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Should BRICS Members Adopt a Wholesale Digital Payment System?

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Abstract: This article examines proposals to establish a BRICS Central Bank Digital Currency (CBDC) aimed at facilitating trade flows among the members, as part of their broader discussions around reforming the international monetary and financial system. It sets these proposals within the context of global CBDC efforts, South-South convergence processes and the challenges the BRICS have faced in navigating global geo-political tensions, while aligning national CBDC efforts with groupwide initiatives. We focus on a Brazilian proposal to establish a unified BRICS cross-border payment system, seen as a first step towards a full-fledged BRICS CBDC. Our main finding is that while this cross-border digital currency can be useful for smoothing payments and reducing the trade deficits of the smaller BRICS members, it does little to redress their asymmetric position vis-à-vis the larger country, China. The implication is that sustainable convergence among the grouping through the adoption of a unified cross-border currency would require a higher level of monetary and policy coordination than that set out in the Brazilian proposal.

Keywords: CBDC, BRICS, cross-border payments, international currency, international trade, stablecoins.

JEL Codes: F33, F36, E12.

1 Introduction

BRICS integration efforts in the past few years have been marked by an inherent tension between "reforming the status quo" and "going it alone" (Liu & Pappa, 2022). The heterogenous grouping consisting of Brazil, Russia, India, China and South Africa has expanded with the formation of the BRICS+, with Egypt, Ethiopia, Indonesia and the United Arab Emirates counting among the new members, and several other countries on the waiting list. South-South integration efforts, once slowed by political dissensions between governments, have regained momentum in the wake of recent summits in Johannesburg (2023), Kazan (2024) and Rio de Janeiro (2025).

This tension is particularly visible in BRICS proposals to reform the global monetary and financial system. On the one hand, the grouping fully participates in multilateral G20 and Bank of International Settlements (BIS) - led efforts to streamline global payment systems and trial central bank digital currencies (CBDCs). On the other hand, the establishment of the New Development Bank (NDB) in 2015, initiatives such as BRICS Pay, launched in 2018, and more recent discussions to explore a unified BRICS CBDC initiative, reflect a growing willingness to consider home-grown solutions and move way from legacy global payment and financial infrastructure.

Within this broad geo-political context, this article brings into focus the BRICS plans for a unified cross-border digital payment system - a possible precursor to a full-fledged BRICS CBDC - assisted by a jointly-financed investment mechanism. The question we try to answer is whether a unified BRICS digital currency for cross-border payments, as suggested by Paulo Nogueira[1] (2023; 2024), with each country maintaining its national currency and an autonomous monetary policy, could offer advantages to the BRICS nations. Specifically, would it enable the smaller members to overcome their structural disadvantages, whether nominal, stemming from the persistent depreciation of their currencies against the dollar–

[1] Paulo Nogueira is a Brazilian economist with extensive experience in the field of international monetary relations, the global trading system and South-South convergence processes. He served as Executive Director for Brazil at the IMF from 2007 through 2015, then as Vice President of the New Development Bank from 2015-17, where he was responsible for strategy.

renminbi pair, or real, rooted in their productivity gaps? What challenges might arise, particularly given the asymmetrical nature of the grouping, with China in 2024 representing 68% of the combined GDP of the original five?[2] And would such a solution lay a solid foundation for a full-fledged BRICS CBDC that serves not only as a means of payment but also as a reliable alternative store of value?

Our main finding from investigating the Brazilian proposal is that a joint BRICS digital payment system can serve to smooth payments among the five. However monetary and economic stability would depend on the continued willingness of the larger country to provide investment flows and technology transfer to the smaller partners, compensating for differences in productivity and nominal depreciation. The implication is that a common cross-border payment currency, while beneficial, does not fundamentally alter the existing asymmetries within the group. A full-fledged CBDC that can serve as both a means of payment and a store of value would therefore require a higher level of monetary and policy coordination than that conceived in the Brazilian proposal, enabling a more sustainable convergence among members of the grouping.

The paper is structured as follows: Section 2 presents the global CBDC landscape and advances to implement wholesale and retail digital payment platforms. Section 3 focuses on BRICS' discussions for adopting a unified cross-border digital payment system. Section 4 develops a simplified model to study the Brazilian proposal. Section 5 concludes.

2. CBDCs and reforming the global payment eco-system

Faced with the challenge posed by cryptocurrencies and stablecoins, most central banks worldwide have advanced on projects to adopt a central bank digital currency, while also seeking to improve legacy cross-border payment systems. As cash usage declines, CBDCs have emerged as a new form of central bank money, offering quasi-instantaneous national and international payments while potentially improving financial inclusion (Torre and Xu, 2023; 2025).

[2] World Economic Outlook, IMF, October 2025

A CBDC constitutes a new form of central bank money, with the following properties: it is digital, made secure by a system of encryption, and managed in a decentralized way by a private blockchain, the members of which are chosen by the central bank. From a theoretical point of view, central bank digital currency therefore belongs to both the monetary base and the M1 aggregate. It can replace all forms of cash and demand deposits, and second-tier banks' reserves at the central bank could be made up of CBDC. However, CBDC holdings could also become one of the means of holding reserves or liquid deposits, while traditional means of payment (cash, demand deposits, etc.) continue to be active alongside them. Several forms of CBDC are usually distinguished. Wholesale CBDCs are limited to settlements among central banks or financial institutions and could eventually also be used as a reserve asset, while retail or general-purpose CBDCs are tailored to be used by individuals and businesses as digital money for lending, payments and savings.

Various pilot programs are underway (see Table 1, Appendix) involving multiple central banks, financial institutions and intermediaries. According to the CBDC tracker (2025), more than one hundred economies, representing 98% of global GDP, have projects in various stages of progress. 66 countries are in the advanced - development, pilot, or launch phase of exploration, 44 countries are running pilot programs, and four countries - Bahamas, Jamaica, Nigeria and Zimbabwe - have already launched a CBDC (IMF, 2021; Bank of Jamaica, 2021; Ree, 2021; Reserve Bank of Zimbabwe, 2023).

