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Central Bank Digital Currencies (CBDC) Sentiment Score Analysis of News using Chat GPT-4.0 from January 2018 to June 2024

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Abstract. *The Central Bank Digital Currencies (CBDC) can refine monetary statistics, fiscal policymaking, controls against illicit activities and promote financial inclusion. However, it could also raise concerns about data leakage and privacy. This paper analyzes the sentiment score of news towards CBDC using ChatGPT 4.0. The author extracted 11,679 news of LexisNexis database from 2018 to 2024, grouped in selected topics and create a new sentiment analysis index (CBDCSX). The results show i. Most of news related to CBDC were positive, wherein the events that drove to more positive news were related to the announcement of launches/pilot; and to more negative news were related to political speeches and legislation/ consultation. ii. For the CBDC projects progress, the privacy concern should be overcome, since privacy is the main concern of citizens and professionals and that most appeared on the news, instead of "cyber", "attacks", "digital thefts", and competition or association between cryptocurrencies versus CBDC. Therefore, the likelihood of a Central Bank issuing wholesale CBDC exceeds of issuing a retail CBDC, due to the privacy risk being reduced. And to CBDC become adopted by relevant economies, the regulatory and perception of the privacy concern should be solved, considering that USA and Europe government officials were the most mentioned on the news. This study enriches literature with the overall CBDC's sentiment and their events that triggered positive and negative sentiment, and highlights that privacy may guide the future of CBDC projects; and differentiates from the literature with the analysis of different languages using ChatGPT-4.0.*

Keywords: ChatGPT, CBDC, Central Bank Digital Currency, sentiment analysis, topic modeling, privacy.

Introduction

Central Banks around the globe are initiating projects with the intention of issuing their own Central Bank Digital Currency (CBDC), almost 93 percent of Central Banks are currently engaged in some form of CBDC research. The aim is not to introduce another separate currency, but to create a new, digital form of Central Bank money in existing currency areas (Balz, B., 2024). The CBDC can be wholesale for use among financial institutions or retail for the general public, including households and non-bank businesses (Choi, S. et. al., 2023).

The motivations behind Central Banks' endeavors related to CBDCs vary across regions. In advanced economies, Central Banks are researching CBDCs to promote safety, robustness and domestic payments efficiency. In emerging market economies, the important motivation is financial inclusion (Tombini 2023).

Considering there is a high level of uncertainty issuing a CBDC due to several of choices of design and operation (Robisco, A. and Carbó, J., 2023) and different social and political motivations, we believe that it is relevant to analyze the media news sentiment towards CBDC and their projects to enhance predictability and transparency, since at this moment several of CBDC projects are still in the initial stages of development.

The empirical strategy of this research is divided in two parts. In the first, it is proposed to create a CBDC attention index based on news stories of LexisNexis database that covers a very wide variety of newspapers and news-wire feeds with the key words on their headlines "CBDC",

DOI: 10.2478/picbe-2025-0116

“Central Bank Digital Currencies”, “Central Bank Digital Currency” and the name of the CBDC projects identified by Bank for International Settlement (BIS) as of March 1st 2024. The methodology applied ChatGPT to deliver sentiment analysis classifying as positive, negative or neutral based on a prompt for the lead text of each news. The choice of ChatGPT, was based on Robisco, A. Carbó, J. (2023) results that identified that ChatGPT better capture the sentiment towards CBDC rather than other Natural Language Processing (NLP) alternatives. In the second part, to deepen the sentiment analysis, we listed the 50 most common words from the news classified as positive, neutral and negative, per year and grouped on the following related topics, based on the results of these words: CBDC segment (wholesale or retail), government officials and personalities, currencies and CBDC’s projects names, countries and regions, cryptocurrencies and information security.

The potential contributions of this research and what differentiates from the literature is the development of a sentiment index for CBDCs based on LexisNexis database with different languages using the artificial intelligence Open AI ChatGPT-4.0 for a recent period January/2018 to June/2024. The literature review section has in detail the papers that used Lexis Nexis database, Open AI ChatGPT-4.0 and CBDC sentiment score that together supported our analysis. However, this study differentiates by consolidating all this methodology and database in one analysis.

Additionally, this paper is justified by the potential social impact on the development of digital assets, which can accelerate financial inclusion and democratization, as discussed at the World Economic Forum (World Economic Forum 2021). Financial inclusion is one of the most important policy goals widely cited for CBDCs, particularly in emerging economies, as CBDCs can reduce the complexity and reliance on intermediaries in payments, potentially saving time and costs for consumers.

Literature review

The origin of CBDC dates to the 1980s, when Central Banks permitted commercial banks to use digital money, and this led to a rise in digital money. Digital money at that time was depositors’ account balances that are accessible using bank applications, mobile wallets, or internet banking. Two decades later, cryptocurrencies, also known as private digital currencies, emerged, which allowed people to hold large amounts of private digital currencies without needing an intermediary and without regulation. At this moment the status is: CBDCs launched Sand Dollar from Bahamas (2017), Zig from Zimbabwe (2021), e-Naira from Nigeria (2021), JAM-DEX from Jamaica (2023) and 27 countries have projects in pilot, besides the projects in research and proof of concept stages.

Many see the current development of CBDCs as a response to the challenge that cryptocurrencies, especially stablecoins, could pose to Central Bank prerogatives, and as evidence of the desire of institutions to address long-term goals such as payment systems efficiency and financial inclusion (Bode, D; Higginson, M. and Niederkorn, M. 2021).

Considering this context, the literature created attention scores and sentiment analysis to understand the expectations of media, social media and regulators towards CBDCs.

The authors Auer, R., Cornelli, G. and Frost, J. (2020) created a Central Bank speech score, which reflected discussion of CBDCs in speeches by Central Bank management. Considering that –1 when the authors judged that the speech stance was clearly negative or in the case it was explicitly said that there was no specific plan at present to issue a CBDC, 0 in the case of a neutral stance, and +1 when the speech stance was clearly positive or if a CBDC project/pilot was launched or was in the pipeline.

Prodan S., Dabija D. and Marincean L. (2023) analyzed Twitter data posted between January 2021 and January 2023, with the aim to verify citizens' perceptions towards CBDCs by using a Python script. The results showed a growing debate and discussion around the use of CBDCs, with concerns about their potential consequences on civil liberties and financial control, but also the benefits such as financial inclusion and tackling money laundering and terrorism.

Robisco, A and Carbó, J. (2023) quantified Central Banks' stance towards CBDC, analyzing a set of Central Bank discourses from 2016 to 2022 using ChatGPT, BERT and traditional dictionary methods. They found that the sentiment calculated by Large Language Models (LLM), and in particular ChatGPT is the one that most resembles the sentiment identified by human experts in those same speeches. At the time the authors were writing, the only version running behind ChatGPT was GPT-3.5. We used the most updated version GPT-4.0.

Wang, Y. et al (2022) created two new indices called CBDC Uncertainty Index (CBDCUI) and CBDC Attention Index (CBDCAI) based on coverage of news stories from LexisNexis News & Business between 2015 –2021. Both indices spiked during news related to new developments in CBDC and in relation to digital currency news items. In addition, they demonstrated that CBDC indexes have a significant negative relationship with the volatilities of the MSCI World Banks Index, USEPU, and the FTSE All-World Index, and positive with the volatilities of cryptocurrency markets, foreign exchange markets, bond markets, VIX, and gold.

And finally, Koonchanok,R. Pan, Y. and Jang, H. (2024) investigated public attitudes from December 5, 2022 to June 10, 2023 towards ChatGPT by applying sentiment analysis which indicated that the overall sentiment was largely neutral to positive, and negative sentiments were decreasing over time and topic modeling to Twitter data, and also revealed that the most popular topics discussed were Education, Bard, Search Engines, OpenAI, Marketing, and Cybersecurity.

This paper approximated with the recent literature by using the sentiment analysis Open AI ChatGPT as methodology (Robisco, A and Carbó, J., 2023), that enabled to create a sentiment score (Auer, R., Cornelli, G. and Frost, J., 2020; Prodan S., Dabija D. and Marincean L.,2023) covering LexisNexis News & Business database (Wang, Y. et al, 2022). Furthermore, we created a CBDC Sentiment index (Wang, Y. et al, 2022) and analyzed the sentiment result classifying in positive, neutral and negative and revealed that the most popular topics (Koonchanok, R., Pan, Y. and Jang, H. 2024).

Database and Data Cleaning

We chose The LexisNexis Business database following the Wang, Y. et al (2022) rationale that covers a very wide variety of newspapers and news-wire feeds, including but not limited to news-wire feeds and media news transcripts, instead of restrict the analysis for tweets (Prodan S., Dabija D. and Marincean L. 2023) or Central Bank speeches (Auer, R., Cornelli, G. and Frost, J.,2020). To differentiate from literature, this study captured the news-wire feeds and media news of different CBDC projects and not only the expression CBDC.

Thus, we run the query on LexisNexis Business platform for the period between January 2016 and June 2024 with the key words: "CBDC" OR "Central Bank Digital Currenc![1]" OR the name of each CBDC project identified by Bank of International Settlement (BIS) as of March 1st 2024[2] (Auer, R., Cornelli, G. and Frost, J., 2020).

[1] The query with the exclamation mark "!" include singular and plural forms of the same word.
[2] See the table on the Appendix A.

The data cleaning had three steps: first step we specified the search for the key words on the "title" instead of on the "content", "headline", "hlead" of each news, because resulted in a more accurate news related only to CBDC and their projects rather than other subjects in the same news that cause a confusion of the sentiment that should be analyzed.

The second step we selected "group duplicate moderate" option on LexisNexis to avoid duplicate results as much as possible (Wang, Y. et al 2022), however, this filter does not eliminate similar news published by different media vehicles, precisely to capture the intensity that one same topic can generate. The third step was to remove news related to the expressions "Canadian Board Diversity Council (CBDC)" and "e Dollar Monitor" that were generated on the LexisNexis query, since are not related to Central Bank Digital Currencies or their projects, but a coincidence of the same key words "CBDC" and "e-Dollar".

After this process, the resulting dataset of 11,679 news was used for our analysis.

Methodology

Use of Open AI ChatGPT-4.0 on sentiment analysis

This study assumed that at this moment ChatGPT 4.0[3] is the best method and more innovative model to generate sentiment analysis. In addition, Robisco, A and Carbó, J. (2023) paper observed that ChatGPT exhibits a higher degree of alignment because it can capture subtler information than others large language models (LLM), like BERT. And DAI, H. et al (2023) considered that ChatGPT is a game changer in natural language processing (NLP), since LLMs are accessible to the general public through a user-friendly chatbot interface and has emerged as a general-purpose problem solver for many NLP applications. ChatGPT can be used on a comprehensive set of NLP tasks, including common benchmarks in natural language inference, arithmetic reasoning, named entity recognition, sentiment analysis, question answering, dialogue and summarization.

In this sense, to interact with ChatGPT it is necessary to specify the task to be the prompt. The prompt can be as flexible as necessary, from asking to summarize a text, to make up a story, to translate a sentence or to calculate the sentiment. The flexibility in determining the task and ChatGPT's ability to understand it allows us to ask ChatGPT the sentiment in a text about specific topics (like CBDC) and from various angles if necessary (Robisco, A and Carbó, J., 2023).

The selection of the prompt is very important, as different prompts could yield different results. In the prompt we asked ChatGPT to compute the sentiment between -1 and 1, therefore we didn't need any further transformation (Robisco, A and Carbó, J., 2023).

Fine tuning ChatGPT-4.0 prompt

ChatGPT is not infallible and may be subject to errors, like higher sensitivity to the length of texts, and prompt engineering (Robisco, A and Carbó, J., 2023). Thus, we performed two fine tunings.

First, we tested different prompts asking to calculate the sentiment score of the lead of each news presented on Table 1.

[3] GPT-4.0 that is the fourth iteration of the Generative Pre-trained Transformer (GPT) series, a large language models designed for natural language processing tasks capable of understanding and generating human-like text based on the input it receives (Open AI, 2024).

