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RESEARCH ARTICLE

Digital RMB vs. Dollar Hegemony? Friendly Foes in China-US Currency Competition

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Abstract

Digital transformations are impacting inter-state currency politics in strategically important ways. This article contributes to growing debates over the nature of US-China competition as the Chinese RMB rapidly digitizes in ways said to challenge the hegemony of a slower digitizing greenback. We categorize existing views of currency competition in the digital age into two categories: 'conventional transformation' and 'transformative continuity'. Both these presently dominant perspectives, we argue, are overly techno-deterministic and stand in contrast to a third perspective we propose called 'probabilistic flux'. Emphasizing the unanticipated and error-prone nature of technological change through Social Construction of Technology theory and informed by the IPE of monetary relations, we provide a more nuanced assessment of digital RMB's challenges to dollar dominance stressing the functions, benefits and powers of international currency hegemony. Our conclusions are three-fold. First, wider digital currency alternatives to both the dollar and RMB have enriched the international currency functions of the former over the latter. Second, this broader array of digital currency alternatives combines with Chinese RMB digitization to gradually erode the functional base and benefits of dollar dominance position, as well as diminish the US's international monetary power in both Asia and beyond. Third, what we see as largely friendly digital currency competition focused on domestic imperatives currently remains unpredictable. These findings pose present possibilities for greater international cooperation but equally for less friendly competition and flux particularly as US dollar digitization also unfolds in ways that are difficult to anticipate.

Keywords Currency Politics · Digital Currencies · Digital RMB · Dollar Hegemony · Technology

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Introduction

Are digital transformations altering age-old dynamics of hegemonic competition and, if so, how? This question has become a pressing consideration as international relations digitize in ways that potentially add new dimensions to great power competition, particularly the intensifying competition between China and the United States [15, 43, 44, 51, 92, 113]. In the field of study where hegemonic competition is most centrally considered, International Relations (IR), the origin and implications of interrelated processes of digitization and digitalization often dichotomize the 'high' and 'low' global politics of 'digital transformation' [65].[1] Yet, digital transformation in IR is typically understood within economic *or* security issues [114]. Important exceptions, however, include two literatures that this article contributes to: International Political Economy (IPE) and scholarship at the finance-security nexus [32]. These literatures are starting to overlap in considering structural relations of international power between hegemonic states [33]. This article contributes to such on-going bridge building by investigating the effects that digitization and digitalization are having on finance-security relations between hegemonic powers. Specifically, we probe if and how the quick digitization of the Chinese currency challenges dollar hegemony as the US digitizes the greenback far more slowly. How can we make sense of uneven currency digitization in the context of hegemonic competition? Is digitization ushering in a new type of international currency competition and reshaping longer-standing historical trends in monetary hegemony?

Our responses to these questions are cautious no's. Despite its relative speed, the rapid digitization of the renminbi (RMB)[2] appears to neither fundamentally alter either (1) contemporary finance-security relations between China and US nor (2) historical trends of monetary hegemony. Nevertheless, we argue that the digitization of currency more generally is giving way to fluctuating relations that are difficult to anticipate. This growing state of flux is currently characterized by what we call friendly competition amongst powers who are experimenting with new digital possibilities but doing so in ways geared largely towards domestic innovation and not necessarily for increasing international tensions. Nevertheless the hard-to-anticipate nature of technological change entails possibilities that leading states shift to more actively 'weaponize' digital currency experimentation in encouraging international instabilities. Growing intensity of currency competition in the digital age thus has the potential to heighten the active conflicts and render increasingly hot the

[1] The Organization for Economic Cooperation and Development (OECD[80, p.18]) defines digitization is "the conversion of analogue data and processes into a machine-readable format" while digitalization "is the use of digital technologies and data as well as interconnection that results in new or changes to existing activities". Digital transformation meanwhile "refers to the economic and societal effects of digitisation and digitalisation" (*ibid*).

[2] Also known as the e-CNY, Digital Currency Electronic Payment (DC/EP), Chinese Central Bank Digital Currency (CBDC) and digital yuan. Since the report *Progress of Research & Development of E-CNY in China* issued in 2021 by China's central bank, the People's Bank of China (PBOC), the Chinese authority more often uses E-CNY. In this article, digital RMB and e-CNY are interchangeably used, referring to the CBDC issued by China.

'cold wars' that contributions to this special issue traces in other areas of US-China competition, in both Asia and beyond (see also [90]). Importantly, however, our argument is that such a path is *not* pre-determined or written in stone. We instead propose the need for more nuanced understanding of the 'new', of making more nuanced sense of the digital era of international currency competition *as it evolves*. This, we contend, requires close consideration of contexts, which balances new yet often error-prone and highly fluctuating technological changes with older and longer trends in international monetary hegemony.

We elaborate these arguments in four sections. A first section reviews debate over the digital RMB. We distinguish two 'camps', both of which view digital RMB in highly deterministic fashion. Drawing on Social Construction of Technology, we provide a contrasting 'probabilistic flux' framework whose greater emphasis on the uncertain paths of technological change is distinct from what we call 'conventional change' or 'transformative continuity' views of RMB digitization. A second section then draws together three interconnected aspects underpinning monetary hegemony: the functions, benefits, and powers of an international currency. A third section proceeds to bring together IPE insights in assessing US-China competition within a wider context of currency digitization that has included growing non-state experiments in varying forms of 'cryptocurrency'. Emphasizing this wider context of rapidly evolving technological change informs our mixed three-pronged conclusions, which we elaborate in final section summarizing how (a) the international currency functions of the dollar are being enriched while (b) the functional base of dollar hegemony and the US's international monetary power in Asia and beyond are being diluted, pointing to (c) a state of increasingly unpredictable flux that poses possibilities both for greater cooperation *as well as* for less friendly US-China currency competition. The potential remains that current digital innovations geared towards domestic innovation and maintaining international stability rapidly turn towards less than friendly competition in which the US and China actively encourage national innovation to foster international instabilities.

