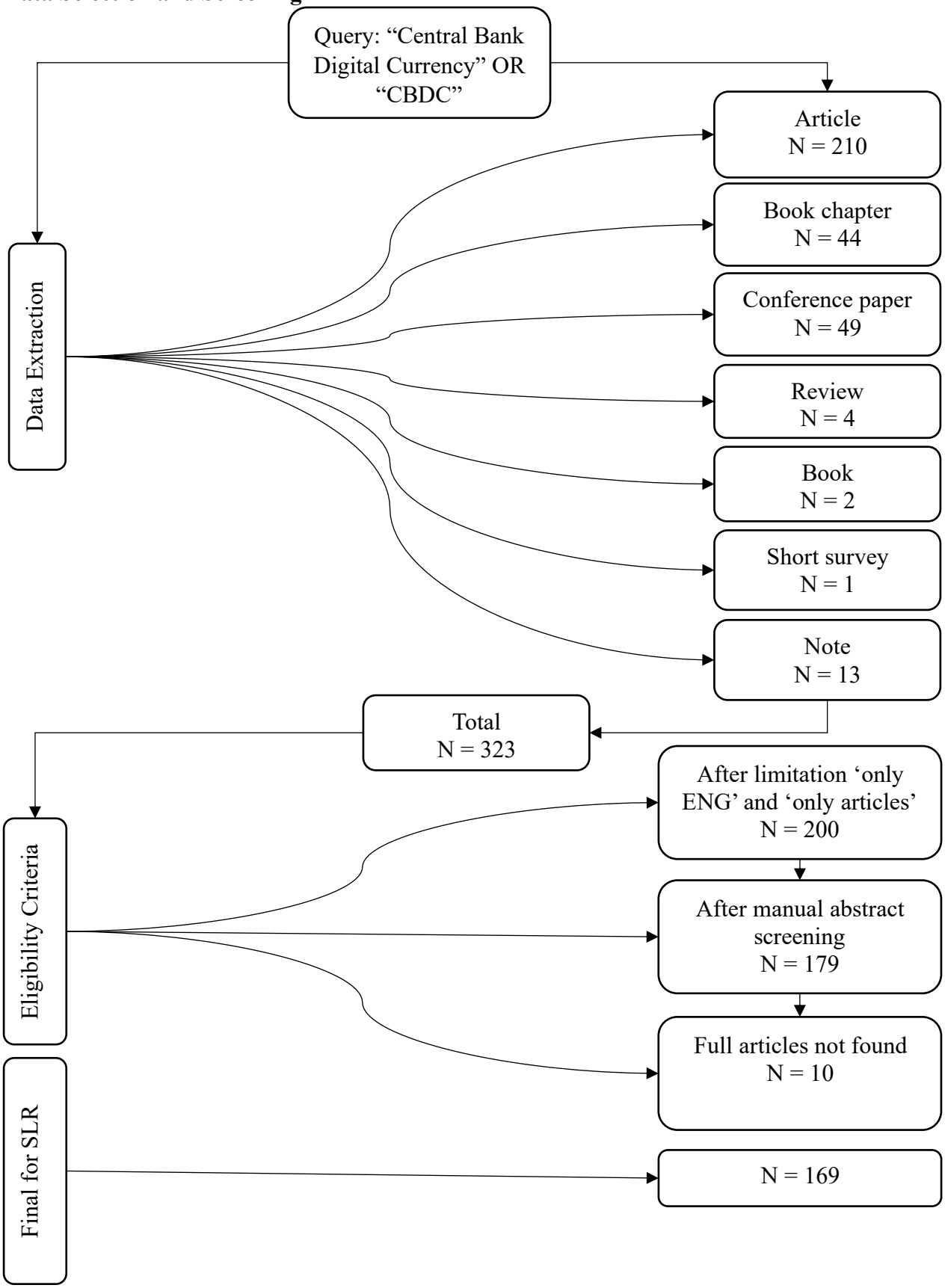

Figure 1: Data Selection

Figure 1 illustrates the process of data extraction and screening related to the query “Central Bank Digital Currency” or “CBDC” using the Scopus database. The initial data extraction resulted in a total of 323 items, including articles, book chapters, conference papers, reviews, books, short surveys, and notes. After applying eligibility criteria, limiting the selection to English articles and excluding non-articles, the number reduced to 200. Further screening through manual abstract review left 179 articles. Subsequently, 10 full articles were not found, resulting in a final set of 169 articles for this SLR.

Method

In this study, the search strategy employed involved the use of keywords “Central Bank Digital Currency” OR “CBDC” in the Scopus database. This database was chosen as the primary source for its comprehensive coverage of the articles.

The search process yielded an initial pool of 323 items, including a variety of document types such as articles, book chapters, conference papers, reviews, books, short surveys, and notes. To refine the selection, inclusion and exclusion criteria were applied, narrowing down the set to 200 English articles. This decision to limit the review to English articles was accompanied by the exclusion of non-article document types. A manual abstract review further screened the articles, resulting in a final set of 179 articles. Moreover, during the subsequent full-text retrieval stage, 10 articles were not found, leaving a final corpus of 169 articles for the SLR. This stepwise screening process, as illustrated in Figure 1, ensured a rigorous selection based on predetermined criteria, enhancing the reliability and relevance of the final set.

The decision to focus on English articles aimed to maintain linguistic consistency and accessibility, aligning with the common language of scholarly communication. Additionally, the use of manual abstract review added a qualitative dimension to the screening process, allowing for an evaluation of the articles' relevance to the CBDC theme. The identified 169 articles constituted the foundation for the subsequent phases of the SLR. The software used for the analysis included R, Biblioshiny, and Excel, providing a robust framework for organizing and analyzing the data. Several studies also have been used these softwares such as (Alrawashdeh, 2023; Bhaskar et al., 2022a, 2022b).

In acknowledgment of potential limitations, it is crucial to note the absence of 10 full articles during the retrieval process. The impact of these missing articles on the overall findings and analysis should be considered. The methodology, thus far, has established a systematic and

transparent approach to the literature review, providing a solid foundation for the subsequent synthesis and analysis of findings. Additionally, within the selected 169 articles, a subset was identified based on the research approaches employed. Among these, 78 studies adopted a quantitative approach, utilizing statistical methods to analyze data related to CBDC. Another subset of 78 studies employed a qualitative approach, focusing on in-depth exploration and interpretation of CBDC-related phenomena. Furthermore, 73 studies used a mixed-methods approach, combining both quantitative and qualitative methods for a comprehensive understanding of CBDC dynamics.

These categorizations provide a view of the research landscape, highlighting the diversity of methodologies employed in the existing literature on CBDC. The inclusion of studies using quantitative, qualitative, and mixed-method approaches added depth and breadth to the SLR, allowing for a more comprehensive analysis.

Results and Discussion

Table 1: Main Information

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2019:2023
Sources (Journals, Books, etc)	93
Documents	169
Annual Growth Rate %	100.62
Document Average Age	0.852
Average citations per doc	8.669
References	7359
DOCUMENT CONTENTS	
Keywords Plus (ID)	201
Author’s Keywords	416
AUTHORS	
Authors	415
Authors of single-authored docs	43
AUTHORS COLLABORATION	
Single-authored docs	46
Co-Authors per Doc	2.67
International co-authorships %	23.08
DOCUMENT TYPES	
article	169

The dataset used in the research study, drawing from a diverse array of sources, including 93 journals, books, and related references, resulting in a total of 169 documents. Notably, the

dataset exhibited a substantial annual growth rate of 100.62%, underscoring the dynamic and expanding nature of the literature within the specified timeframe. Within the document contents, a detailed examination revealed 201 Keywords Plus (ID) and 416 Author's Keywords. The collaborative nature of the research was evident, involving the contributions of 415 authors. Of particular note was that 43 authors had produced single-authored documents, reflecting individual scholarly contributions. Collaboration among authors was further explored, with 46 single-authored documents and an average of 2.67 co-authors per document, indicative of a cooperative research environment. A noteworthy 23.08% of these collaborations extended beyond national boundaries, demonstrating an international dimension to the research endeavors. Document types within the dataset primarily consisted of articles, totaling 169. The analysis of document age revealed an average of 0.852, indicating the relatively recent nature of the included literature. Furthermore, the influence of the research was underscored by an average of 8.669 citations per document. The references section of the dataset was expansive, incorporating 7359 citations, emphasizing the extensive scholarly landscape covered in this research paper.

