National College of Ireland

Project mBridge and the Future of Cross-Border Payments: Assessing the Adequacy of USD and Gold Reserves in a Multi-Currency World

MSc Research Project

MSc in FinTech

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MSc Project Submission Sheet

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Transitioning from USD: The Potential of mBridge and Gold Reserves in Redefining Global Financial Stability

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Abstract

This study investigates the potential impact of Project mBridge on the global markets, with a focus on the shifting role of the US Dollar (USD) as the world's reserve currency and the adequacy of gold reserves in mitigating financial risks. As central banks explore alternatives to the USD through digital currencies this research evaluates whether national gold reserves are sufficient to cover short-term external debts in times of economic uncertainty. By analyzing historical trends in currency purchasing power against gold and assessing the dependency of various nations on the USD, the study provides insights into how prepared different economies are for a potential decline in USD dominance. The findings reveal that while some smaller economies have robust gold reserves relative to their liabilities, larger economies may face challenges due to their lower coverage ratios. This research underscores the importance of gold as a financial safeguard in an evolving global monetary system and highlights the gradual but significant shift towards a more multipolar currency environment. Future research should continue to monitor these developments as Project mBridge and similar initiatives evolve.

Keywords: mBridge, USD, world reserve currency, gold reserve, cross border positions

1 Introduction

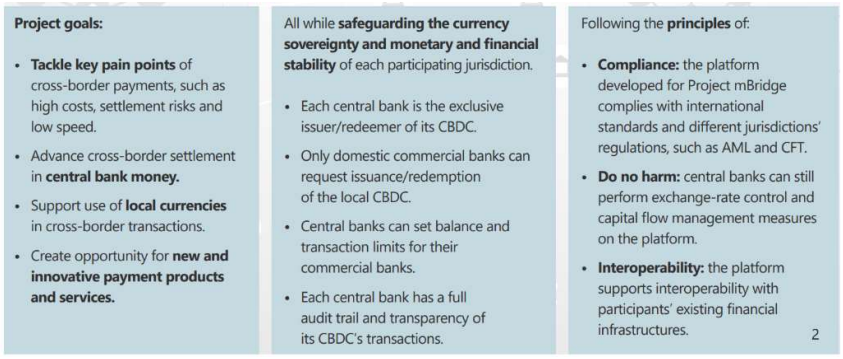
In the current landscape of global economics, USD uses its network inertia (McCauley and Chan, 2014) derived from being the world reserve currency (Eichengreen, 2011). This leads to its entrenched position in the balance sheets (Gopinath and Stein, 2018) of most developing nations and amplifies the resilience this currency needs to stay in demand in the global marketplace. It is also known that ever since the USA dropped the gold standard (Reinhart and Rogoff, 2009) (Bordo and Rockoff, 1996), the USD started seeing instability and over the past 5 decades its national debt has grown multifold.

There are mentions of a new international monetary system which will inevitably be created on the destruction of the old dollar system. To paraphrase a quote out of this paper which summarizes the logical reasoning behind the concern - "The essence of the problem in the existing global financial system is not money but debt. The creation of money as a function of debt repayment. In the American financial crisis, the losses were not borne by the banks and bondholders, but the losses were passed on to the public through the federal finances. The

restoration of trust implies a new international monetary system" (Mirović and Vesna Petrović, 2023)

In June 2024, the Bank for International Settlements (BIS) published a press release [1] which invites international participation to project mBridge [aimed at deploying a multi-central bank digital currency (CBDC)] platform for participating central banks and commercial banks, built on distributed ledger technology (DLT) to enable instant cross-border payments and settlement. In figure 1, extracted directly from the first official document launching project mBridge [2], it is explicitly stated that one of the goals is to support use of local currencies in cross-border transactions.

Supporting the use of local currencies naturally leads to a decline in the usage of the existing medium i.e. the USD. The decline may be significant or a drop in the ocean, this can be found once this research is completed. By establishing that project mBridge is likely to contribute significantly to the notion of declining usage and trust in USD (by pursuing a thorough documentary analysis on reports from the BIS), the need to find the true purchasing power of top currencies becomes eminent.



Project goals:

- **Tackle key pain points** of cross-border payments, such as high costs, settlement risks and low speed.
- Advance cross-border settlement in **central bank money.**
- Support use of **local currencies** in cross-border transactions.
- Create opportunity for **new and innovative payment products and services.**

All while **safeguarding the currency sovereignty and monetary and financial stability** of each participating jurisdiction.

- Each central bank is the exclusive issuer/redeemer of its CBDC.
- Only domestic commercial banks can request issuance/redemption of the local CBDC.
- Central banks can set balance and transaction limits for their commercial banks.
- Each central bank has a full audit trail and transparency of its CBDC's transactions.

Following the **principles** of:

- **Compliance:** the platform developed for Project mBridge complies with international standards and different jurisdictions' regulations, such as AML and CFT.
- **Do no harm:** central banks can still perform exchange-rate control and capital flow management measures on the platform.
- **Interoperability:** the platform supports interoperability with participants' existing financial infrastructures.

2

Figure 1: Page 2, mBridge Brochure, Oct 2023.

Judging currencies by their exchange rate with USD makes room for increasing error in evaluation if the prominence of USD keeps declining over global trade routes. But to soundly judge a currency's purchasing power, there must be a standard asset of common value globally to be able to compare it with. To ensure the soundness of this research, this paper will use (the purchasing power of) gold as the basis for evaluating a currency's standings in the current world order.