What and Why CBDCs? Facts and debates on the digital RMB

Digital currency and digital money represent value in machine-readable formats, typically by computers. While various forms of privately issued digital monies currently exist and have existed in the past (for an overview see [1]). Central Bank Digital Currencies are most important due to their direct backing by states. The International Monetary Fund (IMF) defines a CBDC as "a widely accessible digital form of fiat money that could be legal tender" [71, p.4]. In its narrower definition, the Bank of International Settlements' (BIS) distinguishes CBDCs as "a digital form of central bank money that is different from balances in traditional reserve or settlement accounts" [28, p.4]. Echoing these international financial institutions, the People's Bank of China [83, p.3] defines its CBDC, the digital RMB, as "the digital version of fiat currency issued by the PBOC and operated by authorized operators. It is a value based, quasi-account-based and account-based hybrid payment instrument, with legal tender status and loosely coupled account linkage". The digital RMB, in

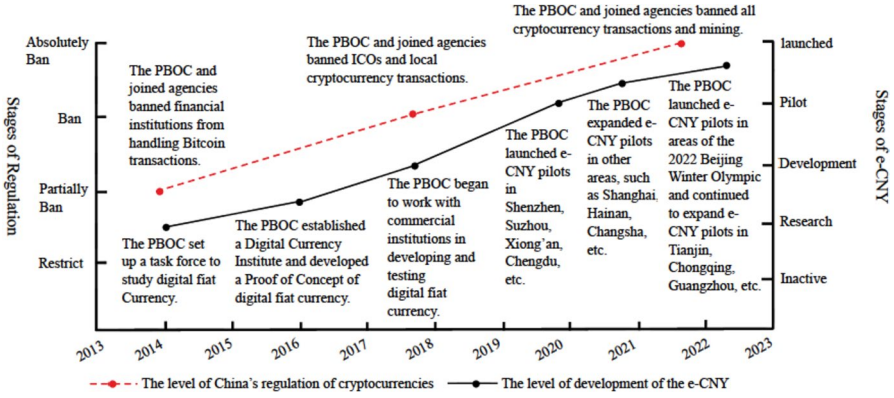

Fig. 1 Timeline of Chinese cryptocurrencies regulation and e-CNY development

other words, combines traditional cash and electronic money together with encryption technology, managed anonymity, programmability and other novel technological features.

How can we understand the process and implications of currency digitization? This section draws together domestic and international lenses of analysis to outline three perspectives on the consequences- real and potential- of currency digitization.

Domestic Development Context and International Implications

The development of the digital RMB has been motivated by both internal and external factors. Internally, the digital RMB project attempts to address several intersecting domestic needs. These include facilitating digital economic development, supporting China's fight against illegal and criminal activities, promoting financial inclusion, and restructuring domestic financial markets by displacing the duopoly of electronic payment platforms in China, Alipay and WeChat Pay [13, 115]. Such internal factors increasingly been shown to be primarily part of internal negotiations between state and non-state actors that have secondary external implications [109]. That domestic struggles have gone hand-in-hand with international ones, as increasingly stressed in academic research [63] stands in contrast to the think tank and media commentary tending to stress *either* the former or the latter [36, 37, 57]. The most relevant internal development for our analysis has been the regulatory crackdown on non-state digital currencies following the general timeline specified in Fig. 1 below.

Absent from official accounts while overemphasized in existing secondary accounts is an intention to have the digital RMB replace the US dollar as international reserve and payment currency (e.g. [12]). There are some indications in official documents that the digital RMB is *implicitly* intended to promote RMB internationalization [83] and to circumvent some harms caused by the dollar-centered IMS [50]. There are, however, two disconnects in existing commentary. First, is a disconnect in debates between internal and external motivations for the digital RMB. This

disconnect, in turn, informs a second divide between claims of the wider hegemonic challenge posed by the digital RMB and official accounts of digitization offered by the PBOC.

Much of the discrepancy between official and secondary accounts can be traced to the relatively rapid development of the digital RMB. Beginning in 2018, PBOC pilot tests of the digital RMB quickly unfolded in several Chinese regions, including at the 2022 Beijing Winter Olympics venues. As of August 31, 2022, the official digital RMB pilot covered 23 cities, involving more than 278 million people, nearly one-fifth of China's total population, around 5.6 million stores that are supporting the digital RMB, and total transaction value of 100.04 billion yuan [84]. In this rapid domestic progression, the technological features and wider implications of the digital RMB were shrouded in confusion surrounding its decentralized nature, coupling of retail transactions with existing bank accounts, as international ambitions [3, 83].

Understanding wider potential international impacts, including on dollar dominance, of the domestic digital RMB pilot requires *connecting* internal and external factors that are often separated from one another (see more generally [41]). The digital RMB is emerging in both specific national and wider international contexts. More than 100 countries worldwide are exploring CBDCs.[3] Of these, China's CBDC trial is the largest in terms of population involved and number of daily transactions. Yet, it is not at the most advanced stage. The first CBDC officially developed was in the Bahamas (the 'Sand Dollar' issued since October 2020) followed a year later by the 'e-Naira', which was officially launched on Nigeria's Independence Day.

In addition to this wider international context, RMB digitization's challenge to dollar dominance must also be assessed in light of a US approach that has been 'strikingly divergent' [52]. In 2018 the US congressional Subcommittee on Monetary Policy and Trade began hearings on digital currency [105]. Further CBDC research was largely left to private firms. The consultancy Accenture [34] through a partnership with the non-profit associations Digital Dollar Foundation in mid-2023 completed an international pilot of cross-border payments with remittances firm Western Union. Prior to this, the Federal Reserve [102] only released an initial report in January 2022 discussing a range of benefits and risks of a digital dollar. The Federal Reserve Bank of Boston and the MIT Digital Currency Initiative Group (MIT DCI) [101] had also jointly published a report exploring the technical feasibility of the digital dollar and initiated a project called 'Project Hamilton'. The New York Federal Reserve [78] conducted a three-month pilot with banks using digital tokens for settlement, yet declared explicitly that the trial was in no way intended as any signal about a potential 'wholesale' CBDC. Finally, the White House [111] tasked the Treasury Department with leading cross-agency research into the implications of a possible CBDC. In short, until 2023 the US remained at a very preliminary stage relative to China in currency digitization with specific technological details and roadmaps all to be determined.