Table 1

#	Prompts tested
1	Compute the sentiment score towards Central Bank Digital Currencies, measured between -1 and 1, of a given text. The response should be just a float number, no text. Reply the result for each sentence of the column "Hlead" of the spreadsheet attached on the column "chatgpt result".
2	Compute the sentiment score towards Central Bank digital currencies for each sentence of the column "Hlead", considering the column "chatgpt result" the measured should be a float number between -1 to 0 for negative, 0 for neutral and 0 to 1 for positive. Reply the result of the spreadsheet attached on the column "chatgpt index".
3	Compute the sentiment score towards Central Bank digital currencies for each sentence of the column "Hlead", as negative, positive or neutral. Reply the result of the tab "Total" of the spreadsheet attached on the column "chatgpt result" in a new spreadsheet.

Source: Own elaboration.

We draw a conclusion that the prompt should guide the ChatGPT-4.0 to what is considered negative and positive towards CBDC to have a better accuracy of the sentiment score, as stated below:

"*Analyze the sentiment score related to the topic "Central Bank digital currencies" for each sentence of the column "Hlead" of the spreadsheet attached. Reply the result as negative, positive or neutral on the column "chatgpt result" and a float number between -1.0 and 1.0 on the column "chatgpt index" in a new spreadsheet. Please consider that expressions related to "concerns", "reject" "Anti-CBDC", "CBDC opposition", "oppose the development", "against CBDC", "ban the creation", "never allow", 'block CBDC" are negative and expressions related to "commitment to CBDC", "step toward of CBDC", "launch CBDC", "support CBDC's projects", "develop CBDC", "create CBDC" are positive.*"

Second, the sentiment analysis was based on the lead (opening paragraph of the news) instead of the title or the entire text, since this part is considered the most important part of a news story and already gives the readers information in a clear, concise and interesting manner and establishes the voice and direction of an article.

CBDC Sentiment Score index construction (CBDCSX)

The equation of the CBDC and Project index (CBDCSX) was aligned with the Cryptocurrency Policy Uncertainty Index (CBDCUI) and CBDC Attention Index (CBDCAI) equation (Wang, Y. et al, 2022).

The CBDC Sentiment Score index (CBDCSX) was calculated as in Eq. (1):

$$\mathrm{CBDCSX}_t = \frac{N_{1t}-\mu_1}{\sigma_1} + 100 \qquad \text{Equation 1}$$

Where $CBDCSX_t$ is the value of the *CBDCSX* in the weeks *t* between January 2016 and June 2024, N_{1t} is the weekly observed value of LexisNexis news articles concerning the CBDC attention, μ_1 is the mean of these and, σ_1 is the standard deviation of such. Adding an average value of 100 to eliminate the potential negative impacts caused by the overall volume of articles varies across publication sources and time.

Sentiments for selected topics
To deepen the sentiment analysis and based on the Koonchanok, R. Pan, Y. and Jang, H. (2024) paper, this study listed the 50 most common words of all news classified as positive, neutral and negative, per year from 2018 to 2024. Regardless the words "Central" "Bank", "Digital" "Currencies", Currency" that were part of the original query and excluding 2016 and 2017, because these years had few news to be analyzed.

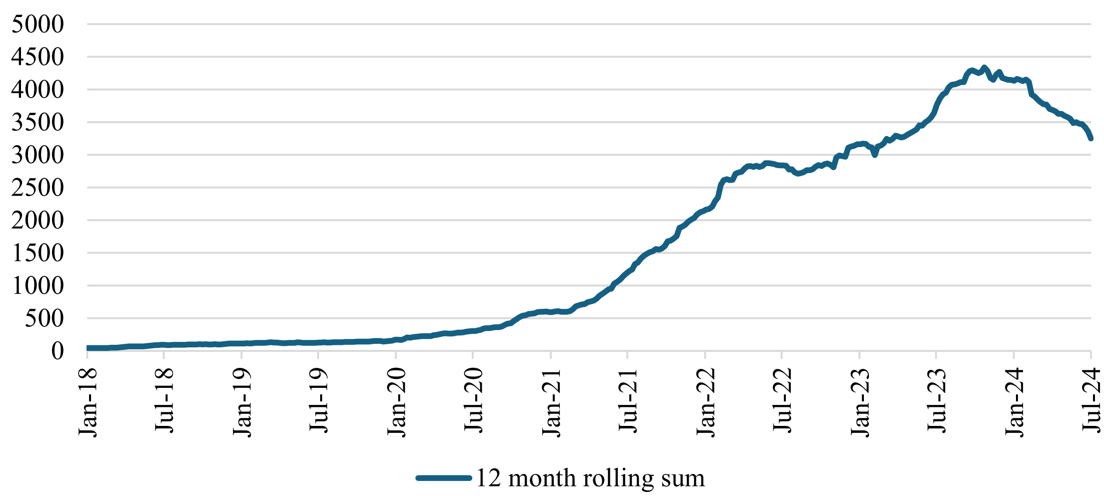
After this step, these words were grouped according to topics that had a relation, in order to understand the subjects that most have attention, the sentiment over the years, and compare each other.

Descriptive analysis

The results of the sentiment analysis show that there are 6,903 news classified as positive, which represents 59,11% of the total number of news, 1,705 news classified as negative, which represents 14.60% of the total number of news and 3,070 tweets classified as neutral, which represents 26.28% of the total amount of news.

Graphic 1 reflects 12 month rolling sum of CBDC and CBDC's project news, inspired by the Auer, R., Cornelli, G. and Frost, J., (2020) graphic, which indicates an increase of attention about this theme after 2020 (covid and pos covid pandemic), especially in the rolling sum of 2022 and end of 2023, however a decrease in 2024.

Graphic 1 - Timing of news on CBDC and CBDC's project

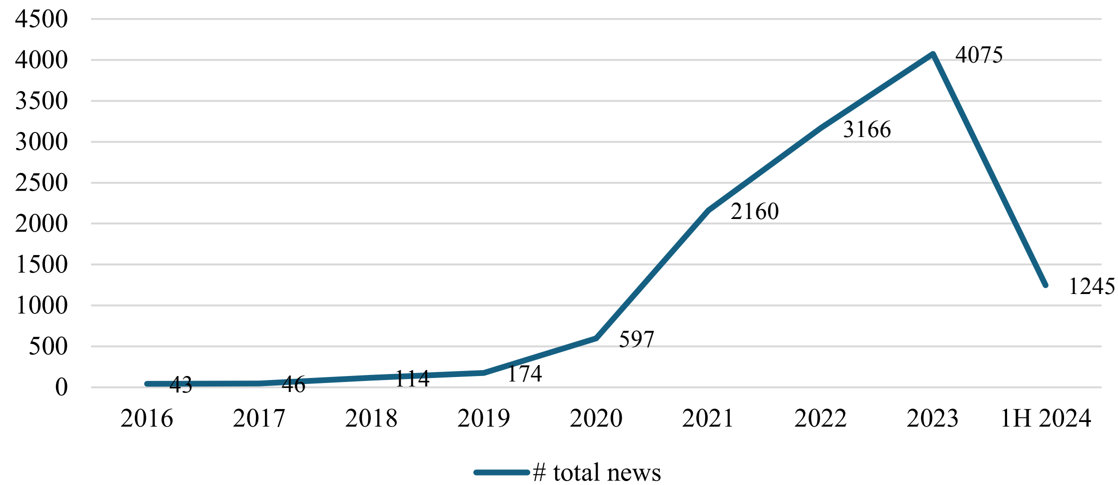


Source: LexisNexis. Own elaboration.

Moreover, we have to point out that the overall volume of news (Graphic 4), regardless of the sentiment score classification, demonstrates a similar movement with the Graphic 1, an increase of attention after 2020 with a peak in 2023 and a decrease on the first half of 2024 of the volume proportionally.

DOI: 10.2478/picbe-2025-0116, pp. 1471-1505, ISSN 2558-9652 |
Proceedings of the 19th International Conference on Business Excellence 2025

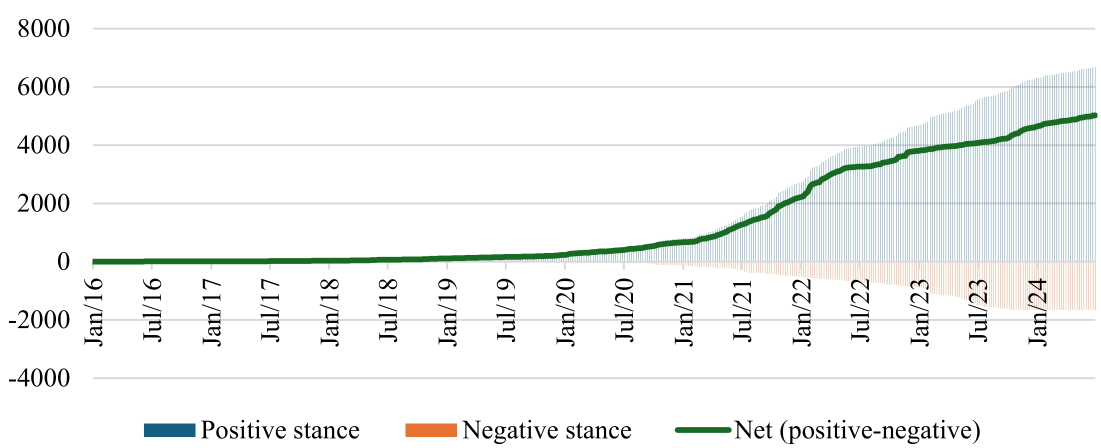
Graphic 2 - Total amount of news per year



Source: LexisNexis. Own elaboration.

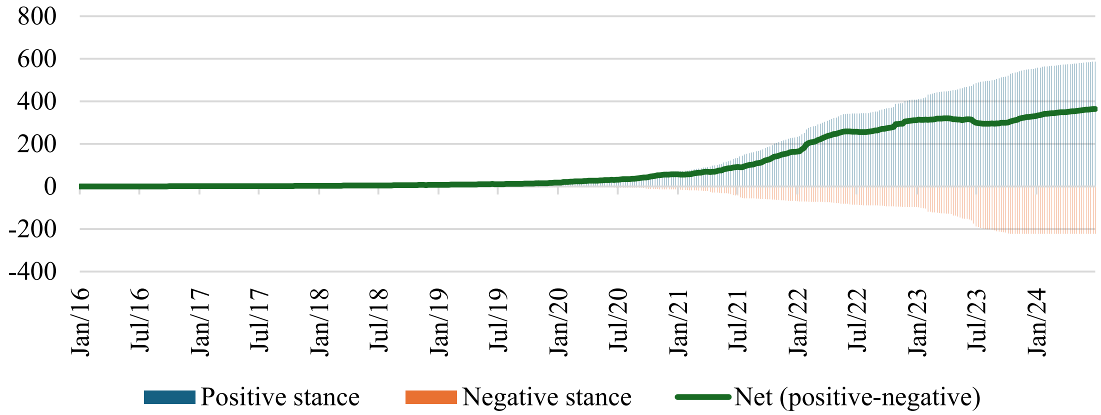
Graphic 3, based on the cumulative count graphic of Auer, R., Cornelli, G. and Frost, J., (2020), shows that since late 2021 there is a growing number of positive and negative news about CBDCs, but always the number of positive news exceeds negative news. Considering the scores, Graphic 4 indicates there was a growing number of negative news about CBDCs late 2024 with scores closer to the most negative classification that is -1, however still not surpassing the positive news.

Graphic 3 - Cumulative count of news on CBDC and CBDC's project



Source: LexisNexis. Own elaboration.

Graphic 4 - Cumulative sentiment score of news on CBDC and CBDC's project



Source: LexisNexis. Own elaboration.

