De-Risking Trade and Reforming CRA towards Intra-BRICS Dedollarization via Smart Contracts

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Abstract:

BRICS countries have maintained a longstanding goal of "de-IMFing" and "dedollarizing" their trade settlements and reserves in order to increase their sovereignty over transactions and avoid currency crisis, and proposed the creation of a Multilateral Clearing Union towards that goal. The Contingency Reserve Arrangement was the implementation of the Multilateral Clearing Union, but fell short of meeting the original purpose due to its IMF linkage requirements and limited scope, symptomatic of a lack of trust between BRICS member states. Furthermore, there existed several economic forces preventing the wider use of BRICS national currencies in trade. This paper seeks develops a proposal to overcome these forces via a near-term solution, using Smart Contracts to de-Risk trade in a manner that promotes national currency stability and reduces dependency on both dollars/euros and Western institutions (such as IMF and western commodities markets).

Keywords:

Smart Contract, Blockchain, De-dollarization, Trade Finance, Foreign Exchange

Introduction and Background to Challenge

The *BRICS New Development Bank's 2017 strategy report*¹, a long-term detailed vision of the direction BRICS countries' economic cooperation was headed in, made the case that reforms in the existing western institutions would not be in BRICS countries' favor anytime soon, and hence emphasized the need of a new Multilateral Clearing Union (MCU) which would simultaneously pool together BRICS countries' resources together and tackle balance of payment shortcomings, trade finance, financial crisis aversion, and an overall restoration of sovereignty via a gradual move towards de-dollarizing BRICS trade.

This MCU proposal was manifested in the form of a \$100 billion Contingency Reserve Arrangement (CRA) that BRICS countries had devised in 2015 as a pool to swap currencies in times of need. The CRA included two currency swap instruments to support short-term balance of payment (BoP) pressures between a country's current and capital accounts : 1) a liquidity instrument to provide support in response to current BoP gaps, and 2) a precautionary instrument to buffer against future BoP gaps. A country's access to the shared capital funds was limited by conditionality, as only 30% of accessible funds ("Delinked portion") were available on demand, whereas the majority, 70% of accessible funds require on-track arrangements with the IMF, as the CRA's rationale paper explains:

"Where financing in excess of this 30% limit is required, an 'IMF-linked portion' will be made available. This will allow the country access to the

¹ "The Role Of BRICS In The World Economy & International Development" (2017). BRICS New Development Bank Strategy Report. https://reddytoread.files.wordpress.com/2017/09/brics-2017.pdf

remaining 70%, provided that a conditionality-based agreement with the IMF is concluded"².

Of importance, it is worth nothing that rather than having a mechanism for direct currency swaps, as was set out in the MCU strategy report, a swap transaction was defined as "the Requesting Party's central bank purchases US dollars (USD) from the Providing Party's central bank in exchange for the Requesting Party Currency, and repurchases on a later date the Requesting Party Currency in exchange for USD"³.

The IMF linked component and USD reserve currency status raise questions about whether there is a potential mismatch between the stated goals of the MCU and the CRA's implementation mechanism. In the RISS Joint Research Paper *Use of national currencies in international settlements: Experience of the BRICS countries*, Karataev et al state:

"Though the BRICS countries have established a Contingent Reserve Arrangement, this arrangement aims to maintain financial stability by providing short-term liquidity support when member countries face international payment pressure. Meanwhile, the currency swap under this arrangement is one between US dollar and local currencies of BRICS, not one among the BRICS currencies. Currently, there are few local currency swap agreements in force (between Russia and China, China and the South Africa).⁴

The key barriers hindering the CRA's success towards its stated goals, including the CRA's promissory model, limited size (mirroring the limited paid-in capital allocated to BRICS' New Development Bank), and IMF linking all stem from a

 ² Biziwick, M., Cattaneo, N. and Fryer, D. (2015) "The rationale for and potential role of the BRICS Contingent Reserve Arrangement." South African Journal of International Affairs. 22:3, 307-324
 ³ ibid.

⁴ Karataev, S. et al. (2017). "Use of national currencies in international settlements: Experience of the BRICS countries." Joint Research Paper: Russian Institute for Strategic Studies. ISBN 978-5-7893-0271-2

fundamental lack of trust between BRICS member countries on their self-reliance for monitoring and governance of each others' and common funds, and a greater trust placed in the IMF for this purpose.

Hence, reducing the IMF linkage would require investing in new monitoring mechanisms to be create. Despite their stated desire to break away from IMF's conditionalities and dollar-denominated trade, BRICS countries have been following precedents set by hegemons due to a fundamental lack of trust between BRICS member countries on their self-reliance for monitoring and governance of each others' and common funds. This status quo is not inevitable, and can easily be overcome by coordinated CRA reform to introduce an internal trust-ensuring credit mechanism amidst financial instruments in national currencies to build the foundation for true independence from IMF and dollar-denominated transactions. Karataev et al's proposed a multi-tiered circular system whereby national and intra-BRICS financial institutions complement and coordinate with BRICS trade settlement transactions to create a robust system for using local currencies. The steps proposed are 1) direct currency trading expansion and lowering transactions costs, 2) creation and use of hedging instruments in BRICS currency pairs which might allow to reduce risk management costs 3) widening of Swap Agreements and limiting worries of liquidity risk, 4) local currency bond market development in conjunction with trade and development goals 5) trade surplus reinvestment into local bond markets 6) diversification of bond markets and BRICS policy coordination for using these instruments to achieve currency internationalization goals. This proposed mechanism is summarized below:



Figure 1. BRICS internal interaction scheme.