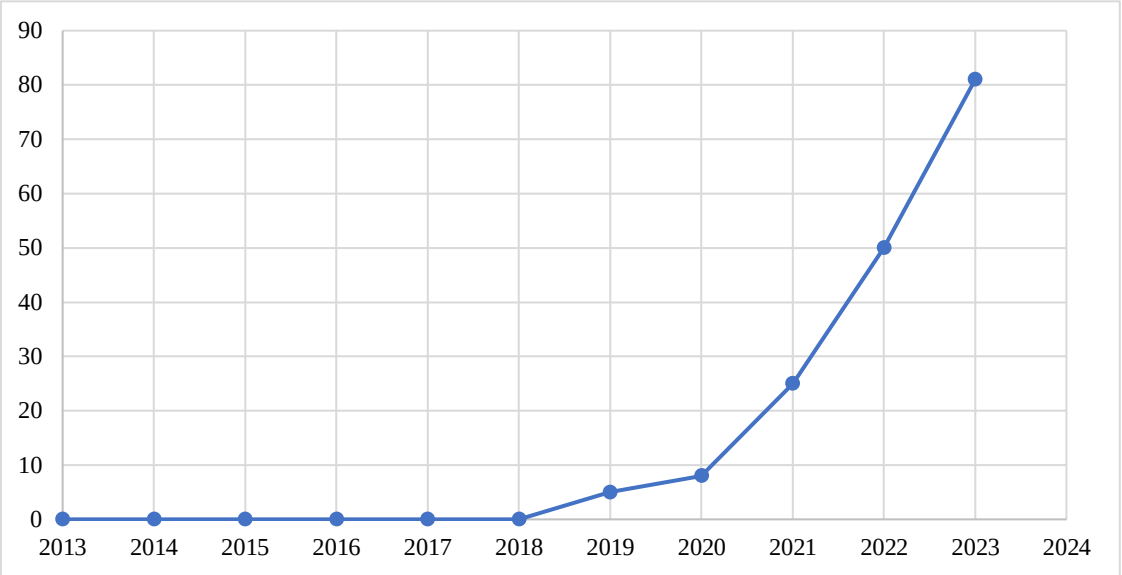

Figure 2: Per year production analysis.

Figure 2 presents an overview of the annual production of studies. The figure showcases the evolution of research output over this period. Notably, the figure reveals a discernible surge in scholarly interest in CBDC, with the number of studies gradually increasing from 2019 onwards. In 2019, there were 5 studies, followed by 8 in 2020, and a substantial growth in 2021 with 25 studies. The upward trajectory continues in 2022, reaching 50 studies, and peaks in 2023 with a notable 81 studies. This progression underscores the growing significance of

CBDC within the academic landscape, reflecting a heightened focus and exploration of this subject in recent years.

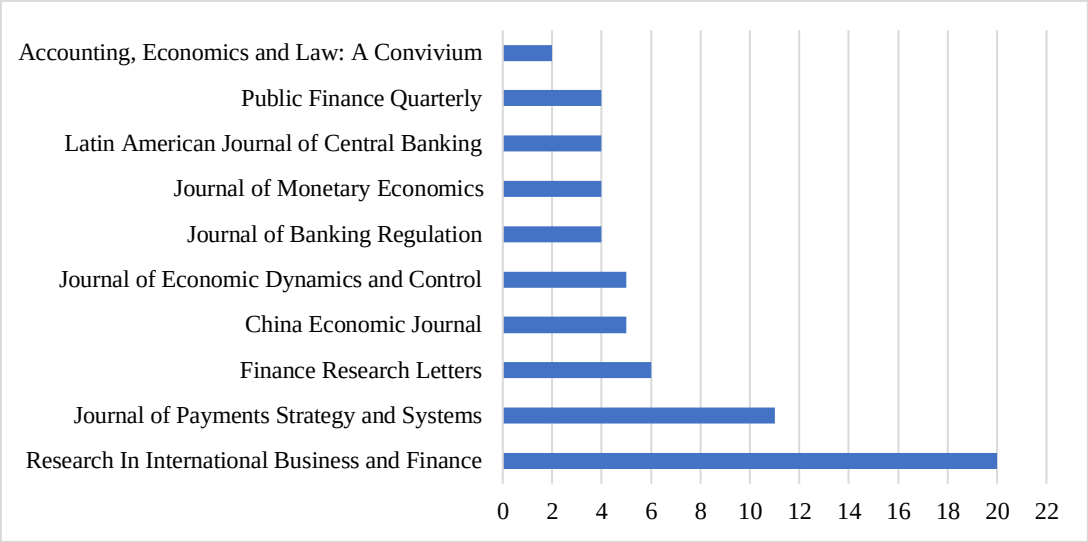

Figure 3: Most revelent Sources.

Figure 3 presents a snapshot of the most relevant sources, showcasing the distribution of studies across various journals. Especially, the "Journal of Payments Strategy and Systems" emerges as a central hub with 11 studies, while "Research in International Business and Finance" stands out with a substantial contribution of 20 studies. Other journals, including "Finance Research Letters," "Journal of Economic Dynamics and Control," and "China Economic Journal," also play significant roles, hosting 6, 5, and 5 studies, respectively. This figure provides valuable insights into the key academic journals influencing the discourse on CBDC.

Table 2: Most Relevent Affiliations.

Affiliation	Publication
Seoul National University	10
Ningbo University	8
Notreported	8
Vnu University of Economics and Business	7
Bina Nusantara University	4
Deutsche Bank	4
Financial University Under the Government of the Russian Federation	4
Information Engineering University	4
Shandong University of Science and Technology	4
Sungkyunkwan University	4

Table 2 outlines the most relevant affiliations quantifying their contributions. Seoul National University leads with 10 publications, followed by Ningbo University and Notreported, each with 8 articles. Other noteworthy contributors include VNU University of Economics and

Business, Bina Nusantara University, Deutsche Bank, Financial University Under the Government of the Russian Federation, Information Engineering University, Shandong University of Science and Technology, and Sungkyunkwan University, each affiliated with 4 articles. This table offers a succinct overview of key institutions actively involved in CBDC literature.

Table 3: Source Impact

Element	H_index	G_index	M_index	TC	NP	PY_start
Research In International Business and Finance	8	11	4	156	20	2022
China Economic Journal	5	5	1	124	5	2019
Finance Research Letters	3	6	1	77	6	2021
Journal of Banking Regulation	3	4	0.75	37	4	2020
Journal of Economic Dynamics and Control	3	5	1.5	116	5	2022
Journal of Monetary Economics	3	4	1.5	90	4	2022
Latin American Journal of Central Banking	3	4	1	30	4	2021
Buletin Ekonomi Moneter Dan Perbankan	2	2	0.5	11	2	2020
Digital Policy, Regulation and Governance	2	2	2	13	2	2023
Economic Inquiry	2	2	1	12	2	2022

Table 4: Most Global Documents.

Paper	Total Citations	TC per Year	Normalized TC
Assessing the Impact of Central Bank Digital Currency on Private Banks	69	23.00	3.77
Central bank digital currency: Central banking for all?	59	19.67	3.22
How does the fintech sector react to signals from central bank digital currencies?	59	29.50	4.55
Designing central bank digital currencies	54	27.00	4.17
Fintech, Cryptocurrencies, and CBDC: Financial Structural Transformation in China	52	26.00	4.01
Central bank digital currency and monetary policy	51	25.50	3.94
The macroeconomics of central bank digital currencies	49	24.50	3.78
The Effects of Central Bank Digital Currencies News on Financial Markets	45	22.50	3.47
A Global Perspective on Central Bank Digital Currency	39	13.00	2.13
Blockchain and central bank digital currency	36	18.00	2.78

Table 3 presents the impact metrics for the top ten sources. The table includes the H-index, G-index, M-index, total citations (TC), number of publications (NP), and the publication year (PY_start) for each source. “Research in International Business and Finance” leads with an H-index of 8, G-index of 11, M-index of 4, 156 total citations, 20 publications, and a starting publication year of 2022. Other notable sources include “China Economic Journal,” “Finance Research Letters,” “Journal of Banking Regulation,” “Journal of Economic Dynamics and Control,” “Journal of Monetary Economics,” and “Latin American Journal of Central Banking.” This table provides a comprehensive overview of the scholarly impact of these sources in the field of CBDC research.

An overview of the most globally impactful studies, based on total citations is provided in table 4. “Assessing the Impact of Central Bank Digital Currency on Private Banks” leads with 69 total citations, averaging 23.00 citations per year and a normalized total citation score of 3.77. Other influential papers include “Central bank digital currency: Central banking for all?” with 59 total citations, “How does the fintech sector react to signals from central bank digital currencies?” with 59 total citations, “Designing central bank digital currencies” with 54 total citations, and “Fintech, Cryptocurrencies, and CBDC: Financial Structural Transformation in China” with 52 total citations. These documents offer significant insights and have garnered substantial attention within the CBDC research landscape.

Table 5: Authors' Impact

Element	H_index	G_index	M_index	TC	NP	PY_Start
Lucey Bm	3	3	1.5	57	3	2022
Ozili Pk	3	3	1.5	20	3	2022
Wang Y	3	4	1	93	4	2021
Alonso Sln	2	2	0.5	51	2	2020
Arauz A	2	2	0.667	21	2	2021
Davoodalhosseini Sm	2	2	1	56	2	2022
Forradellas Rfr	2	2	0.5	51	2	2020
Guesmi K	2	2	1	11	2	2022
Han H	2	2	1	19	2	2022
Huang Z	2	3	1	95	3	2022

Impact metrics for top ten authors contributing to the literature are presented in table 5. The table includes the H-index, G-index, M-index, total citations (TC), number of publications (NP), and the starting publication year (PY_Start) for each author. Notable authors include Lucey Bm, Ozili Pk, and Wang Y, each with an H-index of 3 and G-index of 3, demonstrating a significant impact in the field. Wang Y stands out with 93 total citations and 4 publications starting from 2021. Other impactful authors include Alonso Sln, Arauz A, Davoodalhosseini Sm, Forradellas Rfr, Guesmi K, Han H, and Huang Z, each contributing substantially to CBDC research. This table provides valuable insights into the scholarly impact of individual authors in the CBDC literature.