In Europe, the European Central Bank (ECB) conducted a two-year study on the digital euro in 2021, focused on critical design, emission and circulation issues (ECB 2023a). The subsequent 2-year phase, launched in 2023, aims to finalize the rulebook, platform and operating infrastructure (ECB 2023b). The initiative has strong support from Eurozone central banks, including the Bank of Spain and *Deutsche Bundesbank*, who stress its importance for digitalization, while striking a balance between privacy and trust (Hernández de Cos, 2023; Nagel 2024). The *Banque de France*, (2023, 2024) has carried out a dozen CBDC tests and trials in collaboration with other counterparts and financial institutions. The Bank of England (2023), for its part, has also conducted wide-scale stakeholder consultations on the benefits, risks and use-cases of a digital pound. Its progress update in

2025 demonstrates more confidence in how a digital pound would complement existing payment systems, as well as a clearer vision of the technical infrastructure and design requirements (ibid. 2025).

Matters are less clear-cut in the United States. President Trump is firmly opposed to any digital dollar project, ensuring that all US CBDC initiatives are frozen (Jones 2025). The Federal Reserve (2022) had previously expressed skepticism about whether a CBDC eco-system would present any advantages over existing digital payment infrastructure, while highlighting how it also risked undermining the traditional division of labor between regulators, commercial banks and payment service providers (PSPs), particularly under models where end-users hold their accounts directly with the central bank. The concern is largely misplaced however, as in many of the wholesale and retail CBDC models being trialed around the world (see Table 2, Appendix), end-user accounts and wallets are hosted at commercial banks and PSPs, with these maintaining their intermediation role.

As it concerns the BRICS, the tension between pushing for reform and going-it-alone is particularly present in the realm of digital payments. The grouping is fully engaged in the G20 Roadmap for Cross-Border Payment Systems, adopted in 2019, and which aims to address long-standing inefficiencies related to slow processing speeds, high costs, and limited transparency (Poenisch 2022). The Strategy for BRICS Economic Partnership (2020) in this sense fully integrates the roadmap's objectives of linking national instant payment systems (ISPs) across borders through a hub-and-spoke model. It also, however, introduces a new objective: boosting the use of BRICS currencies in cross-border transactions, reducing by implication reliance on the big four currencies (GBP, JPY, EUR, USD).

Within the G20 framework, one of the most emblematic efforts is Project Nexus, which links India, Malaysia, Singapore, and Thailand by connecting ISPs through a common hub with a shared protocol, enabling rapid FX conversion, as an alternative to the cumbersome correspondent banking system (BW Committee, 2024). Under the auspices of the BIS, Nexus is a huge undertaking, requiring a standardized rulebook and governance, the harmonization of technical and KYC standards, the establishment of an independent

managing entity and partnerships with the private sector. In parallel, discussions since 2019 to create a competitive retail payments platform for BRICS countries — dubbed 'BRICS Pay' — have adopted a similar cloud-based approach and design principles (Lui & Papa, 2022).

While efforts to better integrate national ISPs and boost the use of BRICS national currencies in global payments have progressed at pace, the participation of BRICS members in multilateral CBDC initiatives has collided with worsening geopolitical tensions, particularly following Russia's invasion of Ukraine and the integration of another sanctioned country, Iran, as a BRICS member. Matters came to a head in October 2024, as the BIS announced its withdrawal from Project mBridge, one of the most high-profile CBDC projects, at the same time as the BRICS members were gathering in Kazan for their 16th global summit, discussing plans to pursue their own cross-border CBDC solution. "mBridge is not the BRICS bridge" stated BIS director Augustin Carstens "and I have to say that categorically, mBridge was not created to cater to the needs of BRICS" (Carstens 2024). In his statement, Carstens highlighted that the prospects of sanctions evasion using emerging technologies was not a risk the Basel-based institution was willing to take.

At the time, mBridge had reached the minimum viable product stage, uniting the central banks of China, Thailand, Saudi Arabia, and the Hong Kong Monetary Authority — along with 31 observer countries — in successfully testing a custom blockchain platform for multi-currency payments and payment-versus-payment (PvP) transactions (BIS 2022a; Long 2024). While the South African Reserve Bank participated in Project Dunbar, which concluded in 2022, none of the BRICS members are involved in the BIS's new flagship initiative, Project Agora. The latter features expanded private-sector collaboration (BIS 2022b), while also reflecting the deepening geopolitical fault lines that have come to define global monetary cooperation.

Despite the BRICS members' participation in these high-profile multilateral CBDC projects, and significant progress in testing their own domestic retail CBDCs, the contours of a unified BRICS-wide CBDC program remain vague. At the BRICS Research Conference in April 2022, Chetty (2022) expressed the concern that advances in national CBDC programs risked

creating path dependencies in terms of the choices of infrastructure, protocols and technology, that could significantly raise the costs of future BRICS efforts to establish a compatible and integrated joint-CBDC platform.

This interface of national versus group-wide initiatives poses a significant challenge for the BRICS grouping, especially as these efforts must proceed without the BIS's expertise, coordination mechanisms and resources. In terms of national CBDC programs, China's is among the most advanced in the world. Trial testing of the e-CNY in coordination with the private sector has been on-going since 2017, expanding to all major cities by mid-2024, with total transactions equivalent to US $2.4 trillion (Working Group on e-CNY, 2021; China Daily, 2024; SINA Finance, 2024). Brazil's digital real project Drex, initiated in 2020, consists of both a retail and wholesale component, while in Russia pilot testing of the digital ruble in partnership with 12 banks started in 2023 (Brazil Central Bank, 2025; Bank of Russia, 2024). South Africa and India, for their part, have emphasized the financial inclusion component of their CBDC programs, with South Africa's pilot Project Khokha launched in 2018, and India's digital rupee in 2022 (South African Reserve Bank 2024; Reserve Bank of India, 2025).