The author of the paper you're reading wanted to test bitcoin in this scenario but currently, in August 2024, what's available is only the performance rates of Bitcoin against USD and a bit of younger data for EUR. The road to having countries hedging currency instability risk with bitcoin against their currency is long. The collective efforts of parties pushing the industry

[1] https://www.bis.org/press/p240605.htm
[2] https://www.bis.org/innovation_hub/projects/mbridge_brochure_2311.pdf

forward by building on a grassroot level strives to achieve are towards the dream scenario which we are missing today. The road is long, but achievable [3].
Without initiatives like project mBridge, all thanks to the team of brilliant minds at BIS, it wouldn't have been possible to gradually transition to a globally fair market independent of geopolitics and more reliant on resources and careful fiscal planning for the nation. This research aims to be a small guide in this path, hopefully making the research of evaluation of currencies against increasingly adopted mediums of exchange (be it increasingly prominent currencies or cryptocurrencies).

1.1 Research Question

The question this research aims to answer is 'Are the gold reserves for multiple countries enough to cover short term external debts in their national currency in case of an economic crisis induced due to lowering reliance on world reserve currency?'.

1.2. Objectives and Research Framweork

This research aims to develop 4 artefacts in its implementation for this purpose:
Artefact 1 - an establishment of the need to study the recent trend of currencies (via documentary analysis on mBridge)
Artefact 2 - calculation of purchasing power of currencies (in terms of gold) adjusted to inflation [to observe how much gold can a currency buy in their domestic exchange rate]
Artefact - cross border positions [to observe how much does a country owe currently]
Artefact 4 - FX and gold reserves as % of total reserves [to observe how much repaying capability does a country have in terms of gold held]
Once all 4 artefacts are developed, it is possible to answer our research question of whether gold reserves are sufficient to cover cross border liabilities (in the case of redundancy of USD) in the evaluation, discussion and concluding remarks,

2 Related Work

2.1 Relevance of mBridge to the field of scientific research in geopolitics

The root question which gives rise to this field of scientific research is do we even need a world reserve currency? To answer this, primitive understanding of money is used as an example. Ever since humankind has been using the barter system, it is evident that whichever party holds or governs the resource which is used as a common medium of exchange holds the reigns to the international market. A well cited paper concludes in its findings that "the country with the most developed financial sector takes on a larger proportion of global risk and its currency emerges as the world's reserve currency". (Maggiori, 2017)

One of the oldest related papers (Heldring, 1988) began generating a concern towards the stability of USD and question its status as the single economic power as more and more newly

[3] https://www.bis.org/about/bisih/about.htm?m=289

industrialised countries rise to exert more influence over the world marketplace (Mundell, 2000). The paper also suggests that in the long term this will lead to the development of a single international currency issued by an international institution but that wasn't even partially possible until 2009 (until bitcoin came along) [4] and still not completely feasible due the existence of geopolitics (Eichengreen, 2005).

A highly relevant reference paper (Bharat et al., 2024) in this subtopic explores the declining dominance of the US Dollar by identifying the causes as geopolitical tensions, economic sanctions, rise of alternative currencies like the Chinese RMB which contributed to USD's share over global foreign reserve by 73% in 2001 to 54.59% by Q3 2023. This paper asserts that while USD will likely retain its dominance, a transition towards a multipolar financial system is inevitable. The results of the models employed show that even by 2012, over 58% countries preferred trading with a hypothetical BRICS currency. A serious limitation of this study is that accounts for only trade relations, not political factors.

To overcome this and support the robustness of our assertion, we review papers to study the effect of political influences. By collecting and studying of data on political regimes, trade relationships, capital controls and voting patterns in the UNGA (United Nations General assembly [5] (Navarro and Moises, 2024) it is evident that countries with a higher level of authoritarianism increase the probability of adopting alternate reserve currencies.

Most reputable studies which explore the depths of our field of literature lean towards the same findings that creating a new currency is challenging (Burke, 2024) even if rivals to USD like the Chinese Renminbi (RMB) or the Indian Rupee (INR) are poised to be significant in terms of their growth over national reserves. The referred paper finds that economic sanctions, particularly those imposed on Russia, are accelerating the search for alternative reserve currencies and that USD's dominance causes global economic instability due to its influence on interest rates and financial markets.

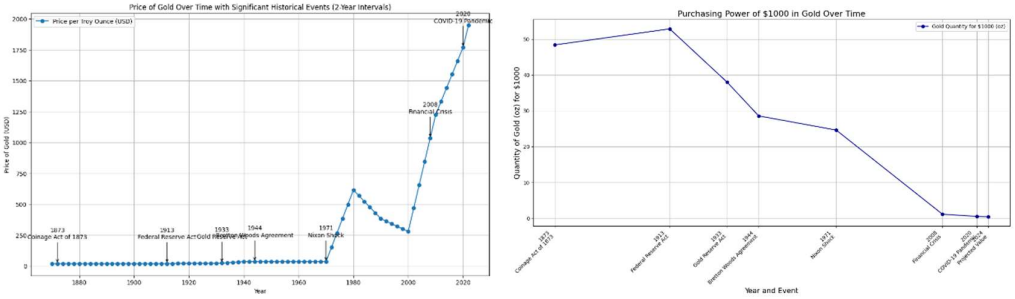
If the requirement is of a data driven perspective, another paper (Gerding and Hartley, 2024) argues that if central bank reserves, foreign exchange transaction volumes, denomination of global debt securities and currency invoicing in global trades are to be analysed, it can be derived that the US Dollar's dominance remains intact. The paper further claims that despite such events as Covid 19 pandemic and the Russian Ukraine war, USD continues to play a central role and that economic sanctions it imposes have reinforced its position rather than weakening it. The authors bask in the glory of statistics of foreign exchange transactions because USD comprises of 90% of global liquid trade which is backed by debt (Prasad, 2014). But what happens when transacting parties don't need the middleman anymore which relies on increasing world debt rather than liquidity? This section justifies the need to study the depths of an alternate foreign exchange transactions named as Mbridge, a payment rail for CBDCs, relieving the reliance on USD for forex transactions.

[4] https://bitcoin.org/bitcoin.pdf
[5] https://www.un.org/en/ga/

2.2 Relationship of USD and Gold over the years

When money is viewed at the most macro perspective, the author defines it as anything which provides as a medium of exchange. The inherent laws of supply and demand make money valuable, not the medium itself.