Table 6: Authors' Productions Over Time.

Author	Freq	TC	TC PY	Year
Davoodalhosseini Sm	1	51	25.5	2022
Alonso Sln	1	32	10.667	2021
Forradellas Rfr	1	32	10.667	2021
Arauz A	2	21	7	2021
Alonso Sln	1	19	4.75	2020
Forradellas Rfr	1	19	4.75	2020
Davoodalhosseini Sm	1	5	5	2023
Buckley Rp	1	2	2	2023
Fujiki H	2	1	1	2023
FUJIKI H	2	1	1	2023
Buckley Rp	1	1	0.5	2022

As shown in table 6, the production of literature by individual authors over time is presented. The table includes the author's name, frequency of publications (Freq), total citations (TC),

citations per year (TC PY), and the publication year (Year). Davoodalhosseini Sm stands out in 2022 with one publication accumulating 51 total citations at a rate of 25.5 citations per year. Alonso Sln and Forradellas Rfr both contributed one publication in 2021, each with 32 total citations and an average of 10.667 citations per year. Arauz A has two publications in 2021 with a total of 21 citations and an average of 7 citations per year. Additionally, Fujiki H and Buckley Rp have made contributions in 2023, each with two publications, while Buckley Rp also had one publication in 2022. This table provides a comprehensive overview of the productivity and impact of individual authors in the CBDC literature over the years.

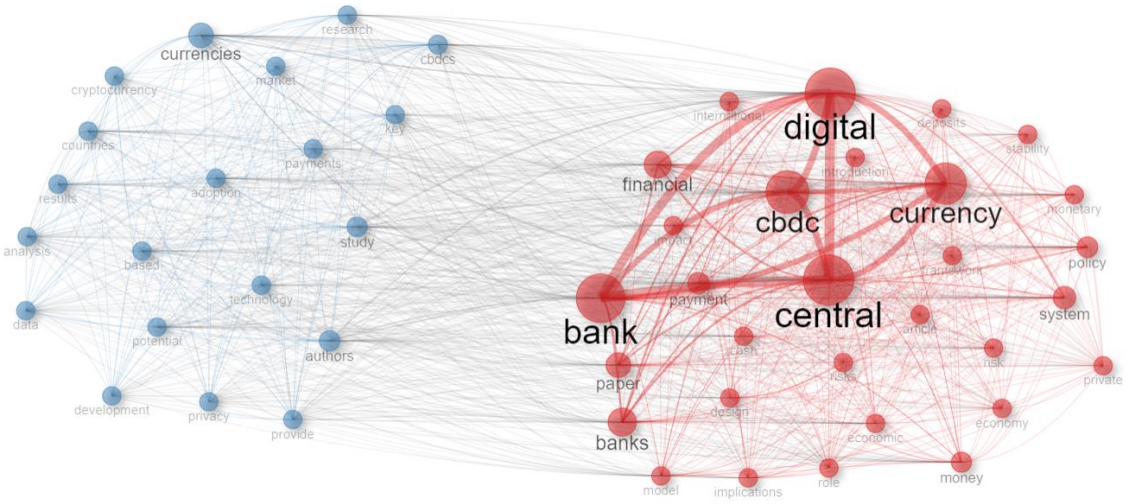

Figure 4: Co-occurrence Network of Abstracts.

Figure 4 depicts a co-occurrence network of abstracts related to Central Bank Digital Currency (CBDC). The red-colored nodes represent central themes such as “cbdc,” “currency,” “bank,” “digital,” “payment,” “money,” and “stability.” The blue-colored nodes highlight associated concepts such as “cbdc market,” “data technology,” “authors,” “adoption,” “economic policy,” and “potential.” The connections between nodes illustrate the co-occurrence patterns of these terms within the abstracts, providing a visual representation of the interrelated concepts and topics in CBDC research. The figure offers a comprehensive view of the key themes and their associations within literature.

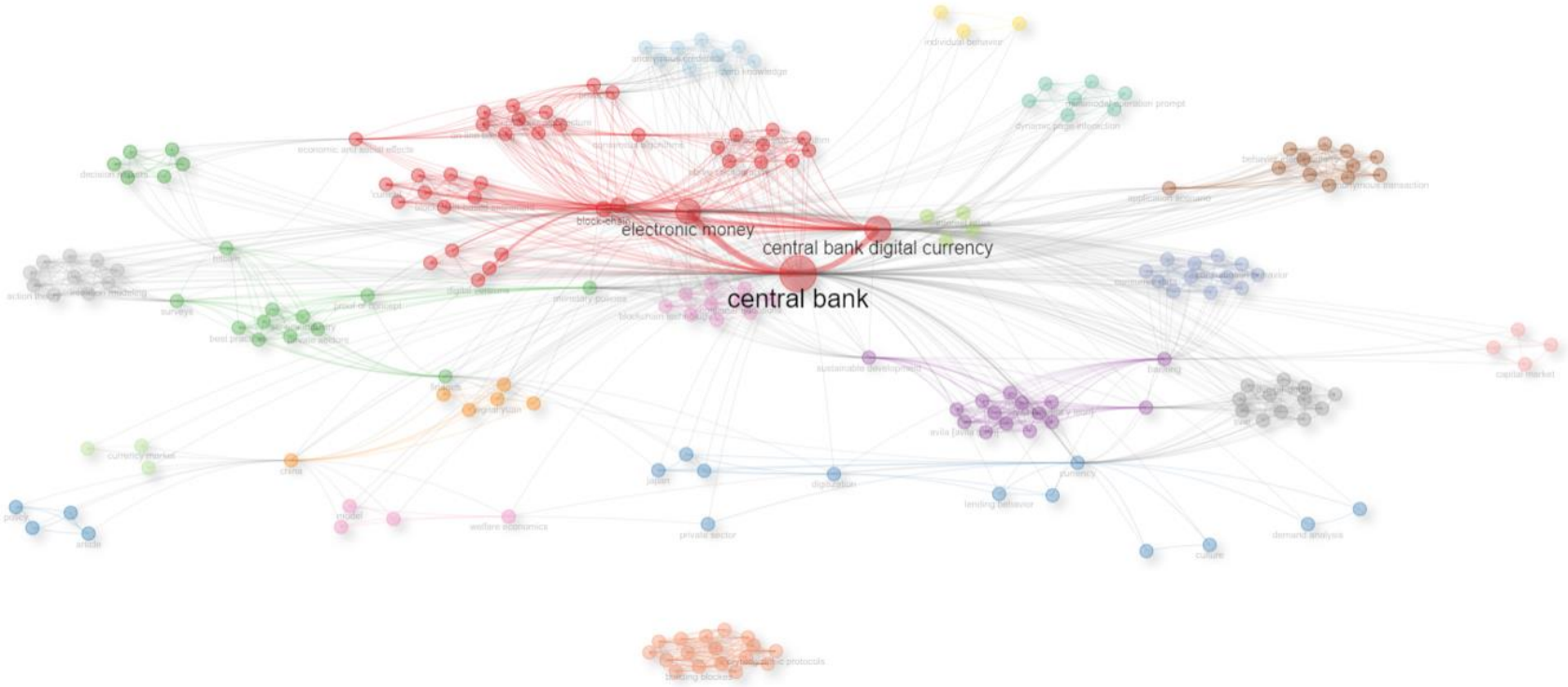

Figure 5: Thematic Map of Keywords' Plus.

Figure 5 illustrates a detailed thematic map of keywords' prominence within the landscape of CBDC research. The red-colored nodes emphasize pivotal terms that have emerged as central themes, including "Central bank," reflecting the overarching institutional context; "Central bank digital currency," highlighting the specific focus on digital forms of national currency issued by central banks; "electronic money," underscoring the broader digitalization of financial transactions; "blockchain," indicating the technological foundation often associated with CBDC implementations; and "economic and social effects," underscoring the comprehensive exploration of the broader impact of CBDC on both economic and societal dimensions. The nodes in red denote the high emergence and significance of these key terms, underscoring their critical roles in shaping the discourse on CBDC. This figure serves as a valuable tool for researchers and readers seeking to comprehend the complex web of ideas and their relationships within the CBDC.