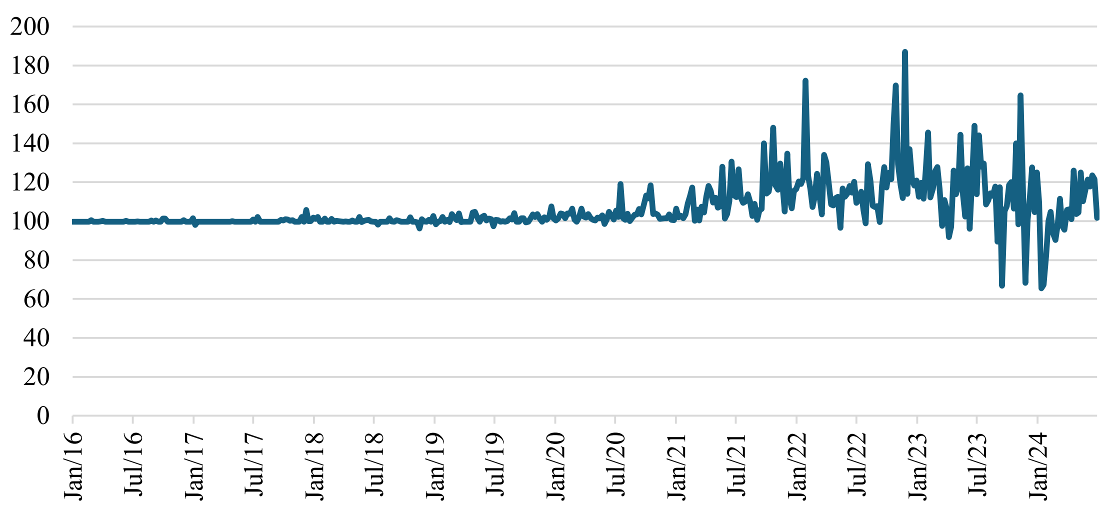
Results

CBDCSX index

This paper introduces the new measure CBDCSX index sentiment analysis for CBDCs and their projects that can be used by researchers, investors, and financial regulators in their subsequent work.

Graphic 5 shows the CBDCSX index from January 2016 to June 2024 and allows to separate the analysis into three periods: i. Between 2018 and 2020 the index is close to 100 that means that were more neutral news or positive and negative news were netted, ii. From 2021 to 2022 the index demonstrated volatility, however most of the time it was higher than 100, iii. Between 2023 and first half of 2024 the index was lower than 100 several times, that indicates that that had more negative news in relation to other periods.

Graphic 5 - CBDC index



Source: LexisNexis. Own elaboration.

Table 2 and table 3 display the events that drove to 10th highest CBDCSX index and 10th lowest CBDCSX index, respectively. On the one hand, the highest numbers were related to launches of CBDC pilots, such as Rupee and e-Naira. On the other hand, the lowest numbers were related to political events, including political speeches, and legislation/ consultation towards CBDC during 2023 and 2024.

Table 2. 10th highest score of CBDCSX index

Week		CBDCSX Index	Events mentioned in the news
Nov/28/2022	Dec/04/2022	187,03	RBI to launch first pilot of retail digital rupee on December 1.
Jan/31/2022	Feb/06/2022	172,14	RBI to introduce Digital Rupee.
Oct/31/2022	Nov/06/2022	169,81	RBI to launch the pilot of wholesale Digital Rupee on 1st November.
Nov/13/2023	Nov/19/2023	164,55	Kazakhstan's National Bank launches digital tenge project.
Oct/24/2022	Oct/30/2022	149,65	ENaira celebrates one year as Digital Currency in Nigeria.
Jun/26/2023	Jul/02/2023	149,02	European Union kicked off the digital euro proposals.
Oct/25/2021	Oct/31/2021	147,98	Nigeria launches eNaira digital currency.
Feb/06/2023	Feb/12/2023	145,63	UK launches formal consultation for digital pound.
May/15/2023	May/21/2023	144,44	Kazakhstan Central Bank marks digital tenge pilot with first retail payment.
Jul/10/2023	Jul/16/2023	144,12	HDFC Bank has introduced a QR code that can be used for both CBDC and UPI payments.

Source: LexisNexis. Own elaboration.

Table 3. 10th lowest score of CBDCSX index

Week		CBDCSX Index	Events mentioned in the news
Jan/15/2024	Jan/21/2024	65,45	Trump Plans to Ban the Creation of Digital Dollar.
Sep/18/2023	Sep/24/2023	66,75	House Republicans' proposed legislation opposes U.S CBDC efforts.
Jan/22/2024	Jan/28/2024	67,30	Digital Pound Consultation.
Nov/27/2023	Dec/03/2023	68,30	Bank of Canada publishes report on digital dollar consultations.
Jan/29/2024	Feb/04/2024	82,52	Trump Calls CBDC very dangerous after vowing to prohibit FED digital dollar.
Sep/04/2023	Sep/10/2023	89,47	European Parliament sceptical of Digital Euro.
Feb/26/2024	Mar/03/2024	90,38	US Senators reject Joe Biden's CBDC plans.

Week		CBDCSX Index	Events mentioned in the news
Apr/10/2023	Apr/16/2023	91,79	Florida lawmakers file legislation to reject CBDC.
Feb/19/2024	Feb/25/2024	94,00	ECB responds to banking industry concerns over digital euro.
Mar/25/2024	Mar/31/2024	95,56	Global SWIFT network is already adapting to new CBDC.

Source: LexisNexis. Own elaboration.

Sentiments for selected topics

Appendix B shows the results of the 50 most common words from the news separated according to classification positive, neutral and negative from 2018 to 2024 per year with the number of times each word appeared.

Then, we grouped the words and analyzed the classification of the sentiments on the following related topics: CBDC segment (wholesale and retail), government officials and personalities, currencies and CBDC's projects, countries and regions, cryptocurrencies, and information security. The evolution reveals that same words increased the number of times that appeared on the news over the years.

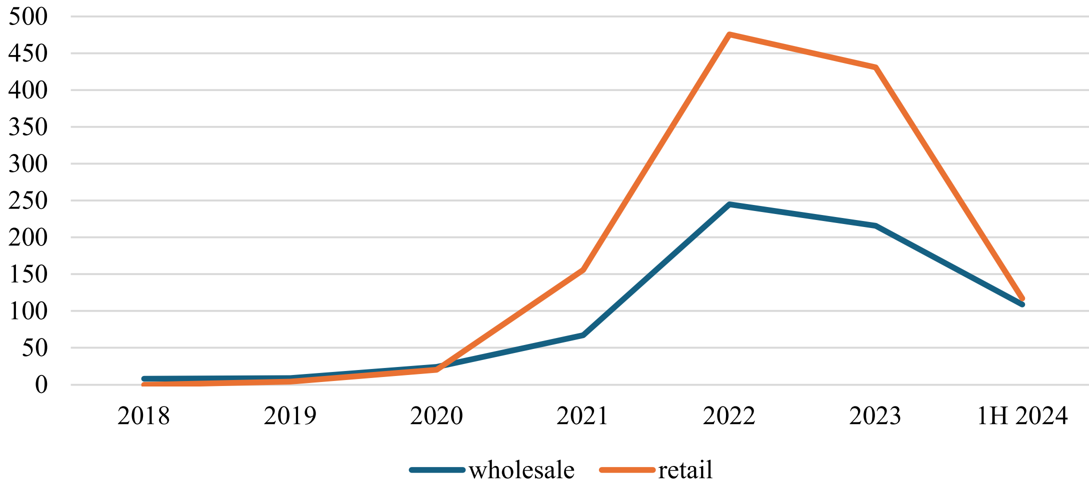
CBDC segment (wholesale or retail)

The CBDC projects can be classified into two segments (retail and wholesale) with different purposes, but they can coexist at the same time. The retail CBDC is intended for households and firms, it differs from existing forms of cashless payment instruments, such as credit transfers, direct debits, card payments and e-money, as it represents a direct claim on a Central Bank rather than the liability of a private financial institution. While the wholesale CBDC targets banks, Central Banks and other financial institutions, that would serve a similar role as today's reserves or settlement balances held at Central Banks (Iorio, A. Kosse, A and Mattei, I. 2024).

Graphics 6, 7 and 8 show an increase of news classified as positive in 2022 and an increase of news classified as negative in 2023 for both segments. Comparing the two segments, between the period of 2021 and 2023, there was more news related to retail projects rather than wholesale. However, there was a change in the first half of 2024, when the number of news covering retail became similar to the number of news covering wholesale.

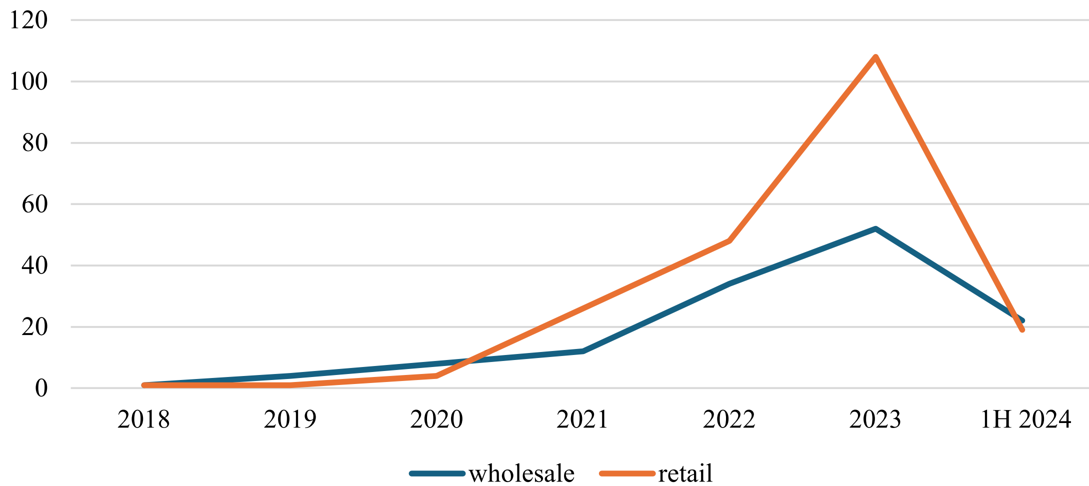
This movement is in line with the progression of CBDC experiments and pilots. Over the course of 2023 there has been a sharp uptick in experiments and pilots with wholesale and in 2024, the likelihood that Central Banks issuing a wholesale CBDC within the next six years exceeds the likelihood of issuing a retail CBDC (Iorio, A. Kosse, A and Mattei, I. 2024).

Graphic 6 - CBDC segment (Positive)



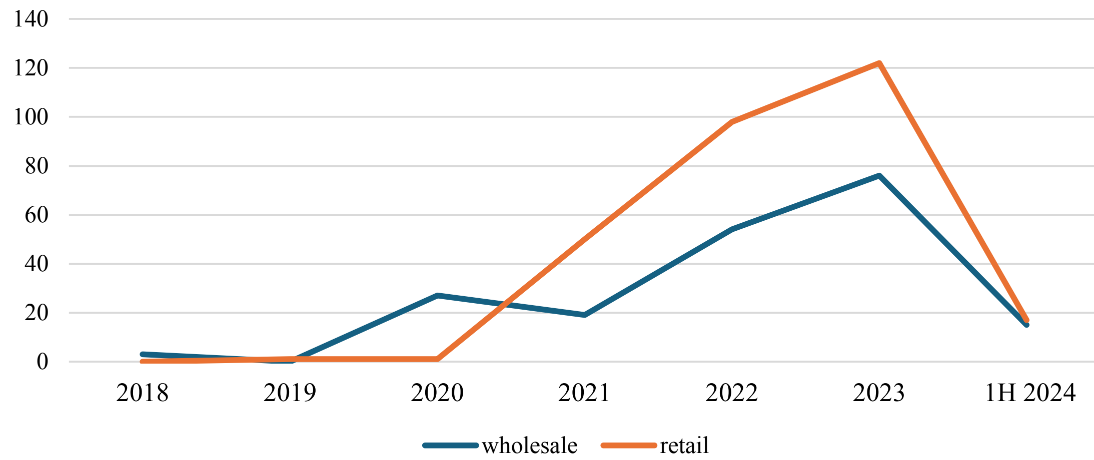
Source: LexisNexis. Own elaboration.