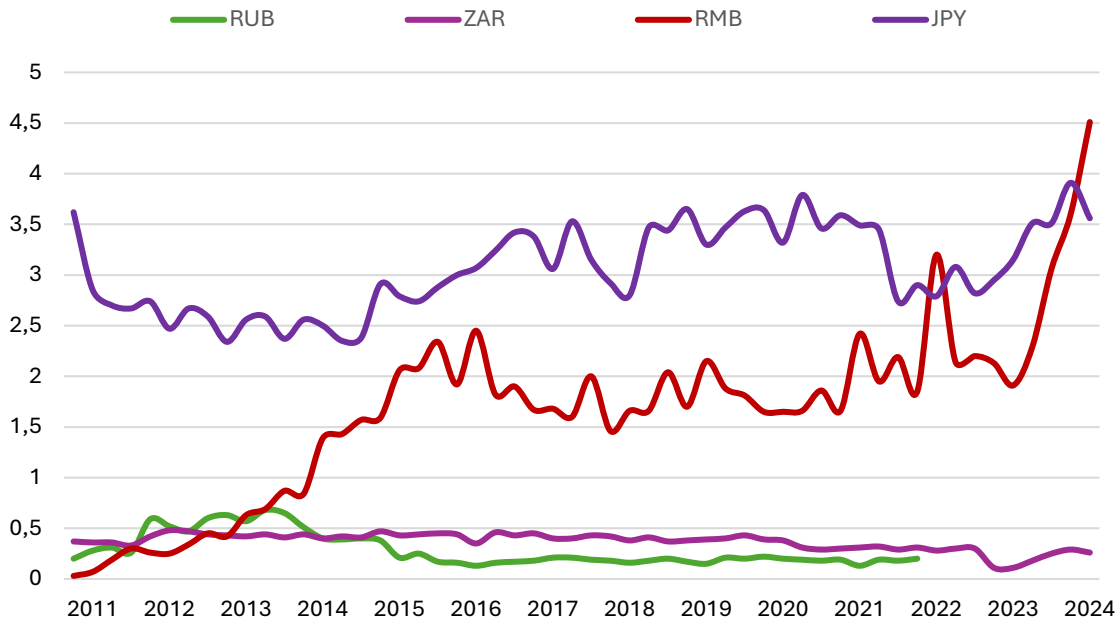
In their 2024 report on reforming the international monetary system, the BRICS weigh the possibilities of establishing inter-operable national CBDC systems versus establishing a unified platform with a common currency and shared infrastructure, without indicating a preference. A more detailed vision comes from Nogueira (2023; 2024) who proposes a unified wholesale CBDC governed by a common rulebook and centralized infrastructure. We explore this proposal in the following section and the broader rationale behind a shared BRICS currency.

3. A Joint International Payment Solution for BRICS: Advantages and Feasibility

A conundrum for the BRICS since deciding to boost international payments in their own currencies is that these exchanges are not working particularly well. On the one hand, from China's perspective, the growing international use of the renminbi can only be seen as

remarkable. The Chinese currency displaced the JPY – a big four currency - on the SWIFT platform for the first time in 2024, as outlined in Chart 1, taking the fourth position behind the EUR, GBP and USD and reflective of China's efforts to boost RMB settlements in global trade (PBC 2023). Given continued restrictions on convertibility, RMB payments are supported by a network of 30 offshore clearing houses as well as large-scale swap arrangements between China and its partners (Tang 2022; Sekine 2024). These include a $30 billion facility with Brazil, agreed in 2009, a China-Russia facility worth $24.5 billion, established in 2014, as well as a China – South Africa arrangement worth $4.75 billion agreed in 2015 (Liu & Papa 2022). India and the UAE, for their part, committed in 2023 to trade in their national currencies (Greene 2023).

Chart 1: SWIFT transactions in ruble, rand, renminbi and yen 2011 - 2024
Percent value of total SWIFT payments



Source: SWIFT, RMB Tracker, 2024

On the other hand, these dynamics have increasingly resulted in problematic imbalances, particularly for the junior BRICS members, whose currencies have limited international acceptance. India's trade deficit with Russia in 2024, for example, left the latter with no obvious use for the initially $8 billion in rupees held by Russian firms (Anand 2024). Russia could either seek out investment opportunities in India, identify third countries that would

accept rupee payments or, if sanctions permitted, trade these rupees for more liquid dollar or euro on forex markets. The latter option, which in this scenario was not possible, defeats the purpose of transacting in BRICS currencies in the first place. In parallel, the sanctions regime on Russia has also pushed the BRICS to explore the possibilities of engaging in barter trades, avoiding banking and payment systems altogether (Lee 2024).

For Nogueira (2024), such situations have demonstrated that it is unrealistic for the group to de-dollarize the means of payment, while remaining dependent on the big four currencies as units of account and stores of value. This becomes particularly salient when considering that over 90% of Brazil's external debt and 80% of India's are denominated in dollars[3], that commodity exports are overwhelmingly priced in dollar, and that it serves as the anchor currency for global financial markets. What is needed, he argues, is a common BRICS payment and reserve asset, particularly as legacy payment and financial systems are increasingly ill-adapted to their needs, while South-South trade corridors continue to expand. A BRICS currency could be used to settle payment imbalances, be held as an alternative reserve asset and serve as the foundational unit for the bloc's monetary and financial architecture, including the Contingent Reserve Arrangement (CRA) and the NDB.

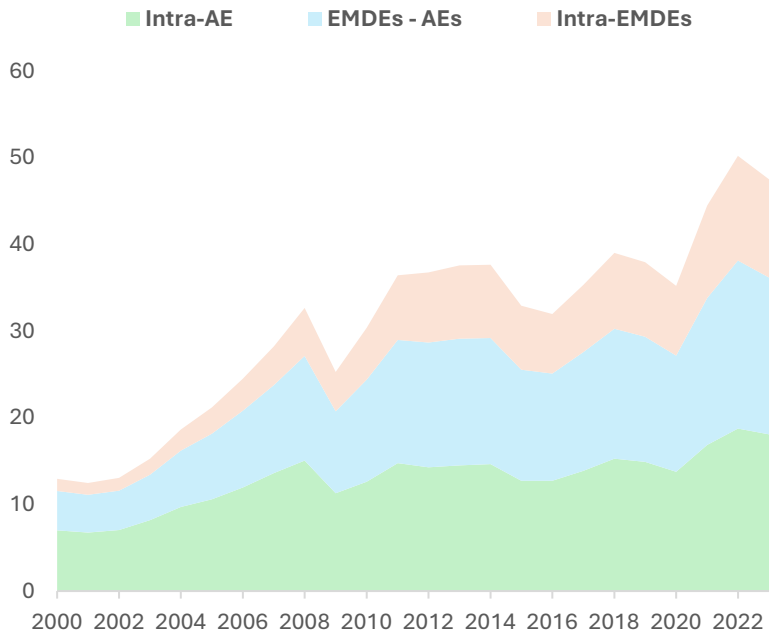
The shortfalls of legacy payment and financial systems, from the perspective of emerging and developing economies (EMDEs) have only grown. The number of correspondent banks tied into the SWIFT messaging system has declined by 20 percent between 2012 and 2018, in the face of stricter compliance standards, generating delays and higher costs for cross-border payments among EMDEs. The BRICS Cross Border Payment Survey further highlights an opaque pricing structure and FX margins – 2.5 percent in the case of Brazilian real, up to 8.5 percent or higher applied on many African currencies – as major deficiencies of the system (JP Morgan 2022; Yakov & Partners 2024).