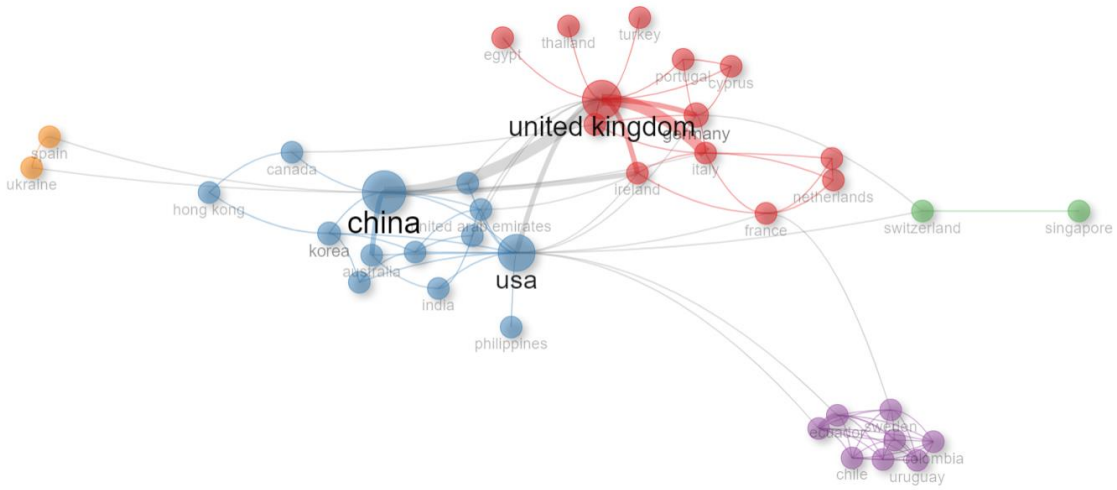

Figure 6: Collaboration Network of Countries.

A collaboration network among countries is shown in figure 6. The countries are categorized by different colors to represent distinct collaborative clusters. In the red cluster, collaborative efforts involve the United Kingdom, Germany, Italy, Ireland, Netherlands, France, Cyprus, Portugal, and Turkey. The blue cluster signifies collaboration between China, the USA, Korea, Australia, India, Canada, Hong Kong, and the Philippines. The yellow cluster involves Spain, Ukraine, Singapore, Uruguay, and Colombia. The green cluster denotes collaborative ties between Switzerland, Sweden, and Chile, while the purple cluster includes Ecuador and Egypt. This color-coded visualization offers a clear representation of international collaboration patterns, showing the connected and global nature of CBDC research efforts.

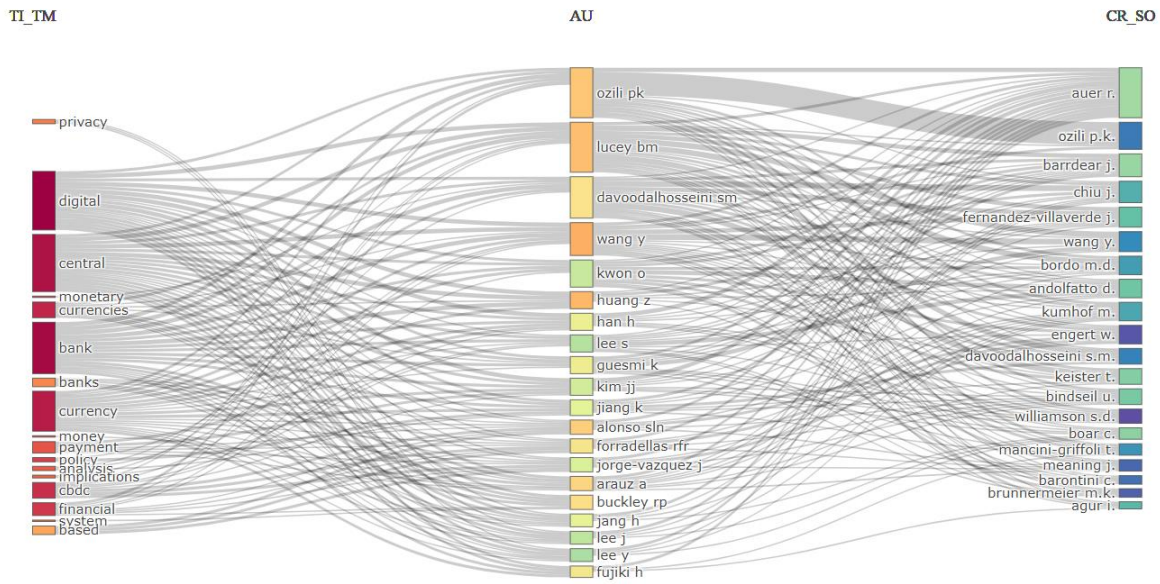

Figure 7: Three Degree Plot.

Figure 7 displays a Three-Degree Plot, representing the associations between terms (TI_TM), authors (AU), and cited references and sources (CR_SO). On the left side of the plot, key terms such as “privacy,” “digital,” “central,” “monetary,” “currencies,” “bank,” “banks,” and more are highlighted. These terms represent crucial concepts within the CBDC literature, forming the thematic foundation of the research. In the middle column, corresponding authors are identified, including Ozili Pk, Lucey Bm, Davoodalhosseini Sm, Wang Y, Kwon O, Huang Z, Han H, among others. This section provides insights into the individuals driving research in the CBDC field and their associated themes. On the right side, cited references and sources are listed, featuring influential works by authors such as Auer R, Ozili P.K., Barrdear J., Chiu J., Fernandez-Villaverde J., Wang Y., Bordo M.D., and more. These cited references contribute to the foundational knowledge base and have been influential. This Three-Degree Plot serves as a comprehensive visualization, offering a understanding of the relationships between terms, authors, and cited references.

Figure 8: Word Cloud Map of Keywords' Plus.

Figure 8 represents a Word Cloud Map of Keywords' Plus, providing a detailed representation of the most significant terms. The word cloud emphasizes main words within the CBDC literature. The most prominent terms in the word cloud include "Central bank," underscoring the overarching institutional context; "central bank digital currency," highlighting the specific focus on digital forms of national currency issued by central banks; "electronic money," emphasizing the broader digitization of financial transactions; "banking," reflecting the financial services context; "blockchain," indicating the technological foundation often associated with CBDC implementations; "currency," representing the broader monetary landscape; and "China," signifying the geopolitical and economic significance of China in the CBDC discourse. The size and boldness of each word in the word cloud correspond to its frequency or importance within the CBDC literature, offering a visually representation of the key themes and concepts.

Quantitative, Qualitative and Mix Method approaches

This SLR encompasses 169 studies on CBDCs, categorized by research approach. Among these, 78 studies employ a quantitative method, 73 utilize a qualitative approach, and 18 adopt a mixed-method approach. This classification underscores the research methods employed.

Studies Using Quantitative Approach

Table 7: Quantitative Approach

Sr.	Titles	Method	Data
1.	(Alonso-Robisco & Carbó, 2023)	Dictionary-based methods, Large Language Models (BERT, ChatGPT), human expert labels	Database of speeches and reports on CBDCs
2.	(Fujiki, 2023a)	ROL model, TR model, LCL model	2019 Financial Literacy Survey data
3.	(Alrawashdeh, 2023)	Bibliometric citation analysis	293 documents from Scopus database
4.	(Dunbar, 2023)	Correlation coefficients, regression analysis	Weekly financial data series, CBDC uncertainty indices, risk-aversion and uncertainty data
5.	(Y. Liu et al., 2023)	Configurable butterfly delay chain-based PUF design	Challenge-response pairs (CRPs)
6.	(Z. ao Wang et al., 2023)	Structural equation model with PLS-PM	Questionnaire data from consumers
7.	(Ozili, 2023b)	Review of existing literature, regression analysis	Data from the Nigerian banking sector
8.	(Panwar & Agarwal, 2023)	CBDC project index, random forest model	Not specified
9.	(Y. S. Kim & Kwon, 2023)	Overlapping-generations model	Not specified
10.	(Fujiki, 2023b)	Survey	Cash Alternative Survey data
11.	(Luu, Do, et al., 2023)	Regression analysis	CBDC Tracker, Hofstede website, World Development Indicator
12.	(Tian et al., 2023)	Sentiment analysis	Monthly cyberwarfare attacks, cyberattacks on crypto exchanges and DeFi protocols
13.	(Cioroianu et al., 2023)	Empirical approach	Cryptocurrency funds data, sentiment data from Twitter
14.	(Ayadi et al., 2023)	Cross-Quantilogram (CQ) model	CBDC attention index (CBDCAI), CBDC uncertainty index (CBDCUI)
15.	(W. Li & Huang, 2023)	GARCH-MIDAS model	Time series data of China, daily returns from CNI Indices website
16.	(J. J. Kim et al., 2023)	Two-step approach	Online survey, China, South Korea
17.	(Gupta et al., 2023)	Survey method	Self-administered questionnaire, India
18.	(Xin & Jiang, 2023b)	Theoretical model	Data from the US and China
19.	(Kosov et al., 2023)	Quantitative approach	Secondary data (FTSE, MSCI, Gold Index, S&P 500, Dow Jones)