Graphic 7 - CBDC segment (Negative)



Source: LexisNexis. Own elaboration.

Graphic 8 - CBDC segment (Neutral)



Source: LexisNexis. Own elaboration.

Government officials and Personalities

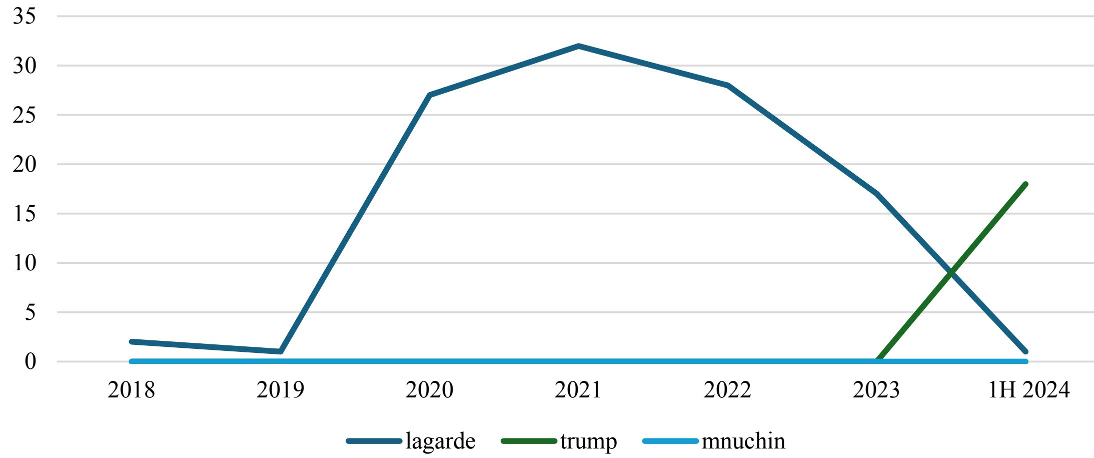
The launch of a CBDC is not only an economic decision, but certainly a political decision, consequently "government officials and personalities" names are one the words that most appear on the news. For example, the issuance of a digital euro -at this moment is in pilot stages- is a response to digitalization and geopolitical tensions, since it would strengthen the strategic autonomy of Europe and increase their resilience (Nagel, J. 2024)**.**

Graphic 9, 10 and 11 show that Christine Lagarde, French politician who has been serving as President of the European Central Bank since 2019, is the government official that most appears speaking about CBDC over this period with more positive news, with a total of 199 news, which 54,2% is news classified as positive, 20% as negative and 25,6 as negative.

On the other hand, Donard Trump, businessman and former president of United States of America and currently presidential candidate had a spike of negative news in 2024, with a total 81 news, which 22% is classified as positive, 71,6% as negative and 0,06 as neutral. And Mnuchin, U.S. Treasury Secretary and President Trump's foremost economic adviser, also appeared in news classified as negative, however the number was low in comparison these other personalities.

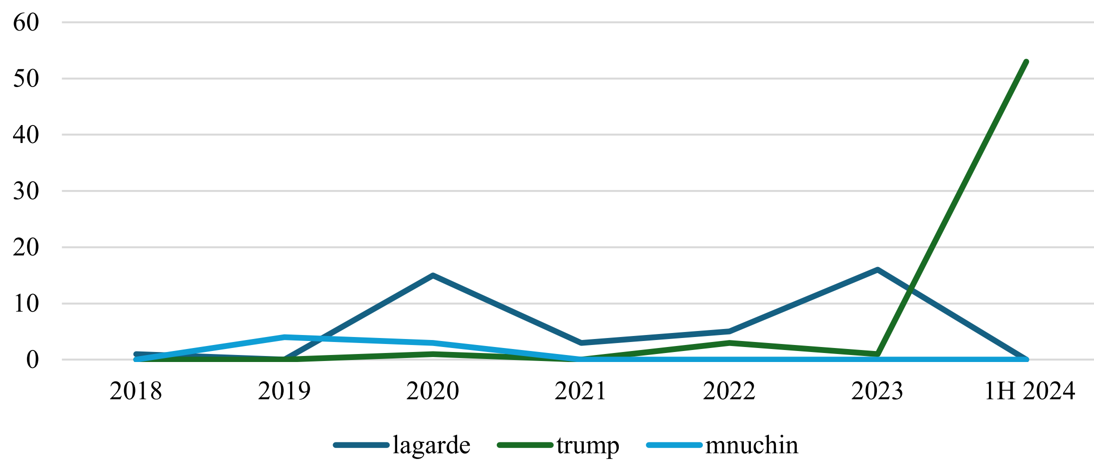
It's also worth mentioning that although President of United States Biden appeared in several news, his name was not identified as one of the 50 most common words in neither positive, negative or neutral news.

Graphic 9 - Government officials and Personalities (Positive)



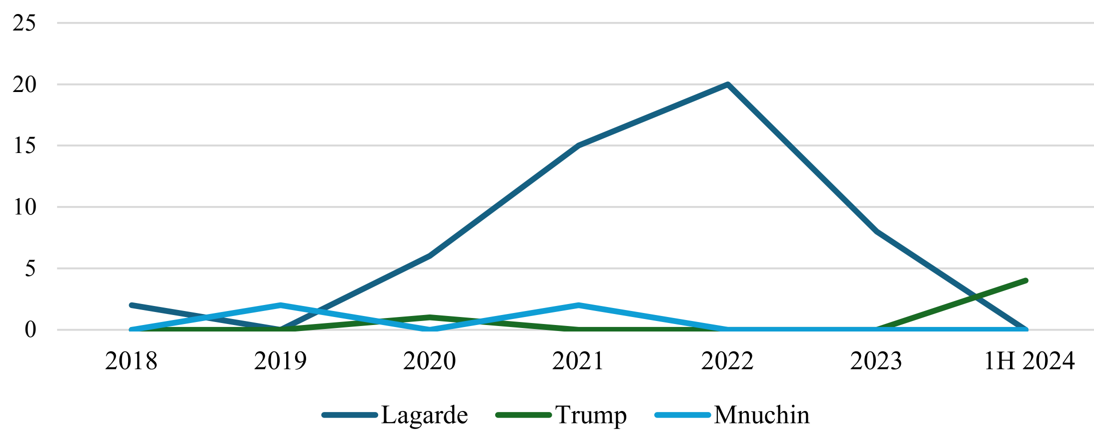
Source: LexisNexis. Own elaboration.

Graphic 10 - Government officials and Personalities (Negative)



Source: LexisNexis. Own elaboration.

Graphic 11 - Government officials and Personalities (Neutral)



Source: LexisNexis. Own elaboration.

Currencies and CBDC's projects

A survey conducted by the BIS showed that almost 93 percent of responding Central Banks are currently engaged in some form of CBDC research (Balz, B. 2024), therefore different currencies and projects appear on the news relating to their progress on CBDC status.

We highlighted from Graphics 12, 13 and 14 the currencies and CBDC's projects that most appeared in the news by decreasing order: Euro, Dollar, Rupee, E-naira and Pound Sterling.

Euro had a relevant increase of news in 2023, with 1181 news classified as neutral/positive and 243 news classified as negative. The three subjects and facts that appeared with more frequency on the news in 2023 are: i.Pilot test being carried out in Spain (the country chosen to carry out the first tests of this currency). ii. European Central Bank has approved recommendations that would make digital currencies available within third-party bank apps. iii. UK Central Bank announcement of an implementation phase and pilot later 2023, with a final ruling expected in 2026 or 2027. The Eurosystem – which comprises the European Central Bank (ECB) and other national Central Banks in the euro area – is actively working on the possible issuance the digital euro, based on the key motivations behind: European payments landscape is highly fragmented, despite a number of initiatives over the years to join forces and to work on a joint European solution, still do not have a European payment solution that can be used across the entire euro area and that runs on a European infrastructure; second, there is a growing trend towards cashless payments in Europe; lastly the promotion of competition and innovation in European payments (Balz, B., 2024).

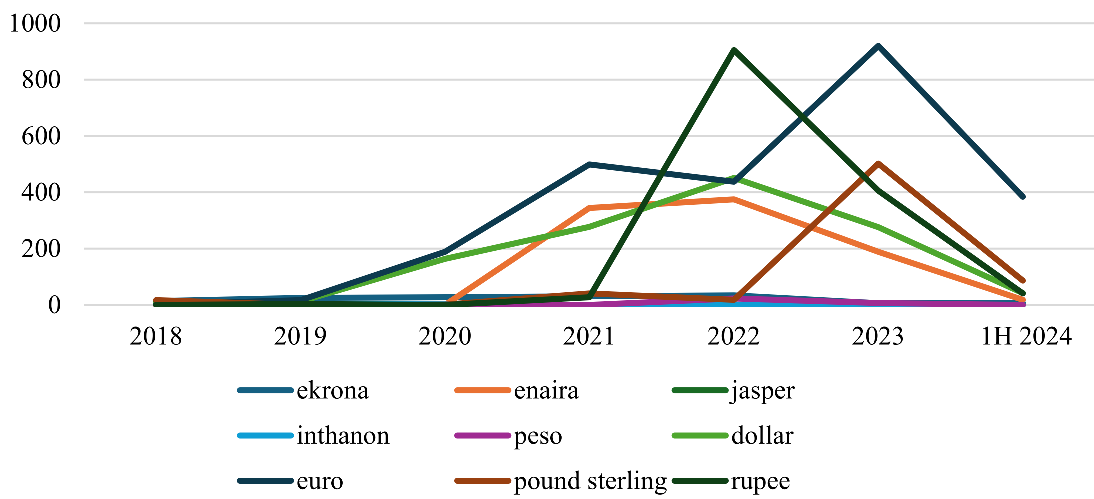
Different from the other digital currencies, the Dollar showed a movement of increase of news from 2019 reaching the highest number in 2022 and a decrease in the next years. The main topic over the year of 2022 was related to the U.S. Federal Reserve (FED) research of the potential benefits and risks of a digital dollar and the Digital Dollar Project (DDP) initiative to explore the technical implementations of a CBDC.

The digital Rupee had a spike of news in 2022, in which 905 news were positive, 107 neutral and 146 negative news, however demonstrated a decrease of attention on the following months. This movement was due to the news related to the launch of the wholesale pilot on 1st November 2022 and retail pilot on December 1st, 2022, what indicates that the overall media had a good sentiment and attention of the India's digital currency. The following arguments support the benefits of the digital Rupee: i. The Indian government has expressed an interest and has taken steps to support the development and adoption of e-Rupee. ii. Greater security compared to traditional physical money by leveraging advanced cryptographic protocols, multi-factor authentication, decentralized ledger technology, reduced susceptibility to physical theft, and more efficiency, especially for remote or rural areas. iii. Cross-border improvement and money transfer; iv. Reduction of the expenses associated with managing, printing, and distributing physical currency. v. Data and information used to improve the effectiveness of economic policies. However, there are also short term and midterm challenges of issuing digital currency, such as: i. Miss of clear guidelines on the usage of digital currencies; ii. Rural areas where high-speed internet facilities are still not available; iii. Struggle to process large volumes of transactions simultaneously; iv. Increase in cyber-attacks and digital thefts; v. Competition from other digital payment options, such as bank-based digital payment systems and cryptocurrencies (Haque, A. and Shoaib, M. 2023).

E-naira is the CBDC from Nigeria, the world's second CBDC launched on 25 October 2021, event that generated an increase of amount of news in 2021, with 344 news classified as positive, 116 news classified as negative, and 86 news classified as neutral. The e-Naira retail is primarily used for smaller retail payments. The benefits of this digital currency are improving cross-border payments, including cheaper remittances to Nigeria and facilitate trade and competition between e-Naira and bank deposits (Alberola E., and Mattei, I. 2022).

Pound Sterling was the fifth currency that appeared most on the news, especially in 2023 due to the release of a consultation paper explaining the proposed digital pound. However, at the same time there was an increase of news classified positive as United Kingdom is a step closer to launching a CBDC, there was also negative news of caution and privacy concerns which stops the progress to issue digital pound sterling.