More fundamentally, the ability of the United States and a handful of powerful countries to weaponize the SWIFT system, as well as the dollar, against foes, justified or not, has

[3] World Bank, International Debt Statistics (2024)

emerged as a key vulnerability for EMDEs. The BRICS have notably been directly threatened by the United States with steep tariffs and sanctions if ever they seek to pursue an alternative to the US dollar as the main reserve currency (Shakil 2025). For Nogueira (2023; 2024), these experiences have demonstrated that there is no conceivable scenario in which the G7 would agree to a reformed global payment system or CBDC project that brings into question the privileged position of the big four currencies, or the decision-making power of this handful of high-income countries. In this regard, the BRICS Pay initiative enshrines in its charter the principles of independence, security, inclusivity, and sustainability. The idea, in principle at least, is that no participant can be unilaterally excluded from a shared platform, while enabling the organic expansion of the joint-solutions under development to other countries (Liu & Papa 2022; Yakov & Partners 2024).

Chart 2: Intra-regional trade between advanced (AEs), emerging and developing markets (EMDEs)
US dollar trillion



	2000	2023
Intra-EMDEs	11%	24%
EMDEs-AEs	35%	38%
Intra-AE	54%	38%

Source: data drawn from UNCTAD (2024)

Nogueira's insights take on added significance when one considers the expansion of South-South trade corridors and shifts in global economic power. The BRICS five accounted for 26 percent of global GDP in 2023 in current dollar terms, from 10 percent two decades ago, just

over a quarter of global output (WEO 2023). Seen from the perspective of trade, in Chart 2, intra-regional trade among EMDEs has flourished, representing 24 percent of global trade in goods in 2023, more than doubling in the space of two decades, while trade among advanced economies has progressed at a much slower pace. As originally set out by Krugman (1984), changes in the structure of trade, as economies gain in size and importance, eventually triggers a shift in the structure of payments, as countries see benefits in invoicing and settling in their own currencies, an interesting dynamic that can be seen at play with the BRICS.

Could a common digital currency, as proposed by Nogueira, utilized for cross-border payment and financial flows among the group, help address these challenges? The question directs us to a long-standing debate in economics about whether countries should give priority to flexible exchange rates, with greater freedom to pursue independent monetary policies. Or prioritize stable exchange rates to facilitate trade, while sacrificing some monetary policy autonomy and placing some restrictions on financial flows?

The answers are not clear-cut. Adherents of flexible exchange rates tend to believe that markets have naturally stabilizing properties, and that free capital movements are important for business. Keynes (2012, p.529) disagreed, arguing that coordination among central banks was crucial to stabilize exchange rates, and proposing the adoption of a universal unit of account, the *bancor*, to denominate and settle trade among countries. A pillar of his approach was the establishment of an International Clearing Union, through which surplus countries would finance the deficits of their partners by drawing on their bancor balances. Both excessive surpluses and deficits would be penalized, with interest payments, for example, while persistently large imbalances would require a revision of a country's exchange rate against the bancor in pursuit of more balanced trade and financial flows (Eichengreen 2008, p.94).

Post Keynesian economists have presented similar proposals. Davidson (2002, 2008, see also Blecker 2009) favored reviving the bancor concept along with an International Clearing Union, arguing that following the unravelling of Bretton Woods in 1973, the new trio of free

trade, capital mobility and flexible exchange rates was increasingly incompatible with the objectives of sustainable growth and full employment. In Davidson's vision, countries would pursue autonomous monetary and fiscal policies, while settling their cross-border transactions in a common SDR-type unit, to which each country would establish a fixed exchange rate. Surpluses accumulated by countries would be used to finance deficit countries, while above a certain threshold, persistent surpluses would be directed to foreign direct investment or international aid programs in deficit countries.

Moore (2004), who agreed with Davidson's analysis, was pessimistic about the United States ever accepting to abandon the benefits associated with being the issuer of world money. Moore opted instead for a "second-best" solution in which countries would unilaterally adopt one of the major international currencies (the USD, EUR or JPY), abandoning their own national currencies. Gnos & Rochon (2004) found Davidson's proposal to be the most convincing, as it elevated the logic of operating a bank with multiple branches from the national to the international level. This, they highlighted, would require a robust governance framework agreed between countries that would set limits on the deficit financing permitted as well as limits on their quota in the SDR-type unit. Nogueira's proposal, as it stands, does not yet incorporate such precautionary measures.

Their point of view is in line with those of Triffin (1960) and Schmitt (1975), who pointed out that the use of a national currency as an international one creates a structural problem as the provision of international liquidity comes to depend on the central country's domestic monetary and fiscal policies, and not necessarily the needs of world economy. De Paula et al. (2017, p.189) demonstrate that this structure relegates the currencies of EMDEs to peripheral status due to their lower liquidity premium, generating an entrenched currency hierarchy. Minsky (1979), on the other hand, was one of the few Post Keynesians to see no inherent flaw with a national currency playing the role of world money. In Minsky's view, what was required was better management of the US trade deficits, and stronger coordination among central banks to manage exchange rate stability and global credit conditions.

Proposals to reform the international monetary architecture are, of course, not limited to the Post Keynesian school. Other specialists also influenced by Keynes' views such as Mundell (2004, p.574-5; 2012) saw large exchange rate fluctuations as harmful for investment, trade and growth, and invited the main central banks to work towards establishing three or four closely coordinated global currency zones, and to converge in each zone on a composite basket currency composed of the dollar-euro-yen or dollar-euro-renminbi. The composite currency would be used to denominate and settle trade and financial transactions within each of these zones and it would serve as a precursor to transitioning towards a full-fledged global currency.