[3] See https://cbdctracker.org/

This US 'wait-and-see' attitude underlines the need for incorporating rather than externalizing the considerable flux surrounding rapid technological change. We can best understand the current status of US-China currency competition as between 'friendly foes'. The focus of competition is remains largely on domestically-oriented innovations rather than on increasing instability in international monetary relations. Nevertheless, such experimentation with digitization has equal possibilities to shift along lines similar to the 'friends *and* foes' approach taken by the Chinese Communist Party towards big tech more generally ([100], *italics added*) and, as one former Central Intelligence Agency analyst put it, to spell "'trouble' and cause unforeseen 'geopolitcal implications' over time" (Yaya Fanusie quoted in [68]). What we currently understand as friendly competition, in other words, is not assured. We need to incorporate this potential for experiments in digital transformation to either progressively or suddenly scale from a domestic focus to become more actively geared at generating international monetary instabilities.

Probabilistic Flux beyond Conventional Transformation and Transformative Continuity

Understanding the impacts of rapidly evolving RMB digitization on dollar dominance must avoid tendencies towards technological determinism. The notion that, once set in motion, digitization processes proceed only in intended and linear manners is countered by Social Construction of Technology (SCOT) perspectives that have increasingly gained popularity in International Relations. SCOT instead emphasize flux, particularly in moments where the paths and impacts of emerging changes have yet to become settled. SCOT especially stresses how the meaning of international developments "emerges as the result of negotiations between technological constraints and social groups" [72, p.29]. The general approach here advances wider efforts in IR and the social sciences to more generally develop a conceptual 'middle zone' [73, p.2] that eschews technological determinism while at the same time avoids a social determinism in which human actors and their organizations are the sole drivers of developments unfolding in equally linear and straightforward manners. SCOT instead stresses how the 'co-constitution' [56, p.6] of human activities with technological objects drives events "neither at random nor contingently, but along certain well documented pathways". Eschewing theorizing linearly evolving relations between humans and technologies SCOT instead attempts to factor in the unexpected and unanticipated paths of change where socio-technical evolution remains at the whims of 'unsuspected dimensions' [56].

SCOT informs our understanding of how currency digitization, as an emerging international phenomenon, is one in which processes of 'technological closure' have yet to occur. The meaning of unfolding processes of currency digitization remains far from 'closed' [72]. The 'live piloting' of CBDC trials remains subject to glitches and errors. The world's first multi-national CBDC project, taking place in the Eastern Caribbean, was afflicted by an unexpected and extended downtime in the first months of 2022 [77]. Accompanying unexpected setbacks are advancements occurring in unexpected parts of the world. For instance that Eastern Caribbean and West

African countries would be first to launch CBDCs was a development few predicted. In this context of trial-and-error technological experimentation, both continuities and changes must be considered. SCOT enables a more nuanced analysis of flux in both processes and outcomes to draw out interrelations between the domestic and international, the past and present, as well as between humans and technologies. Harnessing this perspective thereby enables us to inject into current debates on digital RMB less deterministic views about currency digitization and its implications for dollar hegemony.

Our nuanced perspective helps navigate two bifurcated views dominating debates on digital RMB. A first set of existing views that we counter emphasise 'conventional transformation'. Commentators from this first viewpoint see the digital RMB as necessarily challenging US dollar dominance [21, 62] through an approach that is "selectively reshaping international financial order" [108] by conceiving such competition a digital currency war among major sovereign currencies [31]. These views build on long standing domestic narratives in both China and the US about hegemonic transition passing from Pound Sterling during *Pax Britannia* to contemporary *Pax Americana* and dollar dominance [95, 107]. In China, relevant studies tend to emphasize the flaws of the current dollar dominated international monetary system [118] and the opportunity the digital RMB poses to internationalize the RMB, both in Asia and beyond [3]. In the US, meanwhile, commentators and corporations including Facebook/Meta emphasise the 'Chinese threat' as digitization of currency negatively impacting the international status of the greenback.

Our SCOT-inspired perspective also counters a second more sceptical view that we label 'transformative continuity'. Here, talk of revolutionizing the existing monetary order via digital currencies (DCs) generally and the digital RMB specifically is seen as just that: talk. The digital RMB is seen in this second view as generating a great degree of hype but never actually changing US dollar dominance. Former US Treasury Secretary Henk Paulson Jr. [82] best exemplifies this view in his insistence that the much-touted Chinese digital currency "does not alter the fundamental nature of the RMB" vis-a-vis US monetary hegemony. Peruffo et al. [86, p.1] similarly conclude that the digital RMB "will not represent a rupture with the dollar centric international monetary and financial system". The wider basis of these views that CBDCs more generally entail "evolution, not revolution" (Cœuré cited in [81]) is two-fold: (a) that 'first mover advantage' in digitizing currency is not significant since (b) late movers benefit from the trials and errors of others, leaving leading the US to "not be as far 'behind' China in understanding digital currency" [20, p.102]. Digital RMB is regarded here as forming the basis of a period of 'friendly competition' between the US and China, both of whose CBDC experiments are largely domestically-focused, at least at the time of writing.

We contest the determinism of 'transformative continuity', however, in holding that friendly competition is not *necessarily* extending dollar dominance. Over the medium-to-long term dollar dominance is not guaranteed. Other states incurring the short-term costs of technological experimentation may eventually seek to contest the world's hegemonic power. The point here is that both first mover dis-advantages and advantages need to both be considered. Deterministic views that see currency digitization as automatically extending risk-reward distributions while the US 'de-risks'

as part of 'Wall Street Consensus' [39], leave China and other peripheral countries, including those in Asia, to take-on the risks of technological experimentation. Each one of these processes is incredibly complex and multi-faceted, with unpredictable evolutions that lead us to resist declarations of the US being destined to either forever maintain currency hegemony, but also being destined to lose it.