Graphic 12 - Currencies and CBDC's project names (Positive)



Source: LexisNexis. Own elaboration.

DOI: 10.2478/picbe-2025-0116, pp. 1471-1505, ISSN 2558-9652 |
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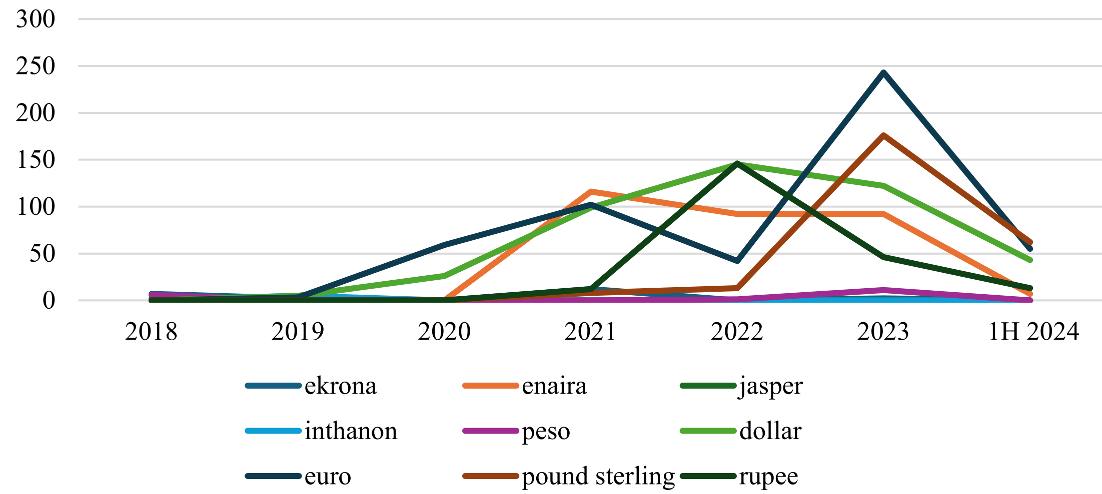
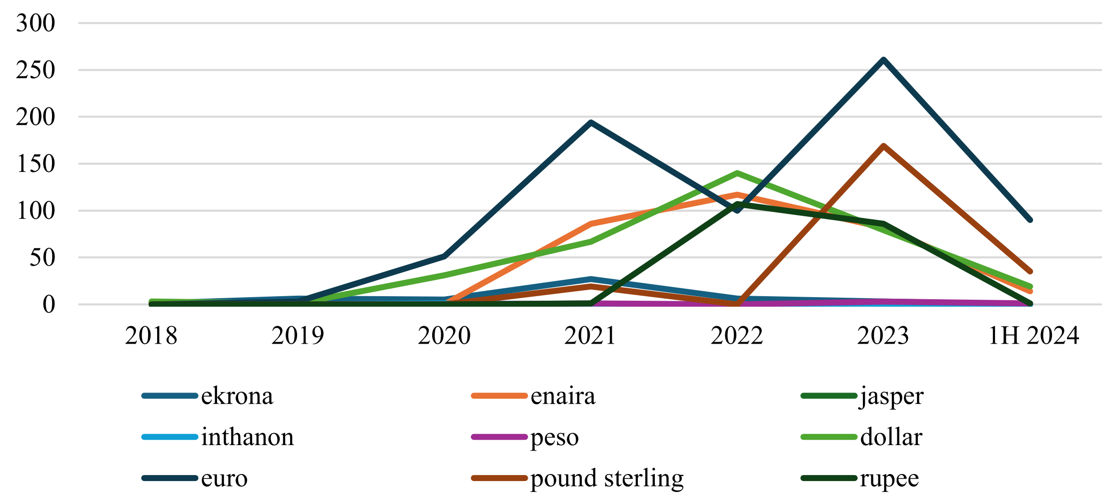
Graphic 13 - Currencies and CBDC's project names (Negative)



Source: LexisNexis. Own elaboration.

Graphic 14 - Currencies and CBDC's project names (Neutral)



Source: LexisNexis. Own elaboration.

Countries and Regions

We analyzed the graphics 15, 16 and 17 with more details for India, China, Euro Zone[4], England, United States, Venezuela and Nigeria and separated the countries according to Table 4, based on the project status.

Launched (officially and fully launched): Nigeria launched the CBDC eNaira on 25 October 2021, as the first of its type in Africa, graphics show that after this period this CBDC didn't receive further attention of the media.

[4] Countries part of the the Euro Zone, (e.g. Lithuania and Schweden) that appeared in a separately, we consolidated with the word "European".

DOI: 10.2478/picbe-2025-0116, pp. 1471-1505, ISSN 2558-9652 |
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Pilot (developed CBDC that is tested in a real environment either with a limited number of parties or on a wide scale): India had a spike in positive news in 2022, same year that launched the pilot of retail and wholesale Digital Rupee. And China has more news classified as positive rather than negative or neutral, also there is no spike in a specific period, what suggest that the media's attention on this country has been in continuing in progress, as two pilots e-CNY and mBridge evoluates. European had an increase of news related to the Digital Euro in 2021 and 2023. The preparation phase of the project started in November 2023 and is laying the foundations for the potential issuance of a digital euro.

Research (first explanatory CBDC research) or Proof of concept (advanced research stage and have published a CBDC proof of concept): England/ United Kingdom was one of the first countries announcing a CBDC project, but is still under analysis, in 2023 had a spike of news due to the Bank of England and Treasury consultation. United States is the country with more news classified as negative, specially from 2021 up to 2024, their projects were just announced in 2020 and are with the status proof of concept and research.

Inactive (officially fully launched a CBDC (launched) and no further updates available): Venezuela's first step towards a CBDC came in 2017, in 2021 Venezuela's Central Bank announced that would launch a digital bolivar that generated spike of news. After this date, there were no further news and the project became inactive.

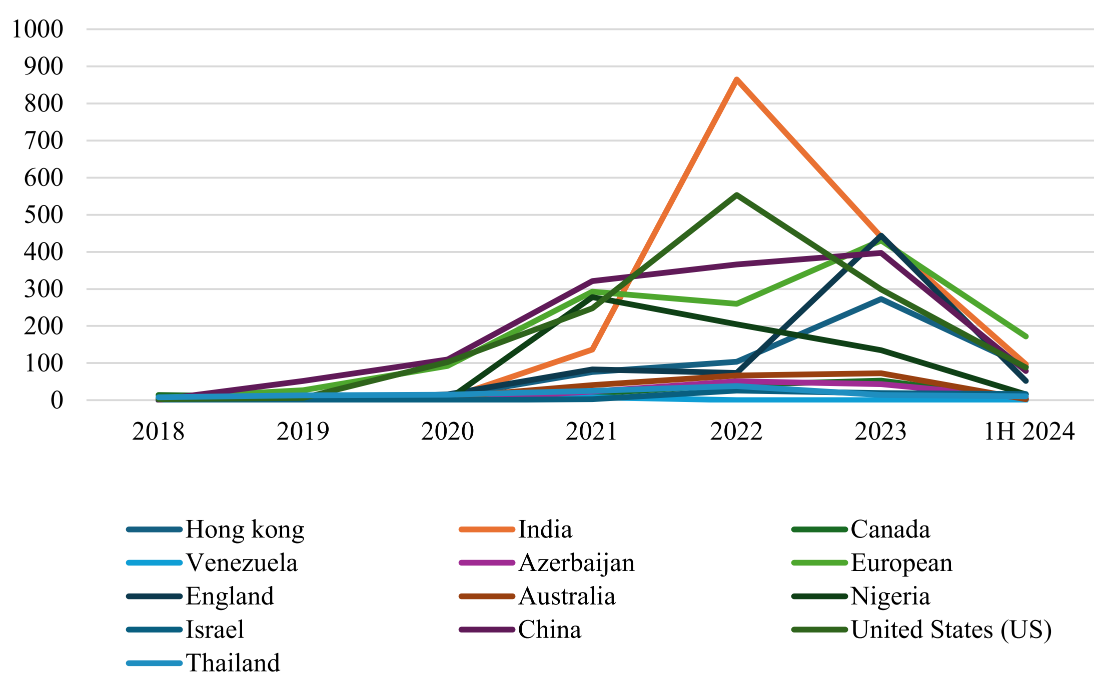
Table 4 - CBDC Project status

Digital currency	Country / Region	Announcement Year	Status
eAUD (wholesale)	Australia	2020	Proof of concept
Project Atom		2020	Proof of concept
eAUD (retail)		2020	Research
Mandala		2023	Research
Azerbaijan CBDC	Azerbaijan	2022	Research
Jasper-Ubin	Canada	2019	Proof of concept
Jasper		2016	Proof of concept
Digital Loonie		2017	Research
e-CNY	China	2014	Pilot
mBridge		2022	Pilot
China CBDC		2014	Research
Wholesale Digital Euro	Euro Area	2022	Pilot
Retail Digital Euro		2021	Research
Stella		2016	Research
mBridge	Hong Kong	2022	Pilot
e-HKD		2019	Proof of concept
Inthanon-LionRock		2019	Proof of concept
Project Ensemble		2019	Research
Project Aurum		2022	Research
Sela		2022	Research
LionRock		2019	Research
Digital Rupee	India	2020	Pilot

Digital currency	Country / Region	Announcement Year	Status
e-Naira	Nigeria	2021	Launched
Digital Pound	United Kingdom	2018	Research
United Kingdom CBDC		2018	Research
RSCoin		2015	Research
e-shekel	Israel	2017	Proof of concept
Sela		2023	Research
Project Icebreaker		2022	Research
Digital bolivar	Venezuela	2017	Inactive
Project Hamilton	United States	2020	Proof of concept
Project Cedar Phase II x Project Ubin+		2022	Proof of concept
Digital Dollar		2020	Research
Wholesale Digital Dollar		2023	Research
mBridge	Thailand	2022	Pilot
Thailand CBDC		2020	Proof of concept
Inthanon-LionRock		2019	Proof of concept
Inthanon		2019	Proof of concept

Source: CBDC Tracker and atlanticcouncil.org. Own elaboration.

Graphic 15 - Countries and Regions (Positive)



Source: LexisNexis. Own elaboration.