Nogueira's (2023;2024) proposal, and BRICS deliberations more broadly, embrace the phased approach documented in this rich literature, but augmented with advances in digital money that could contribute to advancing South-South convergence processes. The objective is not to establish a BRICS common currency – indeed domestically each member state continues to use its national currency, while pursuing autonomous monetary and fiscal policies. Rather, the proposal seeks to establish a wholesale international payment system to smooth trade settlements and financial flows among these emerging giants. In the longer term, this would serve as a basis for a new reserve currency.

Nogueira proposes the establishment of a new unit of account composed of a basket of BRICS currencies, with weights based on the share of GDP of each country and initial exchange rate set at parity with the dollar. The new unit would be used initially as an accounting tool to track trade and financial flows among the grouping, with its value fluctuating in line with the movements of each currency against the dollar. It would then be launched as a digital currency, used for cross-border transactions, and eventually as a reserve currency that can be held, stored and invested.

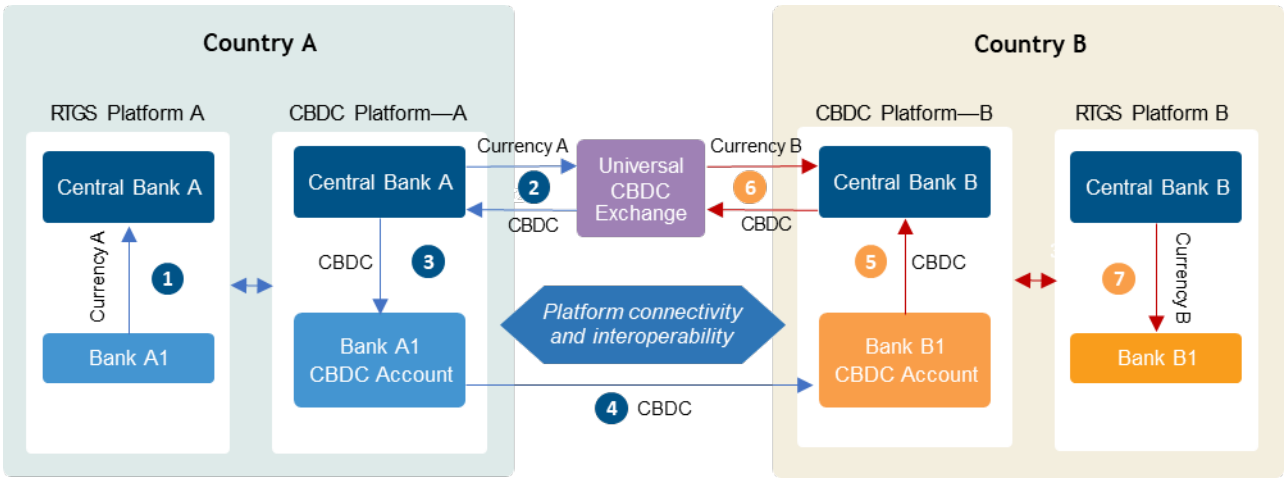
In practice, the Brazilian proposal follows the contours of the BoC-BoE-MAS[4] (2018) model, explored in Bossone & Ardic (2021), and which opts for a shared infrastructure, common

[4] Bank of Canada, Bank of England and Monetary Authority of Singapore

rulebook and universal CBDC. Under this model, central banks are responsible for establishing an exchange and clearance platform, a Universal CBDC Exchange as set out in Chart 3, integrating smart contracts, foreign exchange and direct settlement facilities. Bank A wishing to effectuate a payment to Bank B, requests CBDC from Central Bank A and provides collateral funds. Central Bank A intermediates the issuance of the CBDC with the exchange and provides them to Bank A, which remits the CBDC to Bank B.

Automated smart contracts here ensure that payment is only issued against the fulfillment of certain conditions by Bank B, or the client parties, whether this relates to the delivery of goods or services. Bank B then remits the CBDC to Central Bank B, and these are redeemed by the exchange against Currency B, which is then provided to Bank B. Within each country, national payment systems continue to operate via the traditional real time gross settlement (RTGS) platforms, with debit, credit card and mobile payments.

Chart 3: Wholesale Universal CBDC with Shared Infrastructure



Source: adapted from Bossone & Ardic (2021)

The model is highly stylized but gives some indication of how an intra-BRICS digital payment system could work. To complete the framework, Nogueira (2023; 2024) additionally sets out how overall governance of the system could be provided by a New Reserve Monetary Authority, which could issue bonds to institutional investors to provide backing and credibility to the currency, guaranteed by the Treasuries of the member countries.

Nogueira emphasizes, however, that these plans require a long-term horizon. Indeed, as highlighted in BoC-BoE-MAS (2018), central banks will have the added responsibility of overseeing two distinct but connected monetary systems. The digital currency will need to be adequately collateralized by reserves to manage exchange rate volatility. As a financial asset, speculation and hoarding could destabilize prices or undermine its uses as a means of payment, while there are also risks of currency substitution in countries with poor macroeconomic performance. These, along with several other challenges, require the type of phased long-term approach stressed by Nogueira, and which additionally takes into account the interface between domestic CBDC programs and groupwide initiatives.

4. A simplified macroeconomic setting to analyze a unified payment solution among BRICS partners

In this section, we propose a simple model integrating the essential macroeconomic features associated with trade, monetary and financial relations among the BRICS, seen from the point of view of the smaller members of the group, i.e. each of China's trading partners. This point of view is essential, since the search for a means of payment other than the dollar or the renminbi is only part of the search for a more advantageous solution for China's “small partners”. Initially, we assume that transactions are settled in dollars, with the only cooperative mechanism coming from a Chinese-backed investment fund. We then study the effects of the application of the Brazilian solution. Both in the benchmark and in the extension, it is implicitly assumed that the exchange rate between the renminbi and the US dollar is constant over time.

Variables include trade balances, monetary and financial transfers generated by foreign direct investments, the technological gap between the leading country and its partners, and the evolution of this gap, as well as the effects of international currency speculation.

4.1 The benchmark model

The notations used are as follows: $g > 0$ represents the productivity gap between the big country and the small ones in the group with higher g indicating a larger gap, d represents the depreciation of the currencies of the small countries in relation to the large country's currency, expressed in terms of real exchange rate, s represents the balance of trade of the small countries with the big country, t represents the amount of transfers from the big country to each small country. All small countries are for simplification considered as homogenous.