20.	(Zhou, 2023)	Theoretical model	Not mentioned
21.	(Azzone & Barucci, 2023)	Market-based evaluation	ECB statistical data, FED database
22.	(Mohammed et al., 2023)	Nonlinear model of structural equations (SEM)	Data from the previous year
23.	(Ngo et al., 2023)	Quantitative research method	World Bank, IMF, Facebook
24.	(Luu, Nguyen, et al., 2023)	Empirical approach	Survey with 267 respondents, Demographic data, Reliability checks
25.	(Jabbar et al., 2023)	Empirical approach	S&P Global Market Intelligence, CBDC Tracker, World Bank
26.	(Fadli et al., 2023)	Survey	Survey, India
27.	(Yousaf & Goodell, 2023)	Online survey	Online survey
28.	(Rehman et al., 2023)	PLS-SEM	Questionnaires, Indonesia
29.	(Ren et al., 2023)	Time-Varying Parameter Vector Autoregression (TVP-VAR) approach	Weekly data of digital payment stocks
30.	(Auer et al., 2022)	McCallum's policy rule based on money growth	Time series data of three leading economies
31.	(Z. Wang, 2023)	New monetarist model	Not specified
32.	(Iwańczuk-Kaliska, 2023)	Theoretical model	Not specified
33.	(J. Li, 2023)	Structural analysis with survey data	Canadian Financial Monitor Survey (CFM) data (from 2009), Method of Payment Survey (MOP) 2013 data, Demand deposit rates from CANNEX data
34.	(Grodecka-Messi & Zhang, 2023)	Difference-in-differences regression analysis	Historical Canada Year Book (1927-1950) data, Profit and balance sheet data for ten chartered banks (1927-1950)
35.	(Banerjee & Sinha, 2023)	Regression analysis	Financial data (2011-2012 to 2021-2022 quarterly) measuring the size of the financial sector in India
36.	(Tata, 2023)	Literature review	Not specified
37.	(Y. Wang et al., 2023)	Time-varying parameter vector autoregression (TVP-VAR) model	CBDC attention data (CBDCAI), Cryptocurrency market data (top 10 cryptocurrencies)
38.	(Le et al., 2023)	Multinomial logistic regression	CBDC adoption data (CBDC Tracker), Anti-Money Laundering Index (AML), macroeconomic variables, financial development data
39.	(Alfar et al., 2023)	Pooled OLS estimations, Probit, Logistic regression	CBDC Tracker, World Bank database
40.	(Nguyen et al., 2023)	Time-varying CBDC adoption index, Bank financing gap ratio	S&P Global Market Intelligence (SPMI) database

41.	(Helmi et al., 2023)	Time-varying parameter vector auto-regression (TVP-VAR) model	CBDC news indices, S&P 500 index, CBOE Volatility Index (VIX), cryptocurrency policy uncertainty index, Bitcoin returns
42.	(C. C. Lee et al., 2023)	Ordinary least squares regressions, Simultaneous equation models (SEM)	OptionMetrics, Compustat, Investing website (bitcoin price), Fred (macroeconomics variables), EPU website, OzForex website
43.	(Lin & Chen, 2023)	3 (dynamic page interaction) × 4 (multimodal operational feedback) mixed factorial design	Data collected from 60 participants in a laboratory simulation
44.	(Bibi & Canelli, 2023)	Endogenous Money Theory (EMT)	Not specified
45.	(Akin et al., 2023)	Dynamic conditional correlation-generalized autoregressive conditional heteroskedasticity (DCC-GARCH) model	Data from CoinMarketCap (August 1, 2017, to April 1, 2022)
46.	(Q. Yang et al., 2023)	Quasi-natural experiment approach, Statistical analysis, SBM-GML method	Data from CBDC pilot cities in China, WIND database, China Statistical Yearbook
47.	(G. Wang & Hausken, 2022)	Game theory model	Modeled data, no external sources
48.	(Y. R. Wang et al., 2022)	Theoretical analysis and numerical experiments	Chinese financial institutions data
49.	(J. Yang & Zhou, 2022)	Analysis of money demand, supply, and policy transmission	Not specified
50.	(Bhaskar et al., 2022)	Bibliometric analysis	Bibliographic data from Scopus database (2018-2022)
51.	(Radic et al., 2022)	Situational analysis and questionnaire	Online survey in China, South Korea, and the United States (897 valid responses)
52.	(Ferrari Minesso et al., 2022)	DSGE model analysis	10 quarterly macro-variables for the US and the euro area (1999Q1 to 2019Q4)
53.	(DE MELLO & Kanczuk-Alfaro, 2022)	Model based on means of payment choice, calibration	Monthly data (2004-2013), monetary aggregates data
54.	(Kwon et al., 2022)	Dual currency model	Not specified
55.	(Chen & Siklos, 2022)	Simulations	Time series data for a few countries, additional data for more recent history of velocity
56.	(Keister & Monnet, 2022)	Model presentation	Not specified
57.	(Williamson, 2022)	Model construction	Not specified
58.	(Maryaningsih et al., 2022)	Empirical analysis (Ordered Probit regression)	Various sources including Chinn Ito index, Global Innovation Index, Institutional Profile Database, World Bank
59.	(X. Liu et al., 2022)	Quantitative research method (Structural Equation Modeling)	Questionnaire survey in 10 CBDC pilot areas in China (344 valid responses)
60.	(Koziuk & Ivashuk, 2022)	Survey questionnaire	Responses collected from the survey questionnaire

61.	(Solberg Söilen & Benhayoun, 2022)	Online survey, statistical analysis	Online survey, snowball sampling, UTAUT, Institutional Trust Theory
62.	(Z. Li, Yang, et al., 2022)	Text analysis, empirical approach	CBDC signals from PBOC, fintech index, VAR and TVP-VAR models
63.	(Oh & Zhang, 2022)	OLS regression analysis	OLS regression analysis, sample of 60 economies for 2013 and 2016
64.	(Ma et al., 2022)	Survey	Survey of consumers in CBDC pilot cities, questions on perceived privacy, security, system quality, benefits, etc.
65.	(Eichengreen & Viswanath-Natraj, 2022)	Statistical analysis	Time-varying estimates of devaluation risk for Tether, statistical analysis
66.	(Ding et al., 2022)	Decision tree method, GARCH model	Decision tree method, GARCH (1, 1) model, DBSCAN model
67.	(Mzoughi et al., 2022)	Event study approach	Event study approach, abnormal returns, market model
68.	(Y. Wang et al., 2022)	DCC-GARCH model, wavelet analysis, VAR model	Analysis of relationships using DCC-GARCH, wavelet, and VAR models
69.	(Syarifuddin & Bakhtiar, 2022)	DSGE model	Medium-sized DSGE model, closed economy, interest-bearing CBDC, calibration
70.	(Barrdear & Kumhof, 2022)	DSGE model	DSGE model calibrated to pre-2008 US economy, analysis of macroeconomic consequences
71.	(Z. Li, Zhang, et al., 2022)	Transaction network-based method	Analysis of transaction networks, Elliptic dataset, AMLSim dataset
72.	(Tong & Jiayou, 2021)	Theoretical and practical perspectives	Theoretical model, parameter calibration, quantitative results based on BGG model
73.	(Y. Lee, Son, Jang, et al., 2021)	Proposed lattice-based sequential aggregate signature scheme	Proposal for blockchain-based settlement system, proof-of-concept experiments
74.	(Fernández-Villaverde et al., 2021)	Theoretical model	Theoretical model, three periods, various types of agents, equivalence result
75.	(Alonso et al., 2021)	Pearson’s correlation coefficient, SPSS statistical analysis	Analysis of data from central bank speeches, reports, briefing notes using Pearson's correlation coefficient and SPSS statistical analysis
76.	(Fantacci & Gobbi, 2021)	Not specified	Analysis of Swift's network of payments over 2003-2013 using network analysis
77.	(Bian et al., 2021)	Theoretical payment portfolio model	No empirical data used, theoretical examination
78.	(Kochergin & Yangirova, 2019)	Lasso regression analysis method and SARIMA model	Analysis of statistical indicators of the sustainable financial growth system of the largest oil and gas companies in Russia and China

Table 7 presents quantitative methods applied in a variety of studies. Alonso-Robisco and Carbó (2023) initiated the investigation using dictionary-based methods, Large Language Models (BERT and ChatGPT), and human expert labels, drawing insights from speeches and reports. Fujiki (2023a) used the ROL, TR, and LCL models, relying on data from the 2019 Financial Literacy Survey. Alrawashdeh (2023) conducted a bibliometric citation analysis with 293 documents from Scopus. Dunbar (2023) employed correlation coefficients and regression analysis with weekly financial data, CBDC uncertainty indices, and risk aversion and uncertainty data.