There are two very inconvenient truths countering both 'conventional transformation' and 'transformative continuity' views. First, is that the PBOC has not directly or explicitly sought to undermine US monetary hegemony and increase international flux. While this of course *may* be an ultimate aim of the Chinese government that may emerge in due course, initial developments of the digital RMB indicate project concerns as being primarily domestic in nature. To the extent that it is considered, international currency competition has largely been with other DCs that neither China nor the US directly control, such as the cryptocurrencies we detail below. Second, and relatedly, the US *may* digitize the dollar in any number of directions responding not only to the digital RMB but also to these private, non-state DCs. Indeed, earlier non-state DCs have been identified and contemplated as threats to dollar dominance internationally.[4] Tellingly, the most vehement US response to currency digitization targeted not China, but the Swiss-based Libra-cum-Diem private DC project led by Facebook-cum-Meta.

Informed by these two inconvenient truths, our SCOT-informed argument that it is far too premature to settle on predetermined views of either transformative continuity or change. Instead, our 'probabilistic flux' view considers possibilities that the digital RMB may spark *both* continuity and change in monetary hegemony. It cautiously avoids siding wholly with either deterministic account of digital RMB challenge to dollar hegemony. Rather than side-stepping the wider flux of the *Pax Technologica* [89] era, we incorporate the unanticipated nature of technological change more generally into our analysis of the processes and impacts of currency digitization. Our understanding of the digital RMB challenges- real and potential- is thus situated less within narrow, pre-determined contexts than the broad twists-and-turns of currency digitization *as it actually evolves*. We now proceed to spell out our methodology for generating this more nuanced measuring of continuity and change in contemporary monetary hegemony.

Measuring Dollar Hegemony: An IPE Approach

This section operationalizes our SCOT-inspired probabilistic flux framework through three key, interrelated aspects of monetary hegemony emphasized in International Political Economy (IPE): the (1) functions, (2) benefits and (3) powers of hegemonic currency provision. We introduce each aspect in turn before bringing them into our SCOT-influenced analytical framework exploring the fluctuating impacts of the emerging digital RMB on dollar dominance.

[4] Indeed, in IPE there was a small debate over 'electronic currencies' at the turn of the millennium [24, 46].

Currency Function

Hegemonic currencies fulfill the traditionally defined functions of money- store of value, unit of account and medium of exchange- and do so internationally. Dollar hegemony stems from a "historically determined contexts in which the US dollar is adopted as the main international reserve instrument, unit of account, and means of payment" ([7, p.592], see also [61]). The US dollar was used in 96%, 74% and 79% of export invoicing respectively in the Americas and Asia–Pacific regions, as well as the rest of the world between 1999 and 2019 [8]. Outside of the 16% of country members of the International Monetary Fund (IMF) floating their currencies (e.g. not managing their exchange rates to other currencies), nearly a fifth (19.8%) of IMF members use the dollar as exchange rate anchor [54]. Furthermore, the dollar is the standard denomination for most national and international statistics, with nearly all international organizations using USD as standard statistical currency (e.g. WTO, IMF, and OECD). As a hegemonic store of value, the dollar makes up 60.8% of international and foreign currency banking claims and liabilities, roughly the same as the ratio of issuance of foreign currency debt [8]. Largely as a result of being the most important medium of exchange and unit of account in the post-war international system, the dollar has widely been considered the key indicator of monetary hegemony [29].

Challenges to monetary hegemony emphasize the degrees to which contending currencies must also fulfill these functions, including in both private and public spheres [25] as well as in key markets, such as commodities [59]. Despite the Russian invasion of Ukraine and related American sanctions along with waves of de-dollarization and "international backlash against the dollar" [75] all expanding opportunities for RMB use,[5] the USD has remained dominant in international currency functions, as shown in Table 1.

Currency Benefits

The benefits of currency hegemony include international seigniorage, reduced transaction costs, macroeconomic flexibility, as well as political leverage and reputation [25]. Seigniorage is the excess of the nominal value of the currency over its cost of production. At the international level, seigniorage entails foreign accumulations of cash and financial claims denominated in the dominant currency, today being US treasury bills with low interest rates. Reduced transaction costs benefit citizens, businesses and the government of the country issuing the hegemonic currency by providing convenience, lower costs and reduced risks in foreign transactions via privileged access to low exchange rate risks, denomination rent and cheap borrowing. Macroeconomic flexibility is the benefits accrued from less constraints of the balance of payment for domestic monetary and fiscal policy. The US has long run large current account deficits without any immediate pressures for adjustment

[5] For instance in the growth of RMB payment for settling oil trade between China and Saudi-Arabia.

Table 1 Comparison of Currency Functions between US Dollar and RMB

Currency functions		US dollar	RMB
Medium of exchange	Vehicle currency (OTC foreign exchange turnover, daily averages in April 2022)[a]	88%	7%
	Trade Currency (global payment, July 2023)[b]	46.46% (1st)	3.06% (5th)
Store of value	Reserve currency (Shares of allocate reserves, Q1 of 2023)[c]	59.02%	2.58%
	Investment currency (Share of banks' cross-border claims, all sectors, Q1 2023)[d]	45.2%	negligible
Unite of Account	Invoicing currency (Share of foreign currency debt issuance, 2021)e	63.9%	1.4%
	Statistical currency	Most IOs	Few
	Exchange rate anchor (2021)[f]	19.2%	Negligible
Overall	Index of international currency usage[g]	58.13	2.86

[a]BIS, https://www.bis.org/statistics/rpfx22.htm (Accessed 21 August 2023)

[b]SWIFT, https://www.swift.com/our-solutions/compliance-and-shared-services/business-intelligence/renminbi/rmb-tracker/rmb-tracker-document-centre (Accessed 21 August 2023)

[c]IMF, https://data.imf.org/?sk=e6a5f467-c14b-4aa8-9f6d-5a09ec4e62a4 (Accessed 21 August 2023) dBIS, https://stats.bis.org/statx/srs/table/a6.1?c=5J (Accessed 21 August 2023)

[e]Federal Reserve, https://www.federalreserve.gov/econres/notes/feds-notes/the-international-role-of-the-u-s-dollar-accessible-20211006.htm#fig6 (Accessed 21 August 2023)

[f]IMF, https://www.elibrary-areaer.imf.org/Pages/YearlyReports.aspx (Accessed 21 August 2023)

[g]Data sources: [85]

by financing these deficits in its own currency. The continuous financing of current account deficits by printing money domestically or recycling money internationally leaves the rest of the world to share the inflation risks and to adapt by sacrificing degrees of domestic economic, fiscal and monetary policies independence. Despite debates over the scales and attendant costs of each of these benefits [74], vast aggregate gains accrue to the hegemonic currency issuer, the most central of which we now turn to.