A first equation expresses the balance of trade between one given small country and the big country:

$$s = s(d) \tag{1}$$

The time subscripts are neglected as we will only consider stationary values. The shape of $s(.)$ is for the moment maintained undefined and depends on the verification of the Marshall-Lerner conditions: s increases with d when the depreciation of a small country's currency leads to an increase in its trade balance and decreases with d in the opposite case.

A second equation defines the evolution of the productivity gap between the smaller partner and the big country, which decreases with the direct investments from the big country to the small one:

$$\dot{g} = g - \alpha t \tag{2}$$

where α is a positive parameter.[5]

A third equation expresses the current transfer t as depending on the depreciation d, i.e. investments of the big country in the small ones increases with the depreciation of the real exchange rate of the small countries with the big one:

[5] Over the past 40 years, a substantial literature has been devoted to productivity spillovers linked to FDI, which generally appear as positive provided that the initial gap between the parties is neither too small nor too large. Demena and van Bergeijk (2015) analyze this spillover over three decades, while Shen et al. (2021) also present original theoretical and empirical findings.

$$t = \beta d \tag{3}$$

The last equation expresses that the time variation of the depreciation d depends positively on the current productivity gap following the Balassa-Samuelson effect, negatively on the balance of trade (it decreases with a surplus and increases with a deficit), and negatively with the transfers,[6]

$$\dot{d} = ag - bs(d) - ct \tag{4}$$

where $a, b,$ and c are positive parameters and $\dot{d}$ figures the derivative on time of d.

From (2) and (3), $\dot{g} = g - \alpha\beta d$

The dynamics of small economies from the point of view of relations with the big country can therefore be reduced to the following system:

$$\dot{d} = ag - bs(d) - c\beta d$$

$$\dot{g} = g - \alpha\beta d$$

The stationary solution of this equation depends on s which we have not yet specified. We begin by studying the case where the stationary level of depreciation of the small partners balances the value of exports and imports from the big country. Lemma 1 then follows:

Result 1: The differential dynamics defined by equations (1) to (4) provides a single stationary solution $\{d = 0, g = 0\}$. *This solution is stable under the condition* $\frac{1}{\beta} < c < a\alpha$.

[6] This relationship between the trade balance and the exchange rate in the context of flexible exchange rates is one of the widely accepted mechanisms in open macroeconomics, generally associated with the Mundell-Fleming model.

Proof: The differential system determined by expressions (1) to (4) is written as $\begin{pmatrix}\dot{d}\\ \dot{g}\end{pmatrix} = \begin{pmatrix}-c\beta d + ag\\ -\alpha\beta d + g\end{pmatrix}$. When $\begin{pmatrix}\dot{d}\\ \dot{g}\end{pmatrix} = \begin{pmatrix}0\\0\end{pmatrix}$, $\begin{pmatrix}d\\ g\end{pmatrix} = \begin{pmatrix}0\\0\end{pmatrix}$. The stability is limited to the case $\{trace\ (A) < 0, \det(A) > 0\}$, with $A = \begin{pmatrix}-c\beta & a\\ -\alpha\beta & 1\end{pmatrix}$. Solving provides the condition $\frac{1}{\beta} < c < a\alpha$.

This lemma indicates that the only long-term stable situation is the case where there is no depreciation of the currencies of the small country when compared with the big one. However, the stability of this solution depends on the values of the parameters. Namely, transfers from the big country to the small one should be sufficiently important when the local currency depreciates (β high) and the cross effect substantial (the depreciation is less sensitive to the technology gap than the technology gap is to depreciation, given the transfers that dampen this effect). To summarize, transfers should have a stabilizing role. This result could not always be considered as a good news: (i) transfers are determined for the most part by the big country, which could decide at any moment in time to reduce or halt them, if its economic or political interest motivates this choice; (ii) transfers increase the dependency of small partners on the large country, which could generate some resentment in the former.

Note that the study is slightly modified when the Marshall-Lerner conditions are not validated, and if critical elasticities are such that the balance of trade of small countries varies with the level of depreciation of their currencies. When the effect of depreciation on the trade balance is linear (whether positive or negative), the stationary equilibrium remains unchanged, though the stability conditions are affected. If $s(d) = sd$ is such that a depreciation of the small country's currency leads to a trade surplus, the stability conditions become more relaxed. Conversely, they become more stringent when depreciation results in a new deficit. This latter case may arise when the small country's economy lacks sufficient dynamism in its export sectors or if imports are unelastics.

4.2 Assessing the Brazilian proposal

To consider the main effects of the Brazilian proposal, we incorporate the use of a common CDBC unit for invoicing and settlement by the small countries trading with the large country. If the small partners face similar conditions relative to the large country, the CBDC unit used as a means of payment is less subject to depreciation (or appreciation) than the large country's dollar-aligned currency. Transfers are now divided into two components. First, payment in CBDC entails either an advantage or a disadvantage for the small country, depending on the case, corresponding to a positive (or negative) transfer from the large country. Second, a direct transfer from the large country to the small one, such as an investment, no longer represents the same proportion of the small country's currency depreciation. This is because its impact is perceived differently by the large country, whose CBDC payments originating from the small country are no longer settled in a depreciated currency.

From the perspective of the small country, transfers are now written as (5):

$$t = \beta' d + \delta d \tag{5}$$

where δ figures the weight of each small country in the trade between all small countries and the large one ($0 < \delta < 0.5$), and $\beta' < \beta$.

The time variation of the depreciation now writes as follows:

$$\dot{d} = ag - b's(d) - ct \tag{6}$$

where $0 < |b'| < |b|$. Again, as payments are made in terms of the joint CBDC, the effect on depreciation of the local currency is smaller than in the benchmark, whatever its sign. Only transfers corresponding to direct investments $\beta' d$ influence the productivity gap (transfers realized via the CBDC only correspond as a sort of subsidy to imports). The dynamics consequently become as follows:

$$\dot{d} = ag - b's(d) - c(\beta' d + \delta d)$$

$$\dot{g} = g - \alpha(\beta' d)$$

Result 2: The differential dynamics defined by equations (1) and (4) to (6) still provide a single stationary solution $\{d = 0, g = 0\}$. *This solution is stable under the condition* $\frac{1}{\beta'+\delta} < c < \frac{a\alpha\beta'}{\beta'+\delta}$

Proof: The differential system determined by expressions (1) to (4) is written as $\begin{pmatrix}\dot{d}\\ \dot{g}\end{pmatrix} = \begin{pmatrix}-c(\beta'+\delta)d + ag\\ -\alpha\beta' d + g\end{pmatrix}$. When $\begin{pmatrix}\dot{d}\\ \dot{g}\end{pmatrix} = \begin{pmatrix}0\\0\end{pmatrix}$, $\begin{pmatrix}d\\ g\end{pmatrix} = \begin{pmatrix}0\\0\end{pmatrix}$. The stability is limited to the case $\{trace\ (A') < 0, \det(A') > 0\}$, with $A' = \begin{pmatrix}-c(\beta'+\delta) & a\\ -\alpha\beta' & 1\end{pmatrix}$. Solving provides the condition $\frac{1}{\beta'+\delta} < c < \frac{a\alpha\beta'}{\beta'+\delta}$.