It was the Coinage act of 1792 (established the U.S. and created the dollar, defined as a specific weight of silver or gold) and 1873 (ended silver dollars and put US on the Gold Standard) which was the first major step to USD becoming a contender for world currency reserve (Timberlake, 1993).



Figures 2 & 3: price of gold per troy ounce (measure reflecting price of gold in capital market indexes) & purchasing power of gold over time including significant points in time for USD's timeline

The price of gold in 2024 has ranged between 2000 to 2500 in the first half of the year hence we take 2250 as the average for our estimation purposes. The value of $2250 (equivalent to 1 troy ounce) when adjusted for inflation via the use of historical consumer price index is $92.59. The instability of the trading pair gold to USD can be further noticed by observing the exorbitant jump within the last 3 years itself. Table 1 adds motivation for this research in 2024.

Table 1, Highest Year on year change in the price of gold over the last 30 years

Year	Average Gold Price ($/oz)	YoY Change (%)
2024	2,250	+20.00%
2020	1,770	+25.12%
2011	1,569	+27.83%
2008	872	+31.09%
1999	279	+12.85%

It is evident that USD lost the stability a global reserve currency needs to possess to bring equilibrium to world trade. With the current positioning, it is observable that the US relies heavily on its network effects even though its value isn't really backed by fiscal relief in the forms of assets anymore. Increasing changes in the international monetary system is a situation where gold can play an important role in adding diversification and hedging against risks.

In the world of multipolar currencies and reducing reliance on the world reserve, it is important for governments, investors and institutions to observe the purchasing power of these individual currencies in relation to gold, an asset which stands the test of time as a value holder (Jastram, 2009) and if the gold holdings are enough to set off cross border liabilities or not.

3 Research Methodology

3.1 Data Collection

3.1.1 Documentary Analysis

All mentions of mBridge on BIS' website were collected from their homepage, resulting to around 47 links within the directory itself. There is non-availability of data for mBridge usage yet because it's been less than a month since its international usage after 26 nations agreed to be observing members to this project. However, Official reports, publications and press releases from Bank for International Settlements are satisfactory for the purpose of acknowledging the probable decline in usage of USD, within intra BRICS+ payments.
Within those 47 links, groups are made according to which ones prove the same point/indicate towards the same development in its timeline. Then different periods of significance are clubbed. For example, the period between 2017-19 has been clubbed into one because in that period projects like Lionrock were still setting up the way for CBDC usage whereas 2024 is bifurcated into multiple months as subsections because their recent happenings hold more weight in terms of relevancy when we calculate the timeline development of any project.

3.1.2 Gold time-series Analysis

Historical price against USD is derived from LBMA (London bullion market association) which is considered to be the most trusted price for gold worldwide.
For other statistics for gold, statistics from the World Gold Council [6] have been used in this research due to its alignment with our methods of data collection (relying on data and sources from BIS, IMF and IFS). The value of gold holdings this source uses is calculated using the end of month LBMA Gold price published daily by ICE benchmark administration.
For retrieving the price of gold in other currencies, this approach uses LBMA Gold Price and Bloomberg calculated fx rates (6pm London)
Three sets of data are imported for our research purposes which need cleaning and preprocessing to be analysed i.e

- Historical prices of gold in various currency denominations,
- Data for gold reserves, forex reserves and total reserves per country in USD and
- Gold holdings in tonnes, and as % of each independent nations reserves

3.1.3 Remaining sources are sourced from BIS [7] or IMF [8] or world bank data [9], all of which use stats procured from IFS (International Financial Statistics)

3.2 Data Cleaning and Preprocessing

The data downloaded from [7] needs to be rearranged in a CSV format where it can be read in Google Colab file using python. For this purpose, new files containing just the columns and

[6] https://www.gold.org/goldhub/data
[7] https://www.gold.org/goldhub/data/gold-reserves-by-country#filters-board

rows we need are made and loaded onto colab files which can be found in the portfolio folder of this thesis.

4 Design Specification

The key variables (artefacts) developed in the implementation of our research for coverage analysis and answering the research question are:

1. Inflation adjusted purchasing power of gold for a currency (HaPPG): The value of the national currency, especially in times of economic crises. *(gold prices/purchasing power in USD)*
2. World Reserve Currency Dependency (DRWR): The degree of dependency on the world reserve currency. *(fx reserve to total reserve ratio)*
3. Short term External Debts (CBL): The external debt in the form of latest cross border liabilities. *(cross border positions)*
4. Gold Reserves (GR): The amount of gold reserves held by each country. *(gold reserves in tonnes)*

The brackets denote abbreviation provided to each metric developed later in the research and square brackets here denote the main dataset required for their computation.

5 Implementation

5.1 Project mBridge

5.1.1 2017-2019: Foundations in Project LionRock

The timeline of Project mBridge can be traced back to the Hong Kong Monetary Authority's (HKMA) initiative, Project LionRock, launched in 2017. This explored the feasibility of using Distributed Ledger Technology (DLT) for central bank digital currency (CBDC) within Hong Kong's monetary system. Bech and Garratt (2017) suggests that DLT could significantly enhance the transparency and resilience of financial systems, providing a solid foundation for broader cross-border applications [8]. This aligns with the growing global interest in CBDCs highlighted by Auer and Böhme (2020). These early studies and initiatives laid the groundwork for what eventually became Project mBridge.