DOI: 10.2478/picbe-2025-0116, pp. 1471-1505, ISSN 2558-9652 |
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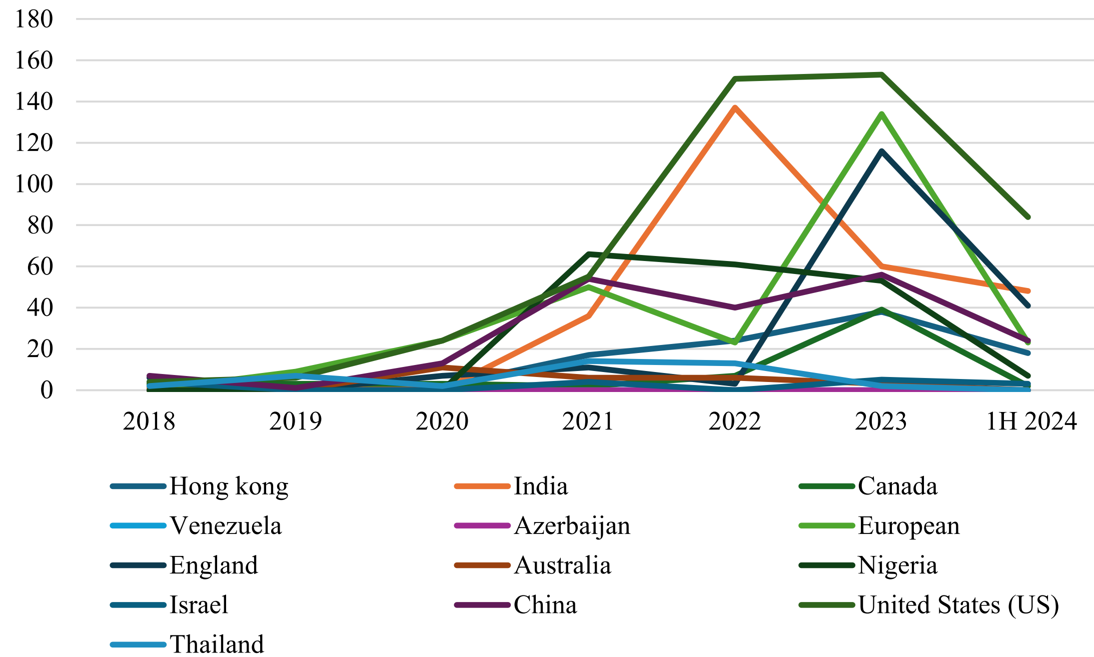
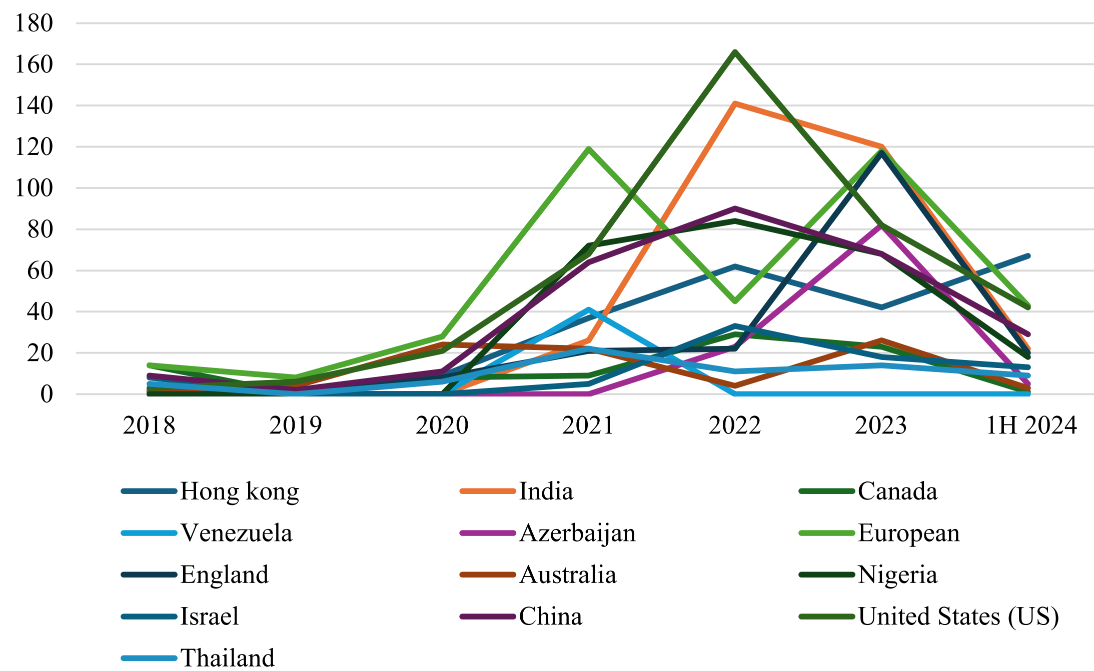
Graphic 16 - Countries and Regions (Negative)



Source: LexisNexis. Own elaboration.

Graphic 17 - Countries and Regions (Neutral)



Source: LexisNexis. Own elaboration.

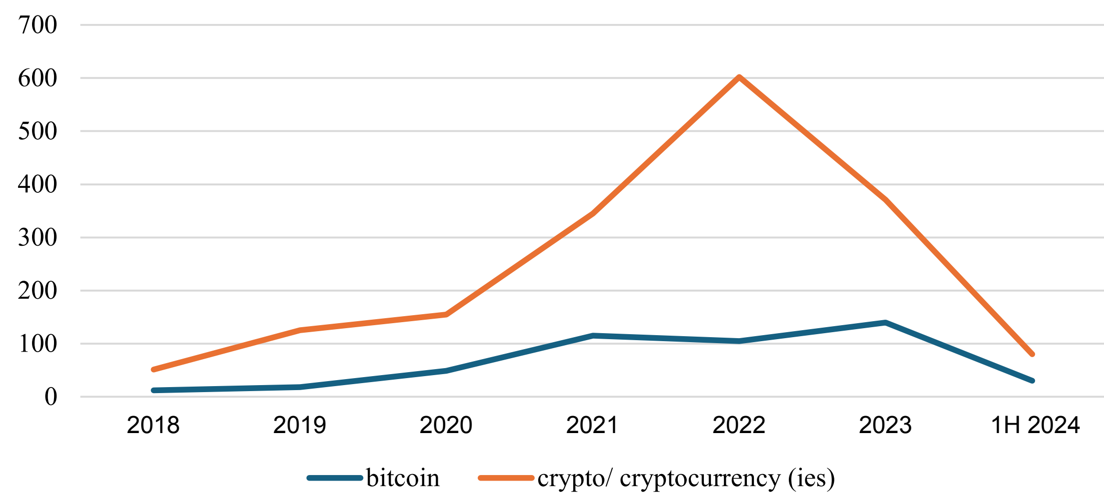
Cryptocurrencies

The purpose of this analysis is to understand if the CBDC is still linked to cryptocurrencies news or over the time. In this sense, we analyzed in a quantitative perspective to verify with the connection over the years was constant, increase or decrease and didn't analyze in the qualitive perspective of, because it would not be clear if the positive or negative sentiment is related to CBDC or to cryptocurrencies (or bitcoin).

The context of news about CBDC also mentioning cryptocurrency (crypto or bitcoin) were four: i. Half of responding Central Banks (63%) said that they have accelerated their work on CBDCs in reaction to developments in stablecoins and other cryptoassets (Iorio, A. Kosse, A and Mattei, I. 2024). ii. India launched Digital Rupee on 1 December 2022 and at the same time, imposed a 30% tax on profits from virtual currencies to reduce the growing cryptocurrency markets; iii. The bankruptcy of FTX (Bahamas-based cryptocurrency exchange) in November 2022; iv. U.S. President Joe Biden signed an executive order to assess the risks and benefits of digital dollar and cryptocurrency.

Graphics 18, 19, and 20 show an increase in 2021, a peak in 2022 and a decrease in the following period, which shows that after the cryptocurrency winter period there was a decrease in news mentioning cryptocurrency associated with CBDC. Although, the total amount of news in 2023 was bigger than in 2022.

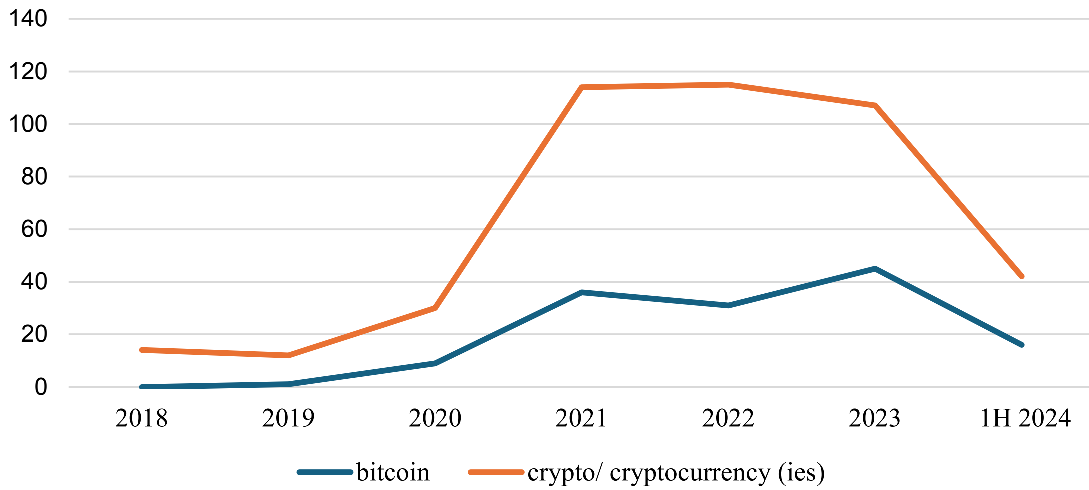
Graphic 18 - Cryptocurrencies (Positive)



Source: LexisNexis. Own elaboration.

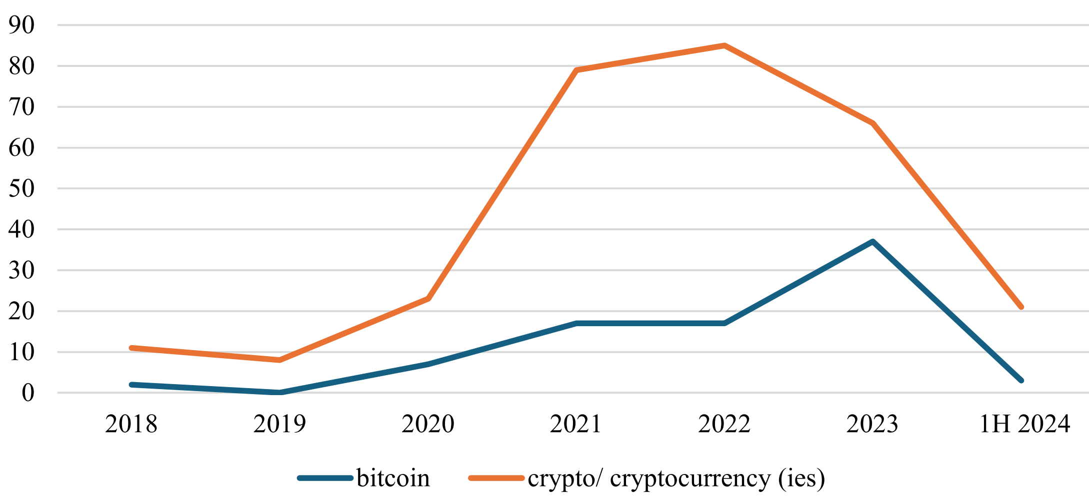
DOI: 10.2478/picbe-2025-0116, pp. 1471-1505, ISSN 2558-9652 |
Proceedings of the 19th International Conference on Business Excellence 2025

Graphic 19 - Cryptocurrencies (Negative)



Source: LexisNexis. Own elaboration.

Graphic 20 - Cryptocurrencies (Neutral)



Source: LexisNexis. Own elaboration.

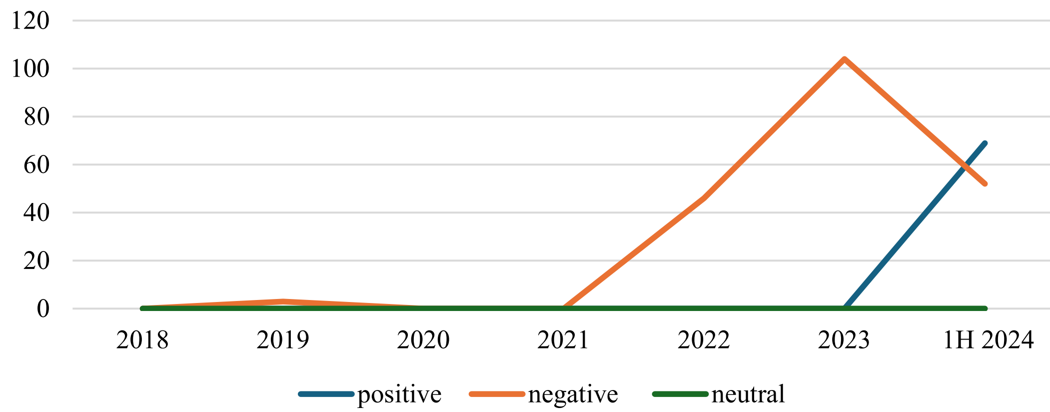
Information Security

Information security is a relevant concern of digital currencies, the words "cyber", "attacks" and "digital thefts" didn't appear as one of the 50 most common words from all news. However, the word "privacy" came across in more negative news, less positive news, and none neutral, which indicates that privacy is the most important caution related to CBDC. Graphic 24 shows an increase in 2021 of negative news mentioning privacy associated with CBDC and a peak in 2023. In 2024, the word "privacy" appeared associated with positive news related to CBDC.