When the balance of trade between the big and small countries is maintained regardless of exchange rate changes, the introduction of a CBDC slightly modifies the stability condition of the equilibrium exchange rate. The impact depends on the respective values of δ, β and β', which describe the relative roles of CBDC-based payment gains and direct investment flows. In a favorable scenario, where the CBDC does not reduce direct investments from the large country ($\beta = \beta'$), the range of stability widens even with weak FDI sensitivity, though excessive reactivity could be destabilizing. [7] Conversely, if the CBDC leads to a decline in direct investment ($\beta' < \beta$), stability conditions become more restrictive. This counterproductive effect arises because CBDC-related payment transfers are purely financial, providing short-term liquidity relief to countries with depreciated currencies, whereas direct investments are structural, fostering technology transfer and contributing to longer-term convergence.

The study was conducted without considering the effects of depreciation on the balance of trade. $s(d)$ was assumed equal to 0, whatever (d). An increasing or decreasing form of $s(d)$ slightly modifies our stability conditions, without fundamentally changing the findings, as this increasing or decreasing form of $s(d)$ would also apply in the benchmark.[8]

[7] If they are too strong, a kind of explosive cycle could be observed asymptotically, with financial flows constantly overcompensating for monetary flows that are now amortized.

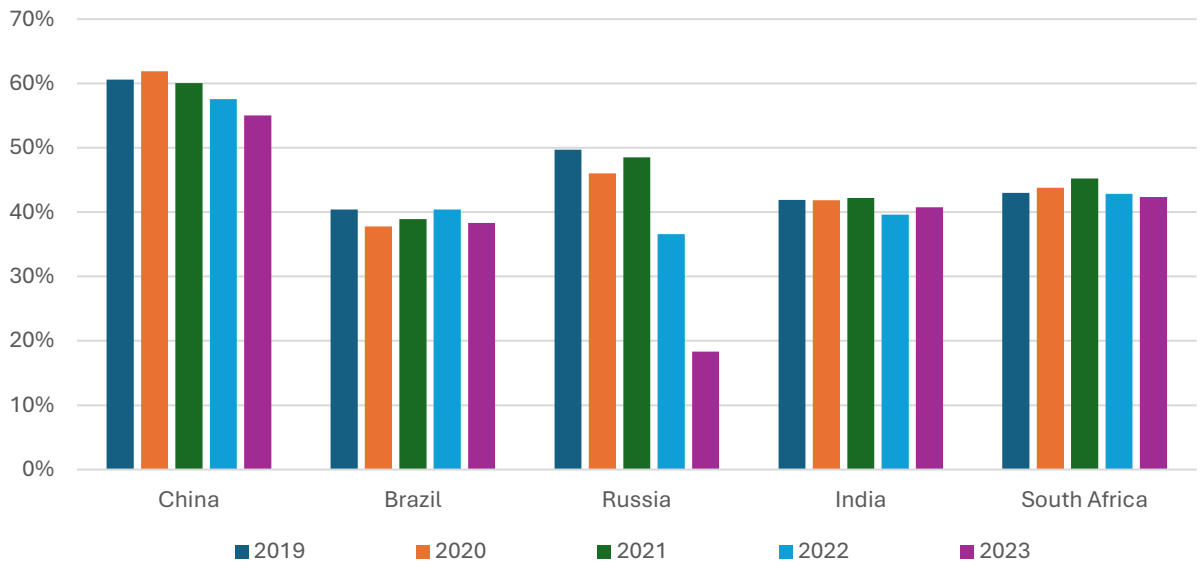
[8] Neutralizing the effect of any possible consideration of the competitiveness effect of Marshall-Lerner conditions echoes, in a way, the remarks of Paul Davidson (2007, pp.139-166), who highlighted the excessive use of this argument by proponents of the stabilizing effect of flexible exchange rate systems.

4.3 Limitations of assessment of the Brazilian proposal

Our model is schematic and represents the basic parameters of the Brazilian proposal. It neglects to explicitly represent CBDC operations, how transactions are validated, and the effect of the issuance of CBDC bonds backed by the Treasuries of the individual members. Similarly, the contribution of each government to the joint investment mechanism is not made explicit. These aspects will need to be built into a more comprehensive model, possibly with numerical simulation. Our intuition however is that these improvements should not dramatically alter our findings.

The limitations of the Brazilian proposal are indeed partly linked to the factors that caused trouble for the European ECU in the context of the European Monetary System. BRICS members do not just trade with each other but also have large trade balances with advanced economies, as shown in Chart 4, as well as the rest of the world. Trade with third countries involves payments mostly in US dollars, and occasionally euros or yen. These balances generate parity movements independent of the proposed BRICS payment system.

Chart 4: Share of BRICS trade with advanced economies as percentage of total trade



Source: developed with data drawn from Bloomberg (2025)

Without extending the discussion to the requirements for an optimal currency area, it is suitable to reflect about the effects of these exchange rate movements, which could challenge the stability of the BRICS cross-border payment system. In similar vein, the adoption of a unified payment currency would require, at a minimum, some harmonization of monetary policy objectives and coordination around inflation targets. In the absence of these, it would seem difficult for the individual BRICS members to maintain a stable parity between their national currencies and the proposed CBDC unit. While these are important questions to consider, they also come to confirm the conservative and phased approach emphasized by Nogueira (2023; 2024) as to how a diverse grouping like the BRICS should come to implement such an ambitious project.