5.1.2 2020: The Birth of Project Inthanon-LionRock

The launch of Project Inthanon-LionRock. This collaboration between the HKMA and the Bank of Thailand (BoT) sought to explore the potential of DLT in facilitating cross-border payments between Hong Kong and Thailand [9]. The project's proof-of-concept implied that a multi-CBDC arrangement would reduce settlement risks, lower transaction costs, and increase payment speed for cross-border transactions. A paper (Kahn et al., 2020) [10] further

8 https://www.bis.org/projects/mbridge.htm
9 https://www.bis.org/cpmi/publ/d196.htm
10 https://www.bankofcanada.ca/2020/12/staff-discussion-paper-2020-15/

emphasized the importance of these platforms in enhancing global payment systems, particularly in reducing reliance on traditional correspondent banking networks. The Bank for International Settlements (BIS) established that this particular project laid the groundwork for future multi-CBDC endeavours [11].

5.1.3 February 2021: Inception of Project mBridge

In February 2021, the Bank for International Settlements (BIS) Innovation Hub joined forces with the HKMA, BoT, the Central Bank of the United Arab Emirates (CBUAE), and the People's Bank of China (PBoC) to launch Project mBridge [12]. This initiative built upon the success of Inthanon-LionRock by aiming to create a multi-CBDC platform specifically designed for cross-border payments. Schrimpf and Shin (2021) argue that the objective was to target inefficiencies in existing payment systems, such as high transaction costs and slow settlement speeds, existing in current correspondent banking practices [13]. The collaborative nature of the project reflects a global commitment to innovation in cross-border payments, as also noted by Adrian and Griffoli (2019) [14]. The project aimed to create a seamless and cost-effective multi-CBDC platform to facilitate cross-border settlements using central bank money and supporting the use of local currencies in international transactions [15].

5.1.4 September 2021: Prototype Demonstration

By September 2021, Project mBridge had advanced to the growth of a functional prototype. The mBridge Ledger (mBL) was a custom permissioned DLT that facilitated peer-to-peer atomic transactions using wholesale CBDCs [16]. A paper highlighted the platform's technical architecture, particularly its EVM compatibility (Pereira et al., 2021) which allowed the use of smart contracts to ensure interoperability with widely adopted blockchain platforms [17]. Lee (2021) emphasized the importance of ISO 20022 messaging standards, which were embodied into the prototype to modernize cross-border payment systems. Grym, Heikkinen, and Takala (2020) highlighted the potential for significant reductions in transaction costs and processing times, redefining the importance of DLT in revolutionizing international finance [12]. The demonstration displayed the platform's ability to reduce the number of steps involved in cross-border payments by enabling direct, bilateral connectivity between the payer's and payee's local banks, streamlining operations, reducing costs, and enhancing efficiency [9].

5.1.5 October 2022: Successful Pilot Phase

The successful pilot phase in October 2022 was a critical achievement for Project mBridge. Real-value transactions across participating central banks ascertained the platform's feasibility in real-world scenarios, as shown in the work of Chapman et al. (2020) [18]. Kosse and Mattei

11 https://www.bis.org/publ/qtrpdf/r_qt2003j.htm
12 https://www.bis.org/press/p210223.htm
13 https://www.bis.org/publ/work935.htm
14 https://www.imf.org/en/Publications/WP/Issues/2019/07/01/The-Rise-of-Digital-Money-47097
15 https://www.bis.org/press/p210223.htm
16 https://www.bis.org/about/bisih/topics/cbdc/mcbdc_bridge.htm
17 https://www.bis.org/publ/qtrpdf/r_qt2003j.htm
18 https://www.bankofcanada.ca/2020/11/project-jasper-lessons-learned-for-the-design-of-distributed-financial-market-infrastructures/

(2021) observed that the platform could achieve near-instant settlement times which significantly reduced cross-border transaction durations [19]. By settling transactions in central bank money, the platform boasted a secure environment, minimizing risks associated with traditional cross-border payments (Sveriges R., 2021) [20]. Monnet (2021) underscored the platform's ability to streamline operations and decrease duplicated processes, leading to lower transaction costs while maximizing efficiency [21].

5.1.6 October 2023: Integrating New Dimensions in Cross-Border Payments

October 2023 was a pivotal month for Project mBridge, marked by the BIS's publication of several critical papers [22]. [23] The paper explored how stablecoins already do and could complement traditional payment systems by enabling a more flexible yet stable medium for international transactions (Catalini and Gans, 2021). Furthermore, the BIS released reports on linking fast payment systems across borders & harmonizing ISO 20022 data requirements, both of which emphasized the importance for interoperable technologies and harmonized regulatory frameworks, aligning with the views of Arner, Buckley, and Zetzsche (2020) [24] [25]. These reports were crucial in inspecting Project mBridge within the broader landscape of cross-border payment innovations [20].

5.1.7 February 2024: Advancing Operational Resilience

By February 2024, Project mBridge had made compelling strides in enhancing its operational resilience. Duffie and Zhu (2021) were assertive on the importance of the BIS's guidelines on "Streamlining Variation Margin in Centrally Cleared Markets," which were crucial in ensuring the platform's stability and efficiency, particularly in managing financial risks inherent in cross-border transactions [26]. This emphasizes the broader trend in the global financial system towards enhancing risk management practices (Huang, 2020) [27]. The BIS publication further strengthened these practices as improtant for the stability and efficiency of cross-border payment systems, integrating these insights into Project mBridge [11].

5.1.8 April 2024: Establishing Service Level Agreements

In April 2024 the BIS introduced "Service Level Agreements for Cross-Border Payment Arrangements," highlighting the need of formalizing SLAs to ensure consistent and reliable services across borders [11]. Rochet and Tirole (2020) defined the critical role of SLAs in maintaining operational efficiency and service quality, particularly in complex, multi-jurisdictional financial networks [28]. Allen, Gu, and Jagtiani (2021) further reinforced that the

19 https://www.bis.org/publ/qtrpdf/r_qt2103c.htm
20 https://www.riksbank.se/globalassets/media/rapporter/e-krona/2021/ekrona-project-2021.pdf
21 https://www.sciencedirect.com/science/article/pii/S002219962100118X
22 https://www.bis.org/press/p231018.htm
23 https://dl.acm.org/doi/10.1145/3417778
24 https://www.bis.org/cpmi/publ/d218.pdf
25 https://www.bis.org/cpmi/publ/d196.htm
26 https://academic.oup.com/raps/article-abstract/11/3/561/6328627
27 https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2500~6ff7622956.en.pdf
28 https://academic.oup.com/jeea/article-abstract/18/5/1570/5572342

formalization of these agreements strengthens the vigour of the mBridge platform, ensuring it can meet the high standards required in the global financial landscape [29].