Y. Liu et al. (2023) took a unique approach with a butterfly delay chain-based Physical Unclonable Function (PUF) design. Z. ao Wang et al. (2023) used a structural equation model with Partial Least Squares-Path Modeling (PLS-PM) and questionnaire data. Ozili (2023b) conducted a literature review complemented by regression analysis using Nigerian banking sector data. Panwar and Agarwal (2023) used a CBDC project index and a random forest model. Y. S. Kim and Kwon (2023) applied an overlapping-generations model, while Fujiki (2023b) employed a survey approach with data from the Cash Alternative Survey. Luu, Do, et al. (2023) employed regression analysis using CBDC Tracker, Hofstede website, and World Development Indicator data. Tian et al. (2023) used sentiment analysis based on cyberwarfare attacks and DeFi protocols. Cioroianu et al. (2023) took an empirical approach using cryptocurrency funds data and sentiment data from Twitter. Ayadi et al. (2023) employed a Cross-Quantilogram (CQ) model with CBDC attention and uncertainty indices. W. Li and Huang (2023) applied a GARCH-MIDAS model to time series data from China. J. J. Kim et al. (2023) implemented a two-step approach involving an online survey in China and South Korea. Gupta et al. (2023) adopted a survey method with a self-administered questionnaire in India. Xin and Jiang (2023b) applied a theoretical model based on US and China data. Kosov et al. (2023) used secondary data from FTSE, MSCI, Gold Index, S&P 500, and Dow Jones. Zhou (2023) adopted a theoretical model, while Azzone and Barucci (2023) conducted market-based evaluation using ECB statistical data and the FED database. Mohammed et al. (2023) employed a nonlinear SEM model with data from the previous year.

Ngo et al. (2023) used a quantitative approach with World Bank, IMF, and Facebook data. Luu, Nguyen, et al. (2023) applied an empirical approach through a survey with 267 respondents. Jabbar et al. (2023) used an empirical approach with data from S&P Global Market Intelligence, CBDC Tracker, and the World Bank. Fadli et al. (2023) conducted a survey-based

study in India. Yousaf and Goodell (2023) implemented an online survey approach. Rehman et al. (2023) utilized PLS-SEM along with questionnaires in Indonesia. Ren et al. (2023) employed a Time-Varying Parameter Vector Autoregression (TVP-VAR) approach with weekly data of digital payment stocks. Auer et al. (2022) based their analysis on McCallum's policy rule, using time series data from three leading economies. Z. Wang (2023) applied a New Monetarist model without specifying data sources. Iwańczuk-Kaliska (2023) employed a theoretical model without specifying data sources. J. Li (2023) conducted structural analysis with survey data, drawing from the Canadian Financial Monitor Survey (CFM), Method of Payment Survey (MOP), and demand deposit rates from CANNEX. Grodecka-Messi and Zhang (2023) used a Difference-in-Differences regression analysis with historical Canada Year Book data and bank balance sheet data. Banerjee and Sinha (2023) applied regression analysis with financial data spanning from 2011-2012 to 2021-2022 in India. Tata (2023) contributed to the literature through a literature review without specifying particular data sources.

Y. Wang et al. (2023) employed a TVP-VAR model using CBDC attention data and cryptocurrency market data. Le et al. (2023) conducted multinomial logistic regression with data sources including CBDC adoption data, Anti-Money Laundering Index, macroeconomic variables, and financial development data. Alfar et al. (2023) utilized Pooled OLS estimations, Probit, and Logistic regression with data from the CBDC Tracker and the World Bank database. Nguyen et al. (2023) employed a time-varying CBDC adoption index and bank financing gap ratio, using the S&P Global Market Intelligence database. Helmi et al. (2023) used a TVP-VAR model with CBDC news indices, S&P 500 index, CBOE Volatility Index, cryptocurrency policy uncertainty index, and Bitcoin returns. C. C. Lee et al. (2023) applied Ordinary Least Squares regressions and Simultaneous Equation Models with data from OptionMetrics, Compustat, Fred, EPU website, and OzForex website. Lin and Chen (2023) conducted a mixed factorial design with dynamic page interaction and multimodal operational feedback, utilizing data from 60 participants in a laboratory simulation. Bibi and Canelli (2023) based their study on Endogenous Money Theory without specifying data sources.

Akin et al. (2023) employed a DCC-GARCH model with data from CoinMarketCap spanning from August 1, 2017, to April 1, 2022. Q. Yang et al. (2023) used a Quasi-natural experiment approach, statistical analysis, and the SBM-GML method with data from CBDC pilot cities in China and the WIND database. G. Wang and Hausken (2022) contributed to the literature through a game theory model, using modeled data without external sources. Y. R. Wang et al.

(2022) applied theoretical analysis and numerical experiments with Chinese financial institutions' data. J. Yang and Zhou (2022) conducted an analysis of money demand, supply, and policy transmission without specifying particular data sources. Bhaskar et al. (2022) performed a bibliometric analysis using bibliographic data from the Scopus database spanning from 2018 to 2022. Radic et al. (2022) conducted a situational analysis and questionnaire-based online survey in China, South Korea, and the United States. Ferrari Minesso et al. (2022) employed a DSGE model analysis with macro-variables for the US and the euro area spanning from 1999Q1 to 2019Q4. De Mello and Kanczuk-Alfaro (2022) used a model based on means of payment choice, calibration, with monthly data spanning from 2004 to 2013. Kwon et al. (2022) applied a dual currency model without specifying data sources. Chen and Siklos (2022) conducted simulations with time series data for a few countries and additional data for more recent velocity history. Keister and Monnet (2022) presented a model without specifying data sources. Williamson (2022) constructed a model without specifying data sources.

Maryaningsih et al. (2022) conducted empirical analysis using Ordered Probit regression with various sources. X. Liu et al. (2022) employed a quantitative research method using Structural Equation Modeling, conducting a questionnaire survey in 10 CBDC pilot areas in China. Koziuk and Ivashuk (2022) conducted a survey questionnaire. Solberg Söilen and Benhayoun (2022) used an online survey and statistical analysis. Z. Li, Yang, et al. (2022) conducted text analysis and an empirical approach using CBDC signals from the People's Bank of China, a fintech index, and VAR and TVP-VAR models. Oh and Zhang (2022) conducted OLS regression analysis with a sample of 60 economies for 2013 and 2016. Ma et al. (2022) conducted a survey of consumers in CBDC pilot cities. Eichengreen and Viswanath-Natraj (2022) employed statistical analysis with time-varying estimates of devaluation risk for Tether. Ding et al. (2022) used the decision tree method, GARCH model, and DBSCAN model with data from decision tree method, GARCH (1, 1) model, and DBSCAN model. Mzoughi et al. (2022) employed an event study approach with abnormal returns and market model. Y. Wang et al. (2022) used a DCC-GARCH model, wavelet analysis, and VAR model for the analysis of relationships. Syarifuddin and Bakhtiar (2022) applied a Medium-sized DSGE model, closed economy, and interest-bearing CBDC, with calibration. Barrdear and Kumhof (2022) employed a DSGE model calibrated to the pre-2008 US economy for the analysis of macroeconomic consequences. Z. Li, Zhang, et al. (2022) used a transaction network-based method with the analysis of transaction networks, the Elliptic dataset, and the AMLSim dataset.

Tong and Jiayou (2021) contributed to the literature through theoretical and practical perspectives, utilizing a theoretical model, parameter calibration, and quantitative results based on the BGG model. Y. Lee, Son, Jang, et al. (2021) proposed a lattice-based sequential aggregate signature scheme for a blockchain-based settlement system, conducting proof-of-concept experiments. Fantacci and Gobbi (2021) conducted an analysis of Swift's network of payments over 2003-2013 using network analysis. Bian et al. (2021) developed a theoretical payment portfolio model without employing empirical data. Kochergin and Yangirova (2019) used Lasso regression analysis and the SARIMA model for the analysis of statistical indicators of the sustainable financial growth system of the largest oil and gas companies in Russia and China.

However, the studies in Table 7 employ a diverse range of quantitative methods and data sources, reflecting the nature of studies using Quantitative methods. The methods include statistical analyses, regression models, theoretical frameworks, surveys, and various other quantitative approaches.