Currency Power

Various specific forms of power are accrued from monetary hegemony [23, 26, 60]. There are inter-related forms of relational, structural, institutional, and ideational power conveyed by monetary hegemony [119]. Relational power is found in direct bilateral monetary interactions, where the issuing country benefits from advances in currency exchange, monetary agreements, and foreign reserves. Institutional power involves more indirect connections formed in and across international monetary institutions that set and implement formal rules and standards. For instance, the US Federal Reserve serves as the world's de facto central bank as its monetary policy is closely, if not exactly, followed often in coordination with central banks globally. Structural power is the centrality of the issuing country to the wider international monetary system where all other nations remain to varying degrees peripheral. Even large (potential) challengers like the European Union remain peripheral, or at least not the structural center of monetary power. Ideational power, finally, centers around the ideas and norms influencing other states' behaviors. A relevant example is how the US wait-and-see approach to currency digitization has been echoed by both allied (e.g. Canada) and non-allied countries (e.g. Iran). The various facets of power derived from currency hegemony together are defined as the ability to (un)intentionally change other private and public actors' ideas and behaviors by virtue of a dominant position in the asymmetrical international monetary relations.

Connecting Interrelated Aspects of Monetary Hegemony: Our Analytical Framework

The three key aspects of monetary hegemony outlined above are closely and at times causally interrelated. International currency function is an important, if not the crucial, basis for monetary hegemony. Fulfilling the functions of an international currency in turn tends to bring varying degrees of benefits and power that are difficult but not impossible to dislodge as part of broader international hegemony [27].

In what follows, we bring together intricate, evolving relations among different currency functions and with their benefits and powers. Our aim is to provide a foundation for understanding the digital RMB's impacts on dollar dominance, which Fig. 2 illustrates in a necessarily simplified manner. We proceed to evaluate the digital RMB's varied impact, real and potential, on the function, benefit and power of dollar hegemony by tracing continuities and changes to each of these three core

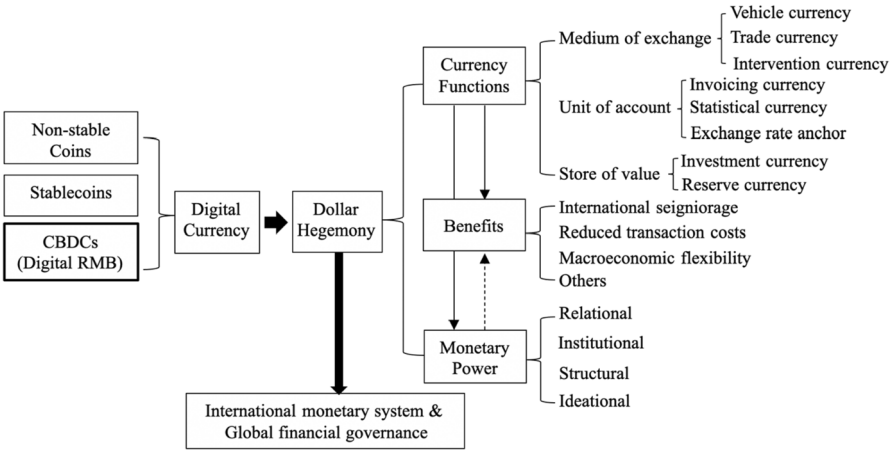

Fig. 2 Assessing Digital Challenges to Currency Hegemony with the case of Digital RMB and Dollar Dominance

aspects of monetary hegemony stemming from the digital RMB within a context of continually emerging (non)stable DCs.

Dissecting Digital RMB Impacts in a World of Multiple DCs

In this section we analyse the challenge that the digitizing RMB is said to pose to dollar dominance. We find that despite its limits and on-going emergence, the digital RMB only *somewhat* alters modalities of international currency politics by adding a new dimension of monetary relations, namely what is, for now, friendly public–private currency competition. Adding a new field of currency competition to traditional currency politics is helpful for investigating the digital technologies underpinning CBDCs. Major countries' competition for monetary power in a digitizing world now spans industry production of micro-processor chips to internet cables. The material underpinnings of the digital – the cables, servers, data centers and connections between them- all enhance opportunities as well as risks for reshaping structural power in an increasingly 'fintech' centered monetary system. Yet limits to such changes lead us to shy away from siding with either deterministic perspective outlined in the previous section.

Enriching Currency Functions, but Eroding the Dollar's Base?

Whether intentionally or not, the digital RMB has begun to fulfil some international functions in ways that do challenge aspects of dollar dominance and contribute to flux in international monetary relations. As the first CBDC of a *major* economy, the cross-border digital RMB can theoretically fully perform all currency functions [2]. What counts, however, is if these occur in practice: that is, if digital RMB becomes endorsed widely it could exert negative influence on the US dollar functions internationally. Such prospects are not pipe-dreams emerging from the likes of Communist

Party of China-related think tanks that have floated proposals for a common Asian digital currency [94]. Since 2020 China and Singapore's CBDCs projects have cooperated to, amongst others, include digital RMB transaction centers in the city-state [69]. In 2021, the PBOC initiated the Multiple CBDC Bridge (mBridge) project with the Bank for International Settlements Innovation Hub, Hong Kong Monetary Authority, Bank of Thailand and Central Bank of the UAE to "design new efficient cross-border payment infrastructure" [10, p.20]. This trial transacted more than $22 million between 15 August and 23 September 2022 [11]. The PBOC and the Society for Worldwide Interbank Financial Telecomm (SWIFT) also established a joint venture, stressing their expectation that the digital RMB will be used globally [88]. Both the Belt and Road Initiative (BRI) and the Regional Comprehensive Economic Partnership (RCEP) are facilitating greater cross-border trade and commerce across Asia. Studies point to how digitization could enable the RMB to reach the status of the euro in international trade through growing usage in BRI countries [103]. While the euro is not, and remains unlikely to form, a substantial challenge to dollar dominance [42], the European Union (EU) nevertheless functions as a – if not the – world's most powerful standard setter [16]. This is even true in finance where the EU has long power in accounting and banking standards [18].