5.1.9 June 2024: Transition to Minimum Viable Product (MVP) Stage
By June 2024, Project mBridge had transitioned to the Minimum Viable Product (MVP) stage, now appealing to the broader international participation [11]. Garratt and Lee (2021) expressed the importance of refining the platform's technology, governance, and legal frameworks in accordance with global CPMI standards [30]. Kiff et al. (2020) reinforced the need for enhancements to platform statistics, maker-checker mechanisms, and queue management systems to ensure scalability and capability in handling real-world demands [31]. The continual exploration of new technologies for FX and liquidity management, as well as AML/CFT compliance, underscores the platform's role in advancing global financial innovation, as noted by BIS (2021) [10]. The number of observing nations grew to 26, reflecting increasing global interest and engagement, with provided access to a secure testing environment to simulate mBridge transactions while providing feedback.

5.1.10 Future Prospects:
As Project mBridge moves ahead, its future plans focus on integrating more participants and examining innovative solutions to enhance the platform's capabilities. Auer er al. (2020) noted that the project aims to continue its development with an emphasis on increasing performance and scalability to meet the demands of an improving interconnected global financial ecosystem [32]. Additionally, mBridge will serve as a testbed for new technologies and payment products and offer insights into potential synergies with other BIS projects and private sector solutions (Duffie, 2020) [33]. Adrian (2021) further suggested that as the platform welcomes additional participants and explores new use cases, it is set to remain at the lead of cross-border payment innovation, helping to shape the demands of the future of global finance [34]. The BIS continues to emphasize compliance with evolving international standards and regulations while maintaining a robust governance structure as critical to the project's success and scalability.

5.1.11 Conclusion of timeline development
Project mBridge represents a paradigm shift in the landscape of cross-border payments. By leveraging multi-CBDCs and DLT, the project has the possibility to offer a more efficient, secure, and cost-effective solution for international trade. Its development, aided by a comprehensive governance structure and legal framework, aims to reduce dependency on the USD and enable the use of local currencies in global transactions. As mBridge continues to

29 https://link.springer.com/article/10.1007/s10693-021-00330-8
30 https://www.ijcb.org/journal/ijcb21q3a2.htm
31 https://www.imf.org/en/Publications/WP/Issues/2020/11/19/A-Survey-of-Research-on-Retail-Central-Bank-Digital-Currency-49850
32 https://www.bis.org/publ/work880.htm
33 https://www.hoover.org/research/digital-currencies-and-fast-payment-systems-disruption-coming
34 https://www.imf.org/en/Publications/WP/Issues/2021/05/10/CBDCs-Opportunities-and-Challenges-for-Cross-Border-Payments-462202

evolve, it is well-positioned to play a transformative role in the global payments ecosystem, as demonstrated by Niepelt (2021) [35].

5.2 Artefact development for coverage analysis

5.2.1 **HaPPG –** Historically adjusted Purchasing Power Of Gold

The following figures represent the mentioned currency's purchasing power of gold. The format for each figure is explained as **Figure number: Currency Ticker (Governing country).**

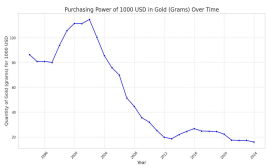


Figure 4: USD(USA)

Figure 5: INR(India)

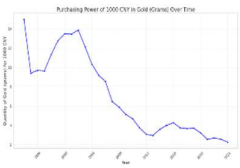


Figure 6: CNY(China)

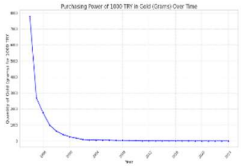


Figure 7: TRY(Turkey)

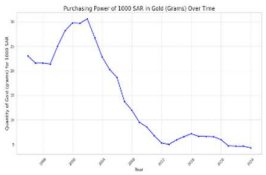


Figure 8: SAR(South Africa)

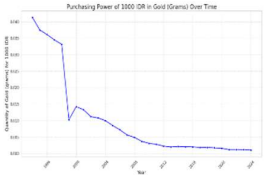


Figure 9: IDR(Indonesia)

Figure 10: AED (UAE)

Figure 11: THB(Thailand)

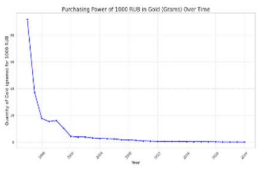


Figure 12: RUB(Russia)

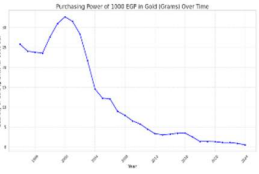


Figure 13: EGP(Egypt)

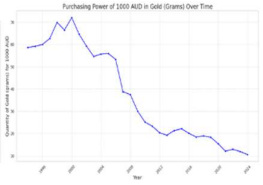


Figure 14: AUD(Australia)

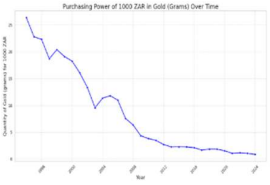


Figure 15: ZAR(Saudi Arabia)

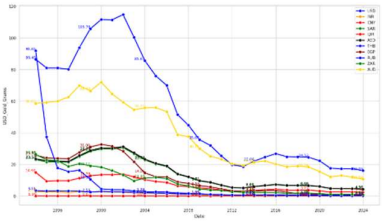


Figure 16: Consolidated Graph of currencies and their purchasing power in terms of gold from 2000-2024