Studies Using Qualitative Approach

Table 8: Qualitative Approach

Sr.	Title	Method	Data
1.	(Mooij, 2023)	Not specified	Not specified
2.	(Islam & In, 2023)	Consortium blockchain, UTXO model	Not specified
3.	(Chitimira & Torerai, 2023)	Qualitative research, legal doctrinal research	Legislative and policy instruments, literature
4.	(Tronnier et al., 2023)	Qualitative content analysis, semi-structured interviews	Semi-structured interviews with 21 participants
5.	(Maruo & Sugino, 2023b)	Literature review, theoretical analysis, empirical data	Primary and secondary sources (academic articles, reports, statistical data)
6.	(S. Lee et al., 2023)	Expansion of a simple money multiplier model	Not specified
7.	(Ozili, 2023a)	Systematic literature review	Not specified
8.	(Tercero-Lucas, 2023)	Diamond and Dybvig model	Not specified
9.	(Kuehnlenz et al., 2023)	Literature review	Not specified
10.	(Denecker et al., 2023)	Not specified	Not specified
11.	(Ozili, 2023c)	Literature review, data analysis	Existing research on CBDCs, data analysis conducted by the author
12.	(Xin & Jiang, 2023a)	Dynamic stochastic general equilibrium (DSGE) model	Not specified
13.	(Karau, 2023)	Standard two-country asset pricing model	Not specified
14.	(Hoang et al., 2023b)	Systematic literature review, text mining	Abstracts of academic publications related to CBDC from Scopus
15.	(Babin et al., 2022)	Case study approach, interviews	Interviews with financial institution executives, existing research
16.	(Son et al., 2023)	Theoretical model	Not specified
17.	(Peruffo et al., 2023)	Theoretical analysis	Various sources including IMF, ECB, BIS, SWIFT
18.	(Chan, 2023)	Literature review	Secondary data from academic articles, reports, news sources
19.	(Souissi & Nabi, 2023)	Theoretical model based on OLG model	Not specified
20.	(Salmony, 2023)	Practice paper	No specific data

21.	(H. Wang, 2023)	Theoretical framework	Data from S&P Global Market Intelligence, CBDC Tracker, World Development Indicators
22.	(Sandhu et al., 2023)	Theoretical framework	Not specified
23.	(Q. Zhang et al., 2023)	Stakeholder analysis	Conceptual analysis, stakeholder analysis
24.	(Siu, 2023)	Theoretical and conceptual analysis	Not specified
25.	(H. Wang & Gao, 2023)	Extensive textual analysis	Not specified
26.	(Leinonen, 2023)	Not specified	Not specified
27.	(Cullen, 2022)	Scholarly article, existing literature and analysis	Not specified
28.	(Fegatelli, 2022)	Theoretical framework	Not specified
29.	(T. Zhang & Huang, 2022)	Comprehensive analysis	Existing literature and research
30.	(Didenko & Buckley, 2022)	Literature review	Not specified
31.	(Elsayed & Nasir, 2022)	Literature review	Not specified
32.	(Davoodalhosseini, 2022)	Literature review	Secondary sources
33.	(Kóczián et al., 2022)	Not specified	Not specified
34.	(Kaczmarek, 2022)	Not specified	Not specified
35.	(Boros & Horváth, 2022)	Not specified	Not specified
36.	(Jin & Xia, 2022)	Not specified	Not specified
37.	(Ozili, 2022)	Desk research method	Not specified
38.	(van Oordt, 2022)	Not specified	Not specified
39.	(Wilkins, 2022)	Not specified	Not specified
40.	(Laband, 2022)	Not specified	No specific data mentioned
41.	(Allen et al., 2022)	Literature review	Review of recent literature, overview of China's fintech experience and CBDC pilots
42.	(Ozturkcan et al., 2022)	Social media analytics	Twitter data with hashtag #CBDC, social media analytics framework, NVivo
43.	(Bolt et al., 2022)	Literature review	Review and analysis of existing literature, academic papers, reports
44.	(Horváth, 2022)	Not specified	References to other publications and working papers
45.	(Dupuis et al., 2022)	Literature review	Analysis of recent events, literature review on money laundering and CBDC
46.	(Morgan, 2022)	Not specified	Critique of the Bank of England's framing, qualitative analysis
47.	(Lloyd, 2022)	Analytical paper	Examination of the rationale, review of existing literature

48.	(Terták & Kovács, 2022)	Review article	Review of history, motives, challenges, and preparations for CBDC
49.	(D. K. C. Lee et al., 2021)	Literature review	Literature review, analysis of global research and practices, illustration with China's CBDC
50.	(Adams et al., 2021)	Literature review, expert opinion	Literature review and expert opinion piece
51.	(Andolfatto, 2021)	Theoretical framework, scenarios, simulations	Theoretical framework, scenarios, simulations, no empirical data
52.	(Sakharov, 2021)	Synthesis, analysis, logical method, comparison, induction, deduction	Review of literature, analysis of key aspects, and potential impact on financial system
53.	(Jun & Yeo, 2021)	Theoretical analysis	Theoretical analysis of a bank's portfolio, (in)solvency, and (il)liquidity risks
54.	(Chorzempa, 2021)	Literature review and analysis	Analysis of existing information and data on CBDC development in China and the US
55.	(Shen & Hou, 2021)	Literature review and analysis	Examination of existing information on China's CBDC
56.	(Laboure et al., 2021)	Not specified	Analysis of the current state of cryptocurrencies and CBDCs, as well as their potential future developments
57.	(D. Li et al., 2021)	Literature review and analysis	Various scholarly articles, reports, and a BIS survey
58.	(Arauz et al., 2021)	Case study approach	Range of primary and secondary sources, including official reports, academic articles, and news articles
59.	(Cunha et al., 2021)	Snowballing review	English language literature, both academic and grey sources
60.	(Morales-Resendiz et al., 2021)	Peer review methodology	Data from pilot studies of retail CBDCs in the Bahamas, Sweden, and Uruguay
61.	(Rennie & Steele, 2021)	Case study approach	Interviews with key stakeholders and a review of relevant literature
62.	(S. Li & Huang, 2021)	Not specified	Overview of the design and implications of China's central bank digital currency, e-CNY
63.	(Scarcella, 2021)	Not specified	Analysis and insights on the potential implications of adopting a European CBDC
64.	(Arauz, 2021)	Theoretical and analytical article	Analysis of risks and regulatory alternatives related to CBDCs and stablecoins
65.	(Ballaschk & Paulick, 2021)	Not specified	Privacy considerations in CBDCs
66.	(Opare & Kim, 2020)	Not specified	Collection of best practices and principles for CBDCs
67.	(Belke & Beretta, 2020)	Survey approach	Exploration of regulatory challenges and investigation of global CBDC design
68.	(Cukierman, 2020)	Not specified	Welfare and political economy aspects of CBDCs
69.	(Nabilou, 2020)	Literature review	Review of existing research on CBDC and related topics
70.	(Viñuela et al., 2020)	Conceptual research approach	Conceptual framework for analyzing different means of payment
71.	(Fonseca, 2019)	Legal analysis	Examination of legal aspects related to CBDC transactions

72.	(Bindseil, 2019)	Literature review and analysis	Examination of financial system implications and control of CBDC
73.	(Qian, 2019)	Conceptual paper	Discussion of benefits, challenges, and design considerations of CBDC

Table 8 presents an overview of studies employing qualitative approaches to investigate. Mooij (2023) does not specify the method or data used. Islam and In (2023) utilize a consortium blockchain and UTXO model without specifying the data source. Chitimira and Torerai (2023) employ a qualitative research approach, specifically legal doctrinal research, utilizing legislative and policy instruments along with relevant literature. Tronnier et al. (2023) conduct a qualitative content analysis and semi-structured interviews with 21 participants. Maruo and Sugino (2023) undertake a literature review, theoretical analysis, and empirical data analysis, drawing from primary and secondary sources such as academic articles, reports, and statistical data.

S. Lee et al. (2023) expand a simple money multiplier model, and Ozili (2023a) conducts a systematic literature review. Tercero-Lucas (2023) utilizes the Diamond and Dybvig model, while Kuehnlenz et al. (2023) conduct a literature review. Ozili (2023c) combines a literature review with data analysis, drawing from existing research on CBDCs and conducting additional data analysis. Xin and Jiang (2023a) employ a Dynamic Stochastic General Equilibrium (DSGE). Karau (2023) uses a standard two-country asset pricing model. Hoang et al. (2023) conduct a systematic literature review and text mining, analyzing abstracts of academic publications related to CBDC from Scopus. Babin et al. (2022) adopt a case study approach with interviews involving financial institution executives and existing research. Son et al. (2023) develop a theoretical model, and Peruffo et al. (2023) undertake theoretical analysis using various sources, including the IMF, ECB, BIS, and SWIFT.

Chan (2023) relies on a literature review, gathering secondary data from academic articles, reports, and news sources. Souissi and Nabi (2023) develop a theoretical model based on the OLG model. Salmony (2023) presents a practice paper. H. Wang (2023) builds a theoretical framework using data from S&P Global Market Intelligence, CBDC Tracker, and World Development Indicators. Sandhu et al. (2023) employ a theoretical framework. Q. Zhang et al. (2023) conduct stakeholder analysis through conceptual analysis and stakeholder analysis methods. Siu (2023) provides a theoretical and conceptual analysis, and H. Wang and Gao (2023) perform extensive textual analysis. Leinonen (2023) does not specify the method or data in the study. Cullen (2022) utilizes a scholarly article, existing literature, and analysis. Fegatelli (2022) employs a theoretical framework. T. Zhang and Huang (2022) conduct a comprehensive analysis based on existing literature and research. Didenko and Buckley (2022) perform a literature review. Elsayed and Nasir (2022) also conduct a literature review. Davoodalhosseini

(2022) conducts a literature review using secondary sources. Kóczián et al. Ozili (2022) adopts a desk research method. Allen et al. (2022) conduct a literature review, reviewing recent literature and providing an overview of China's fintech experience and CBDC pilots. Ozturkcan et al. (2022) use social media analytics, analyzing Twitter data with the hashtag #CBDC, and employ a social media analytics framework using NVivo. Bolt et al. (2022) conduct a literature review, reviewing and analyzing existing literature, academic papers, and reports.