The result of Eurosystem public consultation on a digital euro in 2021, reinforced that privacy was considered the most important feature of a digital euro by both citizens and professionals, the response of what they want most from a digital euro is privacy (43%), security

(18%), usability across the euro area (11%), the absence of additional costs (9%) and offline use (8%) (ECB, 2021).

Graphic 24 - Privacy



Source: LexisNexis. Own elaboration.

While CBDC data can bring benefits to societies, in particular aggregated data could help refine monetary statistics, fiscal policymaking, strengthen anti-money laundering and other controls against illicit activities. It could raise also raise concerns of data leakage and personal data are obtained legally, there is a risk of abuse (Murphy, K. et al., 2022).

The data protection legal frameworks various between countries, for example European Central Bank and the Bank of England have adopted a policy position where they will not be able to access or use CBDC personal data (Murphy, K. et al., 2022) and according to European Central Bank Board Member it would be more secure option when compared to privately issued cryptocurrencies, particularly stablecoins. In contrast, the Reserve Bank of India have emphasized the economic value of CBDC data (Murphy, K. et al., 2022). In addition, in May 2024, the U.S. issued the CBDC Anti-Surveillance State Act to prohibit the Federal reserve banks from offering certain products or services directly to an individual, to prohibit the use of central bank digital currency for monetary policy, and for other purposes.

Conclusion and further work

This paper assesses the sentiment score media news towards Central Bank Digital Currencies and their projects from January 2018 to June 2024 using Open AI Chat GPT-4.0. Based on this measure, a new index was created to CBDCs (CBDCPX index), and an analysis was performed of the expressions that most appeared on the news grouped by selected topics and sentiment score classification.

The focus is to understand the evolution of sentiment over the years; compare the perceptions according to the segment (wholesale or retail), government, projects/ countries, information security, and identify the events related to CBDC that trigger media's attention.

The empirical results suggest two conclusions:

i. Most of news related to CBDC from 2018 to 2024 are positive rather than negative, wherein events that drove to the highest CBDCSX index (more positive news) were related to the announcement of launches or pilot, such as digital Rupee and e-Naira; and to the lowest CBDCSX index (more negative news) were related to political events such as political speeches against the launch of a CBDC and legislation/ consultation.

ii. For the CBDC projects progress for the next years, the privacy concern should be overcome, since privacy is the main concern of citizens and professionals and that most appeared on the news, instead of “cyber”, “attacks”, “digital thefts”, and competition or association between cryptocurrency *versus* CBDC. Therefore, in the middle term, the likelihood of a Central Banks issuing wholesale CBDC exceeds of issuing a retail CBDC, due to the privacy risk being reduced. In long term, to CBDC become adopted by relevant economies, the regulatory and perception of privacy concern should be solved, since USA and Europe and their government officials (Trump and Christine Lagarde) were the most mentioned on the news related to CBDC.

The results presented here are useful for regulatory bodies, Central Banks, analysts, and other stakeholders interested in the CBDCs. Finally, we also mention that the analysis has room for further study, since there is no specific case of a CBDC in circulation from a relevant country to analyze the sentiment after the launch and although ChatGPT 4.0 seems to capture the sentiment better than other NLP models, it still can generate wrong responses and not be consistent. Therefore, in the future when big economies launch their CBDC and NLP and artificial intelligence more developed, it will be possible to enhance the accuracy of the response.

Declarations

Funding: Renata Alves is Researcher of the University Blockchain Research Initiative with scholarship of Silicon Valley Community Foundation (SVCF) and Fundação Getulio Vargas (FGV-EESP).

Competing interests: The author has no competing interests, or other interests that might be perceived to influence the results and/or discussion reported in this paper.

Appendix A

Table A1. CBDC retail and wholesale projects

Country	Type CBDC	Project
Argentina	Retail	Digital Argentinian Peso*
Australia	Retail	E-AUD*
Australia	Wholesale	
Austria	Wholesale	Projekt DELPHI
Azerbaijan	Retail	Digital Manat*
Bahrain	Retail	Digital Bahraini dinar*
Bangladesh	Retail	Digital Bangladeshi Taka*
Bhutan	Retail	Digital Ngultrum
Bhutan	Wholesale	
Brazil	Retail	Digital Fiat Currency
Brazil	Wholesale	Real Digital (wholesale)
Canada	Retail	E-dollar*
Canada	Wholesale	Project Jasper
Chile	Retail	Digital Chilean Peso*
China	Retail	e-CNY
China	Wholesale	
Chinese Taipei	Retail	Digital new Taiwan dollar*
Chinese Taipei	Wholesale	
Colombia	Retail	Digital Colombian peso*
Colombia	Wholesale	Digital Colombian Peso* (wholesale)
Curaçao and Sint Maarten Guilder	Retail	Digital Curaçao and Sint Maarten Guilder
Czechia	Retail	Digital-Koruna*
Denmark	Retail	E-krone*
Dominican Republic	Retail	Digital Dominican Peso*
Eastern Caribbean	Retail	DCash
ECB	Retail	Digital euro
Ecuador	Retail	Dinero Electrónico

DOI: 10.2478/picbe-2025-0116, pp. 1471-1505, ISSN 2558-9652 |
Proceedings of the 19th International Conference on Business Excellence 2025

Country	Type CBDC	Project
Estonia	Retail	Digital euro
Eswatini	Retail	E-lilangeni*
Eswatini	Wholesale	
Euro Area (ECB)	Wholesale	Project Stella
Fiji	Retail	Digital Fijian dollar*
Finland	Retail	Digital euro
France	Retail	Digital euro
France	Wholesale	
Georgia	Retail	Digital Gel
Ghana	Retail	e-Cedi
Haiti	Retail	Digital Gourde
Haiti	Wholesale	
Honduras	Retail	Digital Honduran Iempira*
Hong Kong SAR	Retail	e-HKD
Hong Kong SAR	Wholesale	Inthanon-LionRock
Hungary	Retail	Digital Hungarian forint*
Hungary	Wholesale	
Iceland	Retail	Rafkróna
India	Retail	e₹-R
India	Wholesale	Digital rupee* (wholesale)
Indonesia	Retail	Rupiah Digital
Indonesia	Wholesale	
Iran	Retail	Digital Rial
Israel	Retail	E-shekel
Italy	Retail	Digital euro
Jamaica	Retail	JAM-DEX
Japan	Retail	Digital yen*
Japan	Wholesale	Project Stella

Country	Type CBDC	Project
Jordan	Retail	Digital Jordanian Dinar*
Kazakhstan	Retail	Digital tenge
Kenya	Retail	Digital Kenyan shilling*
Korea	Retail	E-won*
Kuwait	Retail	Digital dinar
Lao	Retail	Digital Laotian Kip*
Lithuania	Retail	Digital euro
Luxembourg	Wholesale	Digital euro
Macao SAR	Retail	Digital Macanese Pataca*
Madagascar	Retail	eAriary
Malaysia	Retail	E-ringgit*
Malaysia	Wholesale	Project Dunbar
Mauritius	Retail	Digital Mauritian rupee*
Mauritius	Wholesale	
Mexico	Retail	Digital Mexican Peso*
Mongolia	Retail	Digital Mongolian Tugrik*
Morocco	Retail	Digital dirham*
Namibia	Retail	Digital Namibian dollar*
Namibia	Wholesale	
Nepal	Retail	Digital Nepalese rupee*
New Zealand	Retail	CBDC Series*
New Zealand	Wholesale	The Future of Money – Central Bank Digital Currency (wholesale)
Nigeria	Retail	eNaira
Norway	Retail	E-krone*
Norway	Wholesale	
Pakistan	Retail	Digital Pakistani Rupee*
Paraguay	Retail	Digital Paraguayan Guarani*
Peru	Retail	Digital Sol*

Country	Type CBDC	Project
Peru	Wholesale	
Philippines	Retail	Digital peso*
Philippines	Wholesale	Project CBDCPh
Poland	Retail	Digital Zloty
Poland	Wholesale	
Qatar	Retail	Digital Qatari Riyal*
Russia	Retail	Digital rouble
Saudi Arabia	Wholesale	Project Aber
Singapore	Retail	Digital Singapore dollar - Project Orchid
Singapore	Wholesale	Project Ubin
Solomon Islands	Retail	Bokolo Cash
Solomon Islands	Wholesale	
South Africa	Retail	Electronic legal tender
South Africa	Wholesale	Project Khokha
Spain	Retail	Digital euro
Spain	Wholesale	
Sri Lanka	Retail	Digital Sri Lankan Rupee*
Sweden	Retail	E-krona
Switzerland	Retail	E-franc
Switzerland	Wholesale	Project Helvetia
Tanzania	Retail	Digital Tanzanian Shilling*
Tanzania	Wholesale	
Thailand	Retail	Digital baht*
Thailand	Wholesale	Inthanon-LionRock
The Bahamas	Retail	Sand Dollar
The Netherlands	Retail	Digital euro
Tonga	Retail	Digital Tongan Pa‘anga*
Trinidad and Tobago	Retail	E-dollar*

Country	Type CBDC	Project
Tunisia	Retail	E-dinar*
Türkiye	Retail	Digital Turkish Lira
Ukraine	Retail	E-hryvnia
United Arab Emirates	Retail	Digital United Arab Emirates Dirham*
United Arab Emirates (the)	Wholesale	Project Aber
United Kingdom	Retail	Digital pound*
United Kingdom of Great Britain and Northern Ireland (the)	Wholesale	Cross-border interbank payments and settlements
United States	Retail	Digital dollar*
United States	Wholesale	New York Innovation Center to Explore Feasibility of Theoretical Payments System Designed to Facilitate and Settle Digital Asset Transactions - FEDERAL RESERVE BANK of NEW YORK (newyorkfed.org)
Uruguay	Retail	Billete Digital
Vanuatu	Retail	Digital the vatu*
Venezuela	Retail	Bolivar Digital
Vietnam	Retail	Digital dong*
Zimbabwe	Retail	Digital Zimbabwe dollar*

Source: LexisNexis. Own elaboration.

Appendix B

Table B1: 50 most common words from news classified as positive

2018	#	2019	#	2020	#	2021	#	2022	#	2023	#	2024	#
with	23	that	88	that	329	that	966	that	1387	that	1508	that	368
Project	23	with	86	with	286	with	720	will	1275	with	1412	with	338
that	21	will	52	banks	262	will	554	with	1113	will	929	euro	300
banks	19	Crypto	43	will	183	euro	452	India	863	euro	810	from	237
will	19	blockchain	41	euro	158	banks	408	RBI	759	banks	790	banks	189
financial	17	crypto	39	said	133	said	404	pilot	745	financial	761	will	179
report	17	banks	37	have	128	have	381	said	704	pilot	727	financial	166
cryptocurrency	16	news	34	payment	123	from	353	Reserve	678	from	636	this	155
Crypto	15	said	33	payments	117	financial	349	banks	641	payments	632	have	154
technology	14	cryptocurrency	32	financial	113	payments	344	from	606	this	621	first	126
from	14	payment	31	US	103	eNaira	322	have	559	have	617	said	125
Jasper	14	have	30	money	100	this	307	US	553	payment	541	pilot	125
Canada	14	from	27	ECB	98	payment	291	first	541	pound	454	which	123
money	13	issued	23	from	98	would	286	rupee	529	said	451	payments	122
ekrona	13	Libra	23	more	97	launch	278	financial	523	would	449	ECB	122
project	13	technology	23	would	97	Nigeria	276	this	487	India	440	their	122
Link	11	their	23	this	94	first	275	launch	458	England	432	European	122
payments	11	also	23	which	93	money	266	retail	412	European	419	This	121
launch	10	CryptoCorner	23	their	87	could	261	payments	404	project	410	payment	119
said	10	money	22	system	87	European	256	more	399	transactions	403	Reserve	113
their	10	Chinas	22	Dollar	86	more	250	would	389	first	400	would	109
Sweden	10	about	22	European	85	US	248	issued	376	more	395	transactions	106
more	10	which	21	could	81	which	243	project	374	money	388	News	104
DLT	10	China	21	dollar	77	ECB	238	Rupee	370	their	384	more	101
Corner	10	financial	21	also	75	issued	224	euro	366	could	377	RBI	101
crypto	9	Corner	21	Project	73	project	219	money	352	cash	376	retail	100
cash	9	could	20	news	73	Reserve	214	which	349	Reserve	362	money	99