5.2.2 DRWR – Dependency of Reserves of a nation to the World reserve Currency

35 https://www.sciencedirect.com/science/article/pii/S0165188921000407

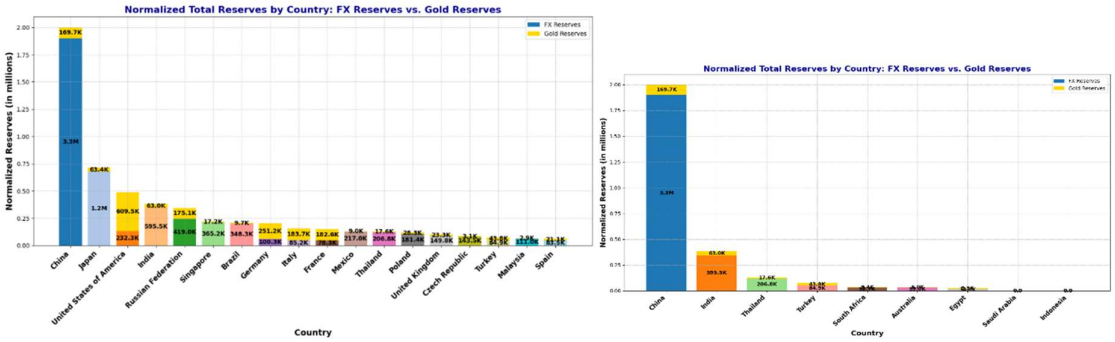


Figure 17 & 18: Total reserves by countries and their division by gold and forex in USD & the same for our focus countries respectively