Dupuis et al. (2022) perform a literature review, analyzing recent events and reviewing literature on money laundering and CBDC. Morgan (2022) provides a critique of the Bank of England's framing and qualitative analysis. Lloyd (2022) presents an analytical paper examining the rationale and reviewing existing literature. Terták and Kovács (2022) provide a review article, reviewing the history, motives, challenges, and preparations for CBDC. D. K. C. Lee et al. (2021) conduct a literature review, analyzing global research and practices and illustrating with China's CBDC. Adams et al. (2021) conduct a literature review and expert opinion piece. Andolfatto (2021) develops a theoretical framework, scenarios, and simulations without employing empirical data. Sakharov (2021) synthesizes, analyzes, uses logical methods, compares, inducts, and deduces, reviewing literature and analyzing key aspects and potential impacts on the financial system. Jun and Yeo (2021) provide a theoretical analysis of a bank's portfolio, (in)solvency, and (il)liquidity risks. Chorzempa (2021) conducts a literature review and analysis, examining existing information and data on CBDC development in China and the US. Shen and Hou (2021) conduct a literature review and analysis, examining existing information on China's CBDC.

Laboure et al. (2021) analyze the current state of cryptocurrencies and CBDCs, as well as their potential future developments. D. Li et al. (2021) conduct a literature review and analysis, reviewing various scholarly articles, reports, and a BIS survey. Arauz et al. (2021) adopt a case study approach, utilizing a range of primary and secondary sources, including official reports, academic articles, and news articles. Cunha et al. (2021) conduct a snowballing review, reviewing English language literature, both academic and grey sources. Morales-Resendiz et al. (2021) use a peer review methodology, drawing data from pilot studies of retail CBDCs in the Bahamas, Sweden, and Uruguay. Rennie and Steele (2021) employ a case study approach, conducting interviews with key stakeholders and reviewing relevant literature. S. Li and Huang (2021) provide an overview of the design and implications of China's central bank digital

currency, e-CNY. Scarcella (2021) provides an analysis and insights on the potential implications of adopting a European CBDC. Arauz (2021) presents a theoretical and analytical article, analyzing risks and regulatory alternatives related to CBDCs and stablecoins. Ballaschk and Paulick (2021) discuss privacy considerations in CBDCs. Opare and Kim (2020) compile best practices and principles for CBDCs. Belke and Beretta (2020) adopt a survey approach, exploring regulatory challenges and investigating global CBDC design. Cukierman (2020) discusses welfare and political economy aspects of CBDCs. Nabilou (2020) conducts a literature review, reviewing existing research on CBDC and related topics. Viñuela et al. (2020) use a conceptual research approach, developing a conceptual framework for analyzing different means of payment. Fonseca (2019) conducts a legal analysis, examining legal aspects related to CBDC transactions. Bindseil (2019) conducts a literature review and analysis, examining financial system implications and control of CBDC. Qian (2019) presents a conceptual paper, discussing the benefits, challenges, and design considerations of CBDCs.

Studies Using Mix Method Approach

Table 9: Mix Method Approach

Sr.	Title	Method	Data
1.	(Chiu et al., 2023b)	Theoretical and quantitative analysis	Bank balance sheets, call report data, M1 series, macro variables
2.	(Sethaput & Innet, 2023)	Literature review	Not specified, likely secondary data
3.	(Arakelian, 2023)	Discussion	Not specified
4.	(Cheng, 2023)	Literature review, analysis	Literature on CBDCs, focus on e-CNY pilot in China
5.	(Takaragi et al., 2023)	Extensive literature review	Not specified
6.	(Singh et al., 2023)	Systematic Literature Review (SLR), Fuzzy Analytic Hierarchy Process (F-AHP)	Literature survey, Expert interviews
7.	(Themistocleous et al., 2023)	Multivocal Systematic Literature Review (MSLR)	CBDC trackers, Empirical data from various online resources
8.	(Bech et al., 2023)	Practical experiments by BIS Innovation Hub	Data from projects InthanonLionRock2, Jura, Dunbar, and mBridge
9.	(Rösl & Seitz, 2022)	Not specified	Not specified
10.	(Agur et al., 2022)	Model presentation	Not specified
11.	(Sarmiento, 2022)	Literature review	Literature review, analysis of e-Peso pilot plan, graphs and charts
12.	(J. Zhang et al., 2021)	Proposed hybrid model	Proposal for CBDC design based on hybrid blockchain model, simulation experiments
13.	(Y. Lee, Son, Park, et al., 2021)	Literature review	Survey of existing literature on security and privacy in blockchain-based CBDCs
14.	(Meaning et al., 2021)	Not specified	No specific method mentioned, no specific data mentioned
15.	(Zams et al., 2020)	Delphi-Analytic Network Process	Primary data from interviews, Focus Group Discussions (FGD), and questionnaires
16.	(Alonso et al., 2020)	Mixed-methods approach	Survey of 1,200 respondents and construction of an index of access to cash
17.	(Niepelt, 2020)	Not specified	Distinguishing RFA from cryptocurrencies and proposing an equivalence result
18.	(Khiaonarong & Humphrey, 2019)	Combination of quantitative and qualitative methods	Estimation of cash use for 11 countries, forecast future cash use, and analysis of potential benefits and costs of CBDC

Table 9 provides insights into studies adopting a mixed-method approach. Chiu et al. (2023) employ a theoretical and quantitative analysis, utilizing data from bank balance sheets, call report data, M1 series, and macro variables. Sethaput and Innet (2023) conduct a literature review, likely relying on secondary data. Arakelian (2023) contributes to the field through discussion. Cheng (2023) combines a literature review with analysis, focusing on literature related to CBDCs, particularly the e-CNY pilot in China. Takaragi et al. (2023) conduct an extensive literature review without specifying the data source. Singh et al. (2023) employ a mixed-method approach, combining a Systematic Literature Review (SLR) with the Fuzzy Analytic Hierarchy Process (F-AHP). The data sources include a literature survey and expert interviews. Themistocleous et al. (2023) undertake a Multivocal Systematic Literature Review (MSLR), utilizing CBDC trackers and empirical data from various online resources. Bech et al. (2023) engage in practical experiments through the BIS Innovation Hub, utilizing data from projects InthanonLionRock2, Jura, Dunbar, and mBridge. Agur et al. (2022) present a model.

Sarmiento (2022) conducts a literature review and analyzes the e-Peso pilot plan, using graphs and charts as part of the analysis. J. Zhang et al. (2021) propose a hybrid model for CBDC design based on a hybrid blockchain model, conducting simulation experiments. Y. Lee, Son, Park, et al. (2021) perform a literature review, surveying existing literature on security and privacy in blockchain-based CBDCs. Zams et al. (2020) employ the Delphi-Analytic Network Process, utilizing primary data from interviews, Focus Group Discussions (FGD), and questionnaires. Alonso et al. (2020) use a mixed-methods approach, conducting a survey of 1,200 respondents and constructing an index of access to cash. Niepelt (2020) distinguishes Reserve Fund Accounts (RFA) from cryptocurrencies and proposes an equivalence result. Khiaonarong and Humphrey (2019) combine quantitative and qualitative methods, estimating cash use for 11 countries, forecasting future cash use, and analyzing the potential benefits and costs of CBDCs.

Conclusion

This SLR delved into a comprehensive exploration of CBDCs research, elucidating key findings from 169 studies that spanned a diverse array of research approaches. UK, USA, and China are found to be the most productive countries in CBDC research. Tis SLR revealed a discernible trend in the utilization of quantitative, qualitative, and mixed-method approaches, highlighting the multifaceted nature of CBDC research. A predominant number of studies (78 out of 169) embraced quantitative methodologies, showcasing the wide spectrum of analytical tools employed. Noteworthy methods encompassed dictionary-based techniques, large language models, regression analyses, structural equation models, sentiment analysis, and various econometric models. The diversity in methodologies mirrored the complexity of the CBDC landscape and underscored the significance of employing varied quantitative tools to comprehensively address the intricacies involved. The exploration of qualitative methodologies across 73 studies unveiled the richness of insights drawn from legal doctrinal research, content analysis, literature reviews, and theoretical analyses. While the specific approaches varied, they collectively contributed to a nuanced understanding of the legal, theoretical, and practical dimensions of CBDCs. Eighteen studies adopted a mixed-method approach, combining the strengths of both quantitative and qualitative methodologies. This approach, evident in studies such as those employing systematic literature reviews coupled with fuzzy analytic hierarchy processes, hybrid models, and multivocal systematic literature reviews, showcases a trend towards an understanding of CBDCs that bridges the gap between numerical data and contextual interpretation.

However, it is imperative to acknowledge the limitations of this study. The inclusion of studies up to the cutoff date of November 2023 implies that more recent developments might not be fully represented. Moreover, the comprehensiveness of the SLR is contingent on the availability of literature and potential language. These outlined limitations underscore the need for ongoing and updated investigations to capture the nature of the CBDC landscape. The synthesis of these diverse research methodologies provides a robust foundation for understanding CBDCs from various perspectives. As the landscape continues to evolve, it is imperative for future research to integrate findings across different methods.

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