2018	#	2019	#	2020	#	2021	#	2022	#	2023	#	2024	#
Reserve	9	been	20	about	73	Global	212	eNaira	347	which	352	India	97
have	9	European	19	blockchain	71	their	210	their	335	launch	347	project	95
International	9	project	19	issued	70	China	205	transactions	327	This	340	Federal	92
first	9	market	19	global	69	been	189	dollar	323	retail	335	Hong	91
market	9	Caribbean	19	project	67	dollar	187	could	311	been	307	wholesale	90
blockchain	9	such	18	China	66	world	179	been	307	potential	307	cash	90
Payments	9	tech	18	research	64	technology	179	other	307	launched	301	Kong	89
Phase	9	Bitcoin	17	they	62	system	173	Federal	298	US	299	US	88
which	8	report	17	form	61	also	172	payment	289	announced	288	offline	84
such	8	more	17	launch	60	announced	171	system	287	RBI	284	Euro	78
bitcoin	8	would	17	potential	60	other	168	announced	285	system	281	report	78
issue	8	Riksbank	17	first	60	public	164	also	283	also	267	pound	77
issuing	8	ekrona	17	cash	59	cash	158	launched	260	Hong	259	been	75
cryptocurrencies	8	company	16	report	59	following	155	technology	257	Kong	259	phase	74
Exchange	8	todays	16	issue	57	they	153	China	247	phase	253	potential	74
GBPP	8	Accenture	16	future	57	today	144	year	246	Treasury	249	today	73
Thailand	8	Point	16	Reserve	57	potential	142	European	241	issued	249	announced	72
need	7	leader	16	public	55	crossborder	142	today	233	News	246	launch	71
stability	7	whats	16	should	54	This	141	government	229	UPI	244	also	70
future	7	subsidiary	16	technology	54	report	139	report	228	technology	239	privacy	69
issued	7	NASDAQ	16	announced	52	blockchain	139	about	217	China	238	platform	69
Riksbank	7	Eastern	16	world	52	time	137	wholesale	206	Rupee	231	National	69
public	7	global	15	Mastercard	52	global	137	paper	206	ECB	225	using	68

Source: LexisNexis. Own elaboration.

Table B2: 50 most common words from news classified as negative

2018	#	2019	#	2020	#	2021	#	2022	#	2023	#	2024	#
that	21	that	22	that	52	that	252	that	275	that	457	that	133
would	10	blockchain	11	euro	49	with	165	will	201	with	382	with	118
financial	9	Wipro	10	with	48	will	123	with	173	euro	206	US	84
have	9	said	8	said	33	banks	113	Reserve	162	financial	197	will	72
ekrona	7	system	7	will	32	eNaira	112	said	157	from	192	have	71
with	6	Thailand	7	would	26	said	111	US	151	would	192	Reserve	64
Riksbank	6	US	6	ECB	26	euro	96	India	137	have	185	concerns	63
England	6	would	6	European	24	other	92	RBI	124	said	173	from	63
plans	5	IBM	6	US	24	have	81	from	117	will	163	said	62
also	5	with	5	cash	22	financial	72	other	106	US	153	about	57
people	5	financial	5	from	22	dollar	69	dollar	105	pound	149	financial	57
cryptocurrency	5	current	5	have	21	Reserve	67	financial	104	could	144	pound	55
report	5	years	5	blockchain	20	Nigeria	65	banks	103	payments	142	banks	55
Bitmain	5	money	5	banks	20	payments	64	rupee	97	cash	137	could	54
there	4	services	5	payment	19	launch	64	pilot	96	concerns	136	Trump	53
issued	4	Limited	5	firm	18	money	63	Federal	90	transactions	136	privacy	52
such	4	solution	5	dollar	17	from	60	this	88	European	132	India	48
about	4	Deutsche	5	this	16	about	59	eNaira	88	their	116	euro	47
information	4	will	5	could	16	which	56	have	86	banks	115	would	45
Chinese	4	dinero	5	other	15	this	56	would	81	England	115	consultation	44
Peso	4	millones	5	Lagarde	15	ECB	55	payments	73	Reserve	109	RBI	41
crypto	4	Inthanon	5	project	15	US	55	could	72	privacy	104	England	39
Project	4	have	4	when	14	would	54	launch	72	pilot	102	which	37
from	4	Mnuchin	4	payments	14	project	54	transactions	67	this	102	transactions	36
world	4	this	4	also	12	payment	52	technology	64	Financial	102	over	36
said	4	Crypto	4	Crypto	11	CBN	52	their	62	about	94	offline	34
US	4	Global	4	whether	11	been	49	also	61	retail	94	potential	34

2018	#	2019	#	2020	#	2021	#	2022	#	2023	#	2024	#
worst	4	Banking	4	money	11	could	48	Nigeria	61	RBI	92	Treasury	34
Pollock	4	News	4	potential	11	European	47	project	58	government	91	government	33
says	3	firm	4	financial	11	cryptocurrencies	47	issued	57	Treasury	89	cash	32
several	3	wholesale	4	issue	11	Federal	45	about	56	payment	87	Federal	31
payment	3	could	4	their	11	concerns	44	government	56	eNaira	87	Senator	31
technology	3	issued	4	been	11	issued	42	concerns	54	been	86	public	30
Sweden	3	task	4	Australia	11	Global	41	which	54	Federal	82	launch	29
purchase	3	force	4	public	10	private	39	payment	53	which	80	United	29
project	3	electrónico	4	over	10	such	38	year	51	potential	78	pilot	29
been	3	pour	4	risks	10	next	37	system	51	money	76	bill	29
Philippines	3	permettre	4	Euro	10	China	37	This	49	other	75	payments	28
Crypto	3	NYSE	4	private	10	their	37	risks	49	over	75	February	28
China	3	WIT	4	which	10	India	36	Rupee	49	News	75	year	28
Canada	3	BSE	4	Reserve	10	potential	35	money	48	also	72	this	28
However	3	NSE	4	Bitcoin	9	Banking	34	announced	48	dollar	71	Donald	28
systems	3	WIPRO	4	announced	9	pilot	34	privacy	46	project	69	legislation	26
make	3	European	3	launch	9	also	34	Flutterwave	46	UK	67	announced	26
International	3	privacy	3	Link	9	paper	34	potential	46	House	66	House	26
following	3	technical	3	developing	9	RBI	34	Global	45	launched	65	Government	25
future	3	time	3	move	9	countries	33	cryptocurrency	44	they	65	dollar	25
failed	3	there	3	government	9	announced	33	retail	44	used	65	payment	24
traditional	3	been	3	news	8	October	33	been	43	IMF	65	News	24
banks	3	dollar	3	market	8	launched	32	News	43	issued	63	States	24

Source: LexisNexis. Own elaboration.

Table B3: 50 most common words from news classified as neutral

2018	#	2019	#	2020	#	2021	#	2022	#	2023	#	2024	#
electrónico	32	electrónico	19	that	46	euro	141	with	185	that	255	Hong	70
dinero	30	dinero	18	with	42	that	138	US	166	with	217	Kong	67
para	18	para	7	euro	40	will	112	will	160	euro	199	with	65
Canada	14	millones	7	said	37	with	102	Reserve	158	will	171	euro	64
Banco	12	ekrona	6	dinero	37	said	102	that	144	pound	143	that	60
said	10	US	6	electrónico	37	ECB	88	India	138	said	131	from	57
como	9	QR	6	ECB	30	Global	80	said	123	pilot	130	payment	45
around	8	cashback	6	banks	28	eNaira	80	banks	120	financial	129	eCNY	43
Israel	8	news	5	Project	28	European	79	eNaira	114	India	120	한국은행	43
Schweden	8	está	5	Reserve	28	Nigeria	72	dollar	92	from	117	pilot	42
servicios	8	códigos	5	Banking	25	US	68	Federal	92	European	116	US	42
fiat	7	pago	5	issued	25	pilot	67	pilot	87	project	113	have	39
standards	7	gran	5	Global	24	project	64	project	84	England	110	State	39
cuentas	7	EN	5	News	24	launch	62	Nigeria	84	banks	106	said	35
Bargeld	7	Bargeld	5	Australia	24	would	62	RBI	83	Reserve	102	AntiSurveillance	35
China	6	Australia	4	project	22	Banking	61	launch	82	phase	92	will	31
some	6	WITH	4	European	21	News	61	announced	80	Ripple	92	would	31
technology	6	Riksbank	4	US	21	announced	54	retail	79	Visa	90	Reserve	31
studying	6	work	4	National	21	Reserve	54	from	77	payments	89	House	31
South	6	with	4	potential	20	from	52	financial	77	retail	87	para	31
that	6	whats	4	will	19	financial	51	euro	75	have	87	ECB	30
work	6	IMF	4	blockchain	18	Euro	50	issued	70	could	87	National	29
issues	6	Lithuania	4	Dollar	18	para	48	Financial	70	US	82	bill	29
Dinero	6	Google	4	wholesale	18	says	46	following	69	Project	81	중앙은행	29

2018	#	2019	#	2020	#	2021	#	2022	#	2023	#	2024	#
operar	6	financiero	4	technology	17	eine	46	CBN	69	Global	81	financial	28
launch	5	como	4	ConsenSys	17	bolívar	45	para	67	Azerbaijan	80	중앙은행이	28
research	5	España	4	following	15	have	43	rupee	64	National	79	following	27
development	5	informe	4	BIS	15	dollar	43	Hong	62	ECB	78	News	27
with	5	años	4	Perpetual	15	payments	42	Kong	61	announced	78	China	27
Project	5	financiera	4	Software	15	banks	42	Banking	59	eNaira	78	Euro	26
Reserve	5	transacciones	4	news	14	moneda	41	Project	58	Treasury	77	Governor	26
Thailand	5	FMI	4	research	14	test	40	dinero	58	para	77	European	25
está	5	payment	3	have	13	numérique	40	released	56	Financial	76	pound	25
este	5	following	3	Internationa l	13	Monetary	39	payments	55	International	73	issued	24
hasta	5	Money	3	cash	13	issued	39	transactions	55	Monetary	72	banks	24
pago	5	Link	3	Common-wealth	13	October	38	Global	54	potential	71	tenge	24
EKrone	5	debate	3	para	13	International	38	would	51	launch	68	potential	23
Stockholm	5	International	3	como	13	Venezuela	38	research	50	Nigeria	68	system	23
Ebury	5	CryptoCorner	3	which	12	Powell	37	system	50	this	67	Monetary	23
cryptocurrency	4	Libra	3	dollar	12	monnaie	37	News	49	BIS	67	India	22
CBB	4	Point	3	announced	12	Project	35	paper	49	CBN	67	Federal	22
idea	4	Roberts	3	cuentas	12	Hong	35	Dollar	48	RBI	67	support	21
COLUMBIA	4	WA	3	from	11	Kong	35	ECB	47	UK	64	payments	21
BASIN	4	Delta	3	Libra	11	Singapore	35	this	47	which	64	Payment	21
TRUST	4	BC	3	Euro	11	potential	34	Kazakhstan	46	would	62	IMF	21
official	4	Investorideascom	3	says	11	retail	34	public	45	Pilot	62	dijital	21
looking	4	leader	3	today	11	China	34	potential	45	News	60	Authority	20
Huobi	4	crypto	3	release	11	Banco	34	Bitt	45	Euro	59	HKMA	20
design	4	blockchain	3	payments	11	launched	33	payment	44	following	58	digitale	20
sector	4	investing	3	Accenture	11	version	33	development	44	wholesale	58	yang	20

Source: LexisNexis. Own elaboration.

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