Such standard-setting power is crucial in the context of currency digitization and its internationalization, particularly in Asia but also worldwide. This is because DCs generally and CBDCs specifically are used to facilitate 'financial inclusion' of those excluded from access to finance due to American sanctions and other monetary policies [17, 19]. The power to set *alternative* standards entails a potential re-setting of the balance between privacy and surveillance monitoring, which both CBDCs and DCs very much facilitate [40]. We return to these possibilities in the discussion of power below, but for the moment draw on analysis noting that what is:

> even more important than the broadening of the utilization of the digital Renminbi is the Chinese support for global CBDC standards and particularly for a multi-CBDC arrangement (a project called "mBridge"). The latter could provide a very cheap and fast alternative to the SWIFT-based system for cross-border payments in the future (Auer et al. 2021). Therefore, it could undermine both the role of the US Dollar as global lead currency and of US surveillance of the global cross-border trading of claims [79].

Traditional and novel limits to RMB internationalization thus also remain important to consider. The digital RMB is currently restricted to fulfilling invoicing currency and investment currency functions. This is likely to continue because of limited currency convertibility and capital controls [96]. The extent to which digitization can contribute to RMB internationalization in the short term is also widely believed to be limited [5, 20, 66]. Existing obstacles to the RMB internationalization do not simply disappear as a result of digitization.[6] Increasing usage domestically

[6] The digital RMB faces disputes and limits noted by competitors, like how "[f]ull anonymity is not plausible" [4, p.6] due to international anti-money laundering and counter-the-financing of terrorism (AML/CFT) regulations. As such, the digital RMB system collects less transaction information than traditional electronic payment system" [83, p.7].

Table 2 Impacts of Digital Currencies on the Currency Functions of the US dollar

Functions	DCs	Non-stable coins	Stablecoins	Digital RMB	
Medium of exchange		Vehicle currency (private)	No	No	No
		Trade currency (private)	N-Weak	P/N-Weak	N-Strong
		Intervention currency (official)	No	No	No
Unit of account		Invoicing currency (private)	No	No	N-Weak
		Statistical currency (private)	No	No	No
		Exchange rate anchor (official)	No	No	No
Store of value		Investment currency (private)	N-Week	P/N-Weak	N-Weak
		Reserve currency (official)	No	No	N-Weaker

Note: "No" means very little influence on the US dollar's international monetary function observed; N and P respectively means negative and positive influences; given that some stablecoins are wholly or partially dollar-backed, they can have a positive impact on the dollar's functions

and internationally may gradually motivate and accelerate China's market-oriented financial opening. As our SCOT-inspired perspective stresses, however, these processes are not automatic or simply evolving linearly.

Potential challenges to dollar function stemming from digital RMB are far more impactful than the (non)stable coins that the US has largely focused on to date. Table 2 summarizes and compares DCs' functional impacts on the USD. We examine three types of representative digital currencies, non-stable coins, stablecoins and CBDCs (specifically digital RMB) and assess and compare their impacts on the international functions of the US dollar.

Important to emphasize here is the probabilistic nature and impact of such changes in the considerable flux of DCs generally. There are both events that can be expected to occur (e.g. further US regulatory reactions to DCs) as well as 'unsuspected dimensions' [56] of technological change more widely. As opposed to predetermined existing takes, we stress the need for more open-ended analysis of digital RMB challenges to the core functions of dollar dominance.

Diluting the Benefits of the Dollar Hegemony?

Economists, especially leading American-based ones, argue that phasing out paper currency by digitizing currencies will automatically lead to a large shrinkage of dollar seigniorage [91]. The functional challenges of the digital RMB on dollar hegemony discussed above *can* cause international seigniorage loss of the dollar. National regulations *can* also exclude the digital RMB from US markets. Yet, as Ivanova [55] argues, the seigniorage income and the benefits that come from the structural causes that the digital RMB have little impact on include the likes of large-scale recycling of American debt that resulted from wider structural transformations from Fordist production regime to finance-dominant regime. Whether the US can maintain its key monetary benefits relies on the sustainability of the finance-dominant regime.

Reduced transaction costs is another key aspect of the dollar benefits influenced by DCs generally and by the digital RMB specifically. Due to different

technological features and the functional influence on the USD, the DCs analysed here influence this benefit by different means and degrees. The digital RMB can challenge the benefits of dollar dominance in three ways: (1) its advantages over traditional cross-border payment systems, including lower transaction cost; (2) higher transaction efficiency; and (3) easier-to-scale digital infrastructure [5]. The traditional single currency or multicurrency cross-border payment have long been dollar-dominated and complicated, involving a international chain of correspondent banks. For instance, although the cost of sending $200 in remittances has been declining in the past decade, the global average still reached $6.09 in 2022, with digital remittances ($4.79) being significantly cheaper than non-digital remittances ($6.69) [112]. Domestic and cross-border payments via digital RMB are claimed to be free and are said to be able to could reach up to 300,000 transactions per second [83]. Being loosely coupled with bank accounts, the cross-border digital RMB settlement can be real-time. In this way, the digital RMB is expected to pose more significant challenges to the ingrained benefits of the dollar hegemony, including the lower-cost transaction advantage.

The current wave of CBDCs, including the digital RMB, has the potential to dramatically lower cross-border transaction cost and enhance cross-border transaction efficiency by eliminating intermediaries, streamlining international payment processes and building new international digital financial infrastructures. Table 3 compares digital currencies and traditional payment system in terms of their market values, transaction speed, transaction cost and transaction confirmation time. It shows that the CBDCs like the digital RMB have great advantages in speed, cost and confirmation time. If US financial firms lose their positions as the most important global financial intermediaries and the long-cycle cross-border payment mechanism with choke points largely controlled by the US is replaced by a peer-to-peer alternative, the dollar will be in high risk of losing its center position in the international monetary structure. US individuals and entities would benefit less from low exchange-rate risks, low borrowing cost, high denomination rent and other benefits.