5.2.3 CBP – Cross border positions

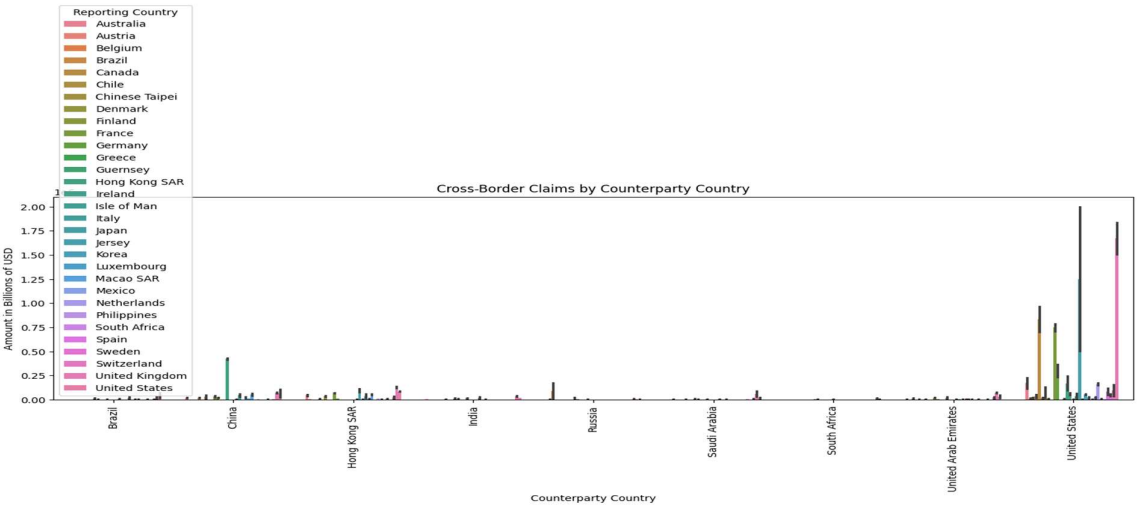


Figure 19: Cross border claims by counterparties

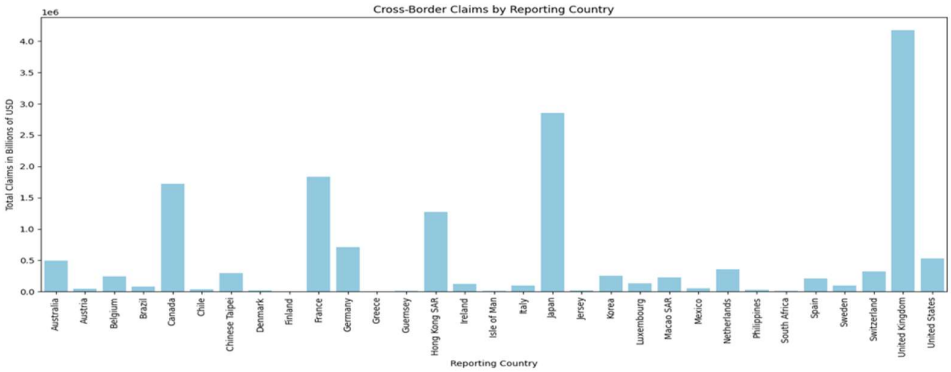


Figure 20: Cross border claims by reporting countries

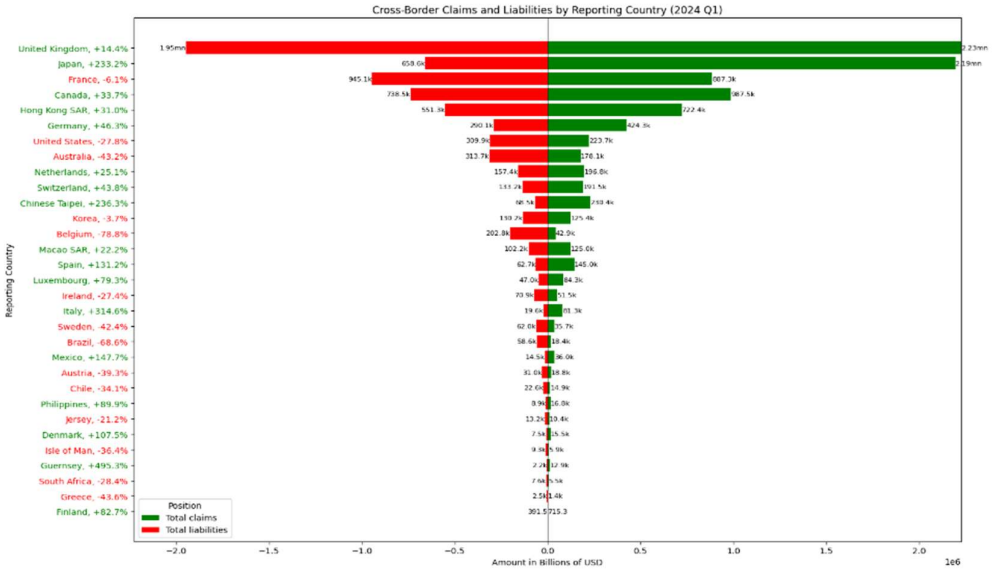


Figure 21: Total cross border positions as of 2024 q2

6 Evaluation

6.1 Implications of mBridge on USD usage via contextual analysis

Our main finding from this timeline development confirm that the 26 observing members include central banks of large economies. It is expected to see their national currency getting stronger worldwide from this network in the long run especially founder nations for this project – HKMA, UAE central bank, Digital Currency Institute of China, Bank of Thailand.

6.2 Artefact 1: Findings from HaPPG

Table 2, insights from purchasing power of gold by currency.

Currency	Highest Purchasing Power (grams)	Lowest Purchasing Power (grams)	Trend Summary
USD	105.76 (2002)	16.03 (2024)	Steady decline in purchasing power, sharp drops during global economic crises.
INR	60.49 (2002)	20.64 (2024)	Sharp decrease post-2002, with notable drops during the 2016 demonetization and 2020 pandemic.
CNY	31.00 (2002)	2.71 (2024)	Steady decline after 2002, reflecting economic reforms and global crises.
SAR	23.33 (2002)	2.66 (2024)	Decline mirrors oil price shocks, with recovery attempts followed by sharp declines.
IDR	14.97 (1996)	0.04 (2024)	Consistent decline, steepest during Asian Financial Crisis and further dips during global events.
AED	11.37 (2002)	1.71 (2024)	Similar trend to SAR, tied to oil prices and global financial events.
THB	3.78 (2000)	0.03 (2024)	Gradual decline, significant drops during financial crises.
EGP	2.56 (2000)	0.01 (2024)	Strong decline post-2011, with major drops during the 2016 floatation and global crises.

RUB	3.41 (1996)	0.00 (2024)	Sharp declines post-1998, with further drops due to geopolitical events and global crises.
ZAR	5.56 (2008)	0.03 (2024)	Steady decline, significant drop during the 2008 crisis and continuing into 2020.
AUD	55.71 (2005)	16.03 (2024)	Moderate decline, with fluctuations around mining boom and drops during global events.

6.3 Artefact 2: Analysing DRWR (Dependency of Reserves of a nation to the World Reserve currency)

Table 3, DRWR Analysis

Country	FX Reserves to Total Reserves (%)	Gold Reserves to Total Reserves (%)
China	97.1%	2.9%
India	90.4%	9.6%
Thailand	92.2%	7.8%
Turkey	66.0%	34.0%
South Africa	83.3%	16.7%
Australia	91.3%	8.7%
Egypt	95.7%	4.3%
Saudi Arabia	100.0%	0.0%
Indonesia	100.0%	0.0%
UAE	100.0%	0.0%
Russia	61.7%	38.3%
USA	79.3%	20.7%