5. Conclusions

In a 2008 article, Davidson (2008, p15) called for a double-entry bookkeeping clearing institution to keep the payments 'score' among the various trading nations. This would be based on common rules to recycle international liquidity through an international clearing union. His objectives were to use this institution i) to prevent a lack of global effective demand, ii) to provide an automatic mechanism for correcting international payment imbalances, iii) to prevent international financial contagions in cases of local crises, and finally iv) to extend the availability of liquid assets for international settlements.

The Brazilian proposal provides an innovative framework for addressing objectives two and four. Providing an alternative to the big four currencies, it establishes a unified unit of payment and a liquidity mechanism to smooth payments and address payment imbalances among the group. Our model has shown how, under favorable conditions, the introduction of a joint CBDC can cushion the effects of depreciation while fostering trade and direct investments that are beneficial for the smaller partners. At the same time, our results highlight that such stabilization remains largely superficial: the liquidity transfers provide short-term relief and cannot substitute for the structural role of direct investments and technology transfers in sustaining convergence.

Where the introduction of a joint CBDC reduces the responsiveness of FDI flows, the stability of the system becomes more fragile, as the underlying technological and financial asymmetries between members persist. Davidson objectives one and three, on the other hand, are not adequately addressed, as these would require closer coordination on monetary policy, as well as the evolution of the payment unit into a true reserve asset, that could be used to support the BRICS' broader financial architecture, including the CRA and NDB. The BRICS should not adopt a wholesale CBDC that does not provide such benefits.

While the project is a complex one, particularly in the tense geopolitical climate, there is no doubt that growing South-South trade, financial and investment flows provide the BRICS

with a valid motivation to explore such an integrated cross-border payment solution. And it must be acknowledged that the rigidity of legacy financial and payment infrastructure, controlled by a small handful of powerful countries, has not been amenable to any significant reform. This, despite repeated calls by EMDEs, particularly in the wake of the GFC in 2008, for a more inclusive and horizontal global monetary and financial order. That the BRICS have expressed a desire to chart a more independent course in this context is not only rational but expected.

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Appendix

Table 1: Selected digital and CBDC projects from around the world

Location	Year	Project Description
Finland	1990s – 2003	Avant smart card system
Ecuador	2014 – 2018	Dinero Electrónico (DE) central bank mobile money, issued with limited circulation between 2014-18.
China	2014~	Exploratory phase, followed by establishment of Chinese Digital Currency Institute in 2016, and wide-ranging pilot testing since 2017.
Canada	2016~	Project Jasper, testing blockchain-based wholesale CBDCs for interbank payments (2016), established innovation center with BIS (2020), and launching a 12-month CBDC research project (2022)
ECB	2016~	Project Stella testing blockchain based cross-border payments (2016), report on a digital euro (2020), two-year investigation phase (2021), two-year preparation phase (2023).
Japan	2016 – 2022	Participation in Project Stella, proof of concept for Japan's CBDC core functions and features (2021), proof of concept phase 2 for more complex functions (2022).
Sweden	2017~	e-Krona Project, based on private blockchain, CBDC for domestic retail and interbank payments (2017), established the e-Krona pilot project (2019), agreement with Accenture for technical solution (2020), phased pilot projects since 2021.
Nigeria	2017~	eNaira issued in October 2021.
Bahamas	2019~	"Sand dollar" digital currency issued in October 2020.
United States	2020~	The Digital Dollar Project is managed independently by leading US experts, economists and former policymakers.
Jamaica	2021~	Pilot testing of the Jam-Dex digital currency started in 2021, limited roll-out since 2022.
Zimbabwe	2022~	Exploring the potential of issuing a gold-backed CBDC.

Source: drawn from central bank and news reports

Table 2: CBDCs projects in collaboration with the BIS' Innovation Hub

Project Name and Year	BIS Innovation Hub Center	Partners	Objective
Project Helvetia 2020	Switzerland	• Swiss National Bank • SIX, financial infrastructure operator • Citibank • Crédit Suisse • Goldman Sachs • Hypothekarbank • UBS	A multi-stage experiment on the settlement in wholesale CBDCs with tokenised financial assets under DLT-based infrastructures.
Project Jura 2021	Switzerland	• Banque de France • Swiss National Bank • UBS • Accenture • Crédit Suisse • NATIXIS	Cross-border settlement using wholesale CBDC
Project Dunbar 2021	Singapore	• Reserve Bank of Australia • Central Bank of Malaysia • Monetary Authority of Singapore • South African Reserve Bank	Multi-CBDCs application on international settlements with a common platform
Multiple CBDC (mCBDC) Bridge 2021 BIS quit the project (October 2024)	Hong Kong	• BIS Innovation Hub Hong Kong Centre • the Hong Kong Monetary Authority • the Bank of Thailand • the Digital Currency Institute of the People's Bank of China • the Central Bank of the United Arab Emirates.	Multiple CBDCs application on international transfers and foreign exchange operations, using distributed ledger technology (DLT).
Project Aurum 2021	Hong Kong	• Hong Kong Monetary Authority	Testing the possibility of a two-tier architecture model of retail CBDC
Project Mariana 2022	Swiss, Singapore	• Bank of France	Wholesale CBDCs simulation on cross-border trading and settlement

	and Eurosystem Centre	• Monetary Authority of Singapore • Swiss National Bank	
Project Rosalind 2022	London	• Bank of England	application programming interfaces (APIs) of retail CBDCs
Project Polaris 2023	Nordic Centre	• Bank of Israel • Norges Bank • Sveriges Riksbank	Cybsesecurity and resilience of both online and offline CBDC system
Project Sela 2023	Hong Kong	• Bank of Israel • Hong Kong Monetary Authority	Technical feasibility of a retail CBDC ecosystem
Project Icebreaker	Nordic Centre	• Bank of Israel • Norges Bank • Sveriges Riksbank	Cross-border and cross currency transactions with retail CBDC systems
Project Tourbillon	Swiss	• Swiss National Bank	cash-like anonymity of retail CBDCs
Project Aurum 2.0	Hong Kong	• Hong Kong Monetary Authority	Strategies to improve privacy of retail CBDC project
Project Rialto	Singapore	• Bank of France • Bank of Italy • Bank Negara Malaysia • Monetary Authority of Singapore	Wholesale CBDC implication in instant cross-border payments

Source: drawn from central bank and BIS-reports

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