The consequences of such functional impacts are closely related to the above two benefits. A sustained boom of DCs may also shrink the US macroeconomic flexibility, the third major benefit of the dollar hegemony considered here.

The digital RMB and other CBDCs affect US macroeconomic flexibility and monetary policy effectiveness in other ways. As noted, the digital RMB may partially or wholly replace the dollar's international functions, the foundation of the US's macroeconomic flexibility. In addition to this direct influence, the emergence of the digital RMB may cause more indirect impacts. The digital RMB is believed to be conducive to China's economic development and financial policy effectiveness. One BIS report estimated that "CBDC issuance of 30% of GDP, against government bonds, could permanently raise GDP by as much as 3%" [6, p.abstract]. Studies within China meanwhile stress how the digital RMB can contribute to China's monetary policy effectiveness, currency stability and systemic financial safety [116, 117]. The digital RMB can be understood as having the potential to increase China's influence in global macroeconomic imbalance adjustment in ways that weaken the 'exorbitant privilege' of the US dollar.

Table 3 Comparison of DCs and Traditional Payment in Transaction Efficiency and Cost

DCs		Market Value ($bn.)[a]	Transaction Speed (Transactions per second)[b]	Transaction Cost (Withdrawal Fees)[c]	Transaction Confirmation Time[d]
Nonstable Coins	Bitcoin	408.4	3–7	$0–34.2	10 min
	Ethereum	178.6	15–25	$0–32.4	6 min
Stablecoins	Tether	65.8	min.50000	$0–40.0	1–10 min
	USD Coin	55.1	min.1000	$0–50.1	5 min
CBDCs	E-CNY	—	10000–300000	0	immediate (retail)
Traditional Payment System	Mastercard	—	around 5000	1.55%-2.6% (of each transaction)	24 -72 h
	Visa	—	1700–24000	1.43%-2.4% (of each transaction)	
	SWIFT	—	around 582	3%-5% (foreign currency exchange expenses to the total payment)	old rails: 1 to 5 working days; upgraded rails: within 2h

[a]CoinMarketCap, https://coinmarketcap.com (Accessed 27 July 2022)

[b]Data sources: [30, 64, 87, 97, 98]

[c]Data sources: [22, 58, 110]

[d]Data sources: [9, 14, 30, 38, 48, 70, 99]

Once again, all this is probabilistic and remains in flux as the world awaits US and other responses (such as the digital Euro) while the current crop of CBDC experiments grows. In such a context theoretically-informed analysis must eschew deterministic claims. Our SCOT-informed perspective provides value-added in balancing between claims of revolutionary change and status quo continuity.

Currency Power Diffusion and a New Disseminator?

Relations between currency power and currency functions evolve following different logics within a country and within the international monetary system. Domestically, monetary sovereignty endows a fiat currency with currency functions, namely through a 'function from power' logic. In the international arena, meanwhile, international currency functions of a particular currency bring monetary power to bear on the issuer country, following a 'power from function' logic. Based on these two logics, the influence of DCs generally, and the digital RMB specifically, on the dollar's hegemonic power can be analyzed here from our four types of monetary power: relational, institutional, structural and ideational.

To recall, relational monetary power mainly entails the unbalanced influence or interactions in direct bilateral monetary relations. These unbalanced monetary relations could be maneuvered to realize foreign policy objectives, either in a cooperative or coercive way. Taking the most coercive action in this domain (i.e. financial sanctions) as an example, DCs are believed to weaken US monetary power in various ways. If nonstate DCs threaten US monetary sovereignty and financial jurisdiction [52], domestic monetary power, a crucial part of the sovereignty, will be negatively influenced. The influence will extend to the currency functions of the dollar via the 'function from power' logic. Without a strong and independent monetary authority against private and foreign pressures, the credit and reputation of the USD in domestic and international markets cannot be maintained, and the US's power as leading financial sanctioner will largely decline. Internationally, private DCs offer public and private actors with alternative currencies to undermine US sanctions, such as through the use of Bitcoin and other cryptocurrencies [35]. A report from the US Department of the Treasury [106, p.2] recognized that DCs "potentially reduce the efficacy of American sanctions" by offering "opportunities to hold and transfer funds outside the traditional dollar-based financial system" and building new financial and payment systems to diminish the dollar's global role".

The digital RMB and other CBDCs, however, do not directly threaten US monetary sovereignty. At present they mainly influence the international functions of the dollar. The international monetary power of the dollar based on these functions will be correspondingly influenced through a 'power from function' logic. The digital RMB provides China with a potential new tool to counteract the US's financial 'long-arm jurisdiction', which is a core feature of the dollar hegemony and a key measure of financial sanction. The digital RMB-centered global financial infrastructure, if it could gradually come into being, will enable cross-border transactions to bypass the traditional international payment and settlement systems. Consequently, the US will be at risk of losing its monetary power. The 2021

Report to Congress of the US-China Economic and Security Review Commission [104, p.9] noted precisely that the digital RMB "could undermine the status of the U.S. dollar and efficacy of U.S. financial sanctions".

The growing use of the digital RMB could also instigate changes in international monetary institutions, including both organizations and rules that underpin the international structure of institutional monetary power. This structure was established in the mid-1940s through the establishment of organizations like the IMF and World Bank, as well as later international monetary and financial regulation rules like the Basel Accords for bank capital requirements. The dollar-centered international monetary regime and international financial development and regulation architecture could conceivably be challenged by a growing usage of the digital RMB. As compared to the gold standard system and the Bretton Woods system, the post-Bretton system is a real fiat money system, underpinned by a series of international monetary institution, including free-floating exchange rate regime and norm, international payment and settlement rules and infrastructure, monetary policy coordination mechanisms. The digitalization of fiat currencies can alter the modality of traditional international payment and settlement rules, which are prime sources of the US institutional monetary power. They can also add a new dimension to the international monetary institution and a new source of international monetary power, i.e. organizations, norms and rules of financial technologies embedded into the CBDCs. As noted above, technological rivalry regarding CBDCs occurs in rules/standard setting and data gathering (see also [93]). As we have stressed, the digital RMB may enable China to define the global standards and make relevant rules of financial technologies and CBDCs [50].