6.4 Artefact 3: Cross Border Positions (Claims and Liability)

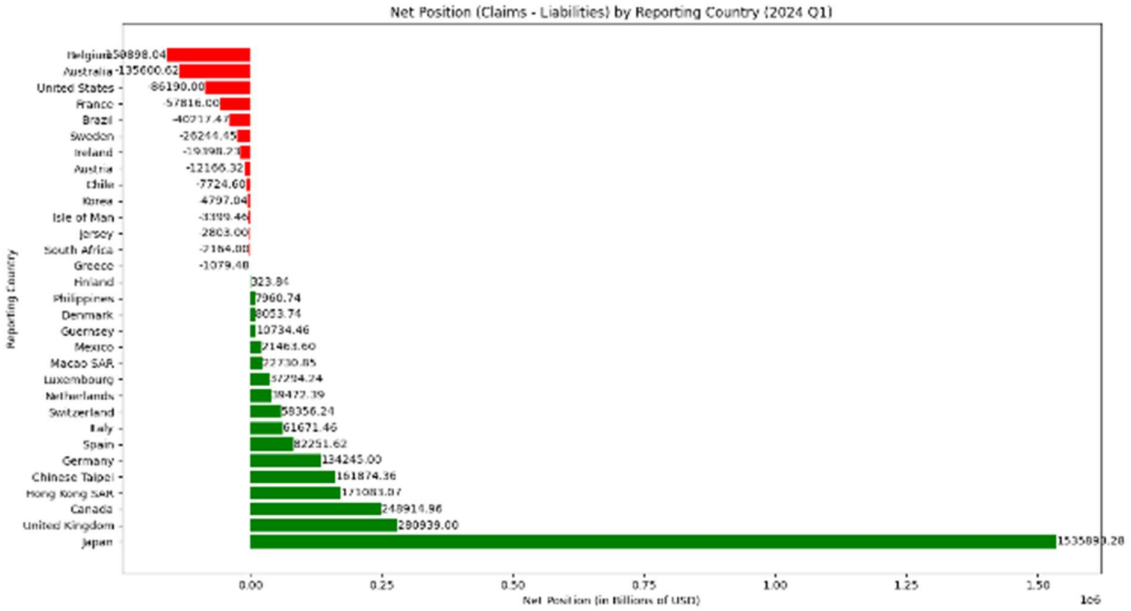


Figure 22: Net external positions by countries for 2024 q1

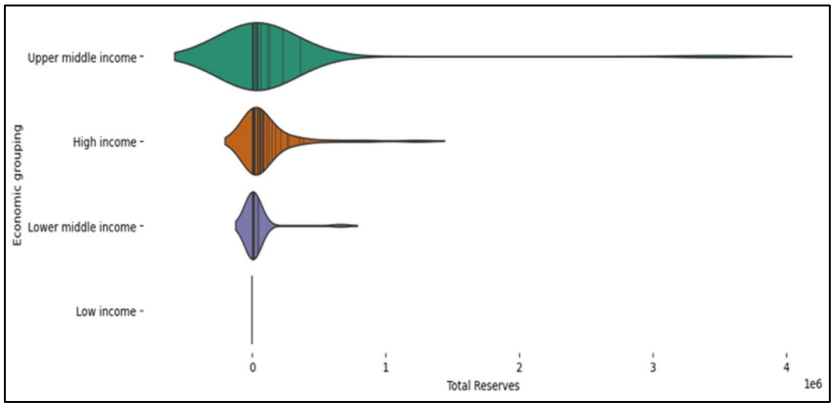


Figure 23: economic grouping of countries as per reserves

6.5 Artefact 4: Gold reserves and liabilities – premise for final calculation

Counterparty Country	**Total cross border Liabilities (in Billions of USD) on 31-3-24**
China	1.691m
United States	11.858m
Japan	-
India	245k
Russia	235k
Saudi Arabia	233k
Turkey	-
United Arab Emirates	426k
Australia	-
South Africa	74k
Egypt	-
Indonesia	-

Country	Gold Reserves Tonnes	Gold Reserves Millions	In millions of USD
China	2264.32	169689.52	170k
India	840.76	63007.2	63k
Russian Federation	2335.85	175050.59	175k
Brazil	129.65	9716.27	10k
United States of America	8133.46	609527.85	609k
Thailand	234.52	17574.99	17k
South Africa	125.44	9400.52	9.4k
Australia	79.87	5985.75	
Egypt	126.57	9485.4	

The amounts left unfilled are due to there being insufficient data for these countries as counterparties (there's only data for them as reporting countries in this regard)

6.6 Results and Discussion

Using artefact development this research reached a point where it can satisfactorily analyze if the gold reserves of nations (whose data is available on all fronts, and are relevant to this study) Results -

Country	**Total Cross Border Liability (Millions of USD)**	**Gold Reserves (Millions of USD)**	**Coverage Analysis (%)**

China	1691	169,689.52	0.997%
United States	11,858	609,527.85	1.945%
Japan	-	-	-
India	245	63,007.2	0.389%
Russia	235	175,050.59	0.134%
Saudi Arabia	233	-	-
Turkey	-	-	-
United Arab Emirates	426	-	-
Australia	74	5,985.75	1.237%
South Africa	-	9,400.52	-
Egypt	-	9,485.4	-
Indonesia	-	-	-
Brazil	10,000	9,716.27	102.923%
Thailand	17,000	17,574.99	96.739%

What is evident from the findings is that small countries like Brazil and Thailand demonstrate strong coverage ratios of 102.92% and 96.78%, respectively, indicating robust financial buffers against external liabilities. In contrast, economic giants like the United States and China, despite having substantial gold reserves, exhibit moderate coverage ratios of 2.05% and 1.05%, suggesting a different strategic focus where gold reserves cover only a small fraction of their liabilities. This observation aligns with the first line of this paper i.e Bigger currencies use network inertia to grow further and deeper.
India and Russia show even lower ratios at 0.42% and 0.14%, respectively, which could indicate a reliance on other financial assets or economic policies that do not prioritize gold reserves as heavily. These findings highlight the diverse approaches countries take to manage their cross-border liabilities, with some prioritizing gold reserves as a key financial safeguard, while others adopt a more diversified or alternative strategy to maintain economic stability.

7 Conclusion and Future Work

This research has explored the implications of Project mBridge on the future of cross-border payments and its potential impact on the USD's role as the global reserve currency. Through a detailed analysis of historical gold purchasing power, dependency on the USD, and the evaluation of gold reserves relative to external liabilities, several key insights have been uncovered. The study aligns with previous literature, such as Maggiori (2017), which highlights the entrenched nature of the USD due to its established financial sector, and Eichengreen (2005), who emphasizes the challenges in replacing the USD as the global reserve currency. Additionally, the findings reflect the geopolitical influences noted by Navarro and Moises (2024), demonstrating how nations with authoritarian regimes are more likely to adopt alternative reserve currencies.

The research objectives—examining the decline in USD reliance, assessing the purchasing power of currencies in terms of gold, and evaluating whether countries' gold reserves can cover

short-term external debts—have largely been met. The analysis confirms that while Project mBridge could reduce dependency on the USD, the global transition away from it will be gradual. The research question, "Are the gold reserves for multiple countries enough to cover short-term external debts in their national currency in case of an economic crisis induced by lowering reliance on the world reserve currency?" is partially answered: only a few countries, like Brazil and Thailand have enough data amongst developing nations and demonstrate strong coverage ratios, indicating sufficient gold reserves. In contrast, larger economies, despite substantial gold holdings, show low coverage, highlighting reliance on other financial assets. This is due to the limitations of this paper which are not enough data for all aspects this research incorporates. The reporting standards are not met in many countries especially where there isn't enough incentive in terms of manhours/wages.

In conclusion, while the USD's dominance may gradually decline, the transition to a new global financial order will require ongoing innovation and robust alternative systems. Project mBridge is a promising step in this direction, but its long-term impact will depend on its adoption and the development of complementary global financial infrastructures. Future research should focus on tracking these developments. The figures for the pilot testing of mBridge are due to be out on 16th September. Post that, it is highly encouraged for readers to take up testing of these numbers to confirm the establishment made in this research.

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