CBDCs and the digital RMB inject new modalities of cross-border capital flow and investment and financing activities, as well as new financial risks. Traditional international organizations dominated by the US and allied powers include the BIS and IMF, which have investigated these new modalities and risks intensively. The first-mover advantage in developing CBDCs and the leading role in digital economic transformation may endow China more influence in these traditional international financial institutions and relevant standard and regulation rules making, even promoting China to be "a disseminator in the digital age" [93, p.1].

Intricately related to the above are relational and institutional forms of power, international structural monetary power is formed in the long run and less likely to change in the short term. The dollar-centered core-periphery international financial structure has brought the US tremendous political might through dollar dependence and financial statecraft, as well as economic benefits from the dollar recycle as discussed before. Whether the digital RMB can initiate dramatic change of the currency pyramid with the US being an apex currency and reform of the core-periphery structure depends in part on how China's domestic financial policies serve the cross-border development of the digital RMB and how major monetary powers (particularly the US) react to it. So far, the nascent digital RMB have not yet brought tremendous tangible challenges to the structure, with the limited existing challenges are even much weaker than what other traditional currencies had or have brought [45, 49].

In sum, the digitization of the RMB does not automatically alter modalities of international currency politics. A new field of currency competition to the traditional currency politics *is* however added: the digital technology underpinned the CBDCs. Major countries' competition for monetary power around this new dimension, which spans from chips to cross-continental internet cables, all provide wide-ranging opportunities and impetus to reshape structural power in a digitizing monetary system. The most impactful changes taking place revolve around ideational power. The current moment is arguably the second time in history that China has been at the forefront of monetary innovation since the 'jiaozi'—the world's first paper money—was invented in the Song Dynasty around the eleventh century. This lead has important symbolic meaning for other countries and regions, Asia in particular. The digital RMB ushers in not only a digital currency, but a wider digital economic ecosystem and a monetary philosophy invented initially by private DCs. These ideational roots and the ways in which the digital RMB expands in relation to other DCs, including a digital euro and digital dollar, will have important implications for this final form of ideational power. Most prominently is the technological ability to enroll citizens denied access to financial services with ease and interoperability with existing fintech ecosystems.

In other words, both the 'hardware' and 'software' components of currency digitization are extremely important for analysis of impacts, future and present, to consider. Cables and handsets facilitate the take up of digital wallets needed to use the digital RMB. The forms of cyber and personal security made available through software underpinning CBDCs also matter. Take up of digital RMB by domestic populations and in international economic transactions is based not only on symbolic factors but real perceptions and experiences with privacy and stability of fintech systems. The ability of the digital RMB to balance privacy and surveillance capacities as well as ensure system stability (e.g. glitches and shut-downs) are important for on-going assessments of wider challenges to dollar dominance along the more nuanced lines we have offered here.

Conclusion

Digital technology and finance are twin playgrounds in what is currently friendly China-US competition driven by and focused on domestic innovation rather than international monetary flux. These twin playgrounds need to be given more systematic interconnection in scholarly analysis given how wide ranging contemporary digital finance has become to now involve non-bank digital payment, peer-to-peer lending, internet-based microlending, Internet banks, digital insurance, digital financial management, internet equity-based crowdfunding and so on. Within these developments, digital currencies play particularly important roles for age-old considerations of international monetary hegemony. The 'first-mover' position of the digital RMB amongst large nation-states has aroused widespread international media attention for potential challenges to dollar dominance. Yet, to date, academic analysis rarely connects scholarly studies of international 'digital war' [76] with 'financial war' [119] as well as with domestic negotiations in more

nuanced manners that avoids tendencies towards technological determinism. The 'probabilistic flux' view we outlined here avoids deterministic accounts of either what we have outlined as the 'conventional transformation' or 'transformative continuity' that are seen *to necessarily* result from digitization generally and RMB digitization specifically.

Our more nuanced view generates a three-fold conclusion that speaks to evolving IR and IPE literatures on digitization more widely. First, the broad context of growing digital currency alternatives to both the dollar and RMB have enriched the international currency functions of the US over China. Second, combined with this wider array of digital currency alternatives the Chinese RMB gradually erodes the functional base of the dollar hegemony, as well as dilutes the benefits deriving from dollar dominance position and the US's international monetary power in Asia and beyond. The emerging and possible unintended impacts of the digital RMB need to be understood also in comparison with other types of digital currencies that have been explicitly positioned as challenges to dollar dominance, namely nonstable coins like Bitcoin and stablecoins such as Tether. Third, currently friendly digital currency competition focused domestically remains in a state of highly unpredictable flux that poses both possibilities for greater cooperation and for less friendly competition and international tensions, particularly as US dollar digitization unfolds in ways that are difficult to anticipate. The digital RMB has the potential, even if not the current capacity, to fundamentally change contemporary finance-security relations between China and the US. This potential needs to be taken seriously but in more nuanced perspectives than the deterministic ones currently on offer.

In sum, digitization processes are adding greater uncertainty and flux that push for countering deterministic assessments of three interconnected aspects underpinning monetary hegemony we have emphasized here: the function, benefit, and power of a country's currency. This overarching conclusion points to the need for future research that considers the multiple, intersecting and far from pre-determined ways in which digitization affects the dynamics and politics of monetary hegemony. As we have stressed, there are both expected responses and reactions to anticipate from US-dominated institutions of global financial governance. How the likes of the IMF and World Bank react to the growing implications of CBDCs both systemically (for international monetary stability) as well as individually (for financial 'inclusion') are very important to trace. Relatedly, the growing usages of digital technologies to in turn accelerate such regulatory reactions influence the traditionally slow speed at which formal organizations have information gathered, acted upon and assessed. The accompanying rise 'RegTechs' including Big Data, blockchain and other applications of digital technologies alongside CBDC holds both perils and promises the same in terms of generating, using and sharing useful monetary data to enhance 'data power' [53] via standard setting for fintech platforms [52]. We have only begun to scratch the surface of implications for specific regions of the world, including the focus of this special issue on Asia. More research is especially needed to situate more specifically digital developments geographically and historically, linking perspectives on 'redback rising' [67] to the past, present and future of dollar dominance [47].

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Declarations

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