Note: currency exchange rates are conditionally assumed at 1:1 Alternative bond placement options:

a) A company from country A places bonds denominated in the country A currency on the country A market. Investors from country B (financial institutions, primarily) are allowed to acquire them;

b) A company from country A places bonds denominated in the country A currency on the country B market. Investors from country B (institutional investors, primarily) are allowed to acquire them. The revenue received can be freely repatriated to the country A;c) A company from country A places bonds denominated in the country B currency on the country B market. The revenue received can be freely repatriated to the country A

To supplement these market-creation steps for intra-BRICS currency swaps and internationalization of BRICS currencies, Karataev et al. outlined two key fundamental forces preventing use of national currencies for BRICS trade finance specifically which need to be overcome. The key factors were identified as:

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⁵ Karataev et. al, 2017, p. 110

- Currency Volatility- exchange rate fluctuations create uncertainty in optimizing settlement pricing and profitability at time of contract fulfillment from both exporters' and importers' perspective:
 "Exporters will seek to denominate their contracts in foreign exchange when their national currency is devaluing. It will allow them to receive additional profits in the national currency...(whereas) importers shall be encouraged to invoice a contract price in their national currency in order to reduce costs and prevent a decline in demand as a result of rising prices."⁶
- 2. Global Commodity Benchmarks:

"Exporters of similar goods [i.e. commodities]... will seek to establish the contract price in the same currency as their competitors. That allows them to neutralize more successfully the adverse exchange rate fluctuations resulting in considerable price changes and therefore prevent the risk of reducing demand. As a result, the market price of such goods is denominated mostly in the US dollar....the global commodities exchange trade in these goods plays a significant role...if the global commodities market's impact on the pricing model will decrease, the use of the USD as invoicing currency will decline too"⁷

Hence, the dominant factors preventing BRICS currency usage in trade were exchange rate fluctuations causing exporters to optimize profit margins by using foreign exchange (typically denominated in dollars), and industry benchmarks for export goods pricing, especially the influence of global commodities exchanges denominated in dollars. This is especially true for Russian energy exporters, who often prefer to be paid in dollars or euros in order to maintain standardized price points and obtain additional rubles in case of depreciation.⁸

Current Status and Current Steps

As a representative sample, according to the settlement data from the Central Bank of Russia, the percentage of Russian exports to BRICS countries settled in dollars

⁶ Karataev, S. et al. (2017), p.19

⁷ ibid.

⁸ https://www.bloombergquint.com/business/putin-s-push-to-dump-dollar-proves-hard-sell-with-russia-inc

has indeed fallen from its peak of above 80% in 2018 to 33.2% as of first quarter 2020.⁹ While Russian exports to BRICS have indeed de-dollarized recently, it is apparent that rather than BRICS currencies, the Euro has replaced the dollar as the dominant currency, as shown below. The Euro however poses its own risks, given that it is still third party non-BRICS currency and EU sanctions against Russia could be expanded in light of recent events (e.g. Navalny etc).



To overcome the remaining barriers to using national currencies, current steps being taken in BRICS include developing an in-house settlement system for trade finance based on Russia's SPFS alternative to SWIFT¹¹, linking domestic payment

10 ibid

⁹ Central Bank of Russia Trade Finance Settlement Data

http://www.cbr.ru/vfs/statistics/credit_statistics/cur_str.xlsx

¹¹ https://www.rt.com/business/472016-russia-india-china-swift/

systems¹², taking steps towards a common BRICS cryptocurrency¹³, and developing BRICSMART to provide easier access to the BRICS markets for foreign investors through benchmark equity index derivatives.¹⁴

Need for Smart Contracts in De-Risking Trade

While BRICS payment and settlement systems are being integrated, direct currency swap lines are being expanded, bond and equity markets are being developed to support BRICS currencies' internationalization, and an intra-BRICS cryptocurrency architecture conceptualized and brought to market, a crucial intermediate step in de-dollarizing inter-BRICS trade finance is de-risking trade by establishing mutually trustable intra-BRICS trade contracts to expand national currency settlement, overcoming the barriers mentioned previously. To enable national currency trade contracts, Karataev et al. specified three key exchange mechanisms in particular which need to be established to de-risk the use of national currencies in intra-BRICS trade:

- 1. BRICS Interbank foreign exchange market, whereby "companies should be able to purchase/sell a currency quickly and without additional costs to make settlements in such currency. This presumes the existence of a highly developed and liquid interbank and forex markets with large numbers of participants and convertible financial instruments." ¹⁵
- 2. Currency Hedging instruments "It will be necessary to encourage trading directly in BRICS currencies that will significantly contribute to lowering costs. This step [BRICS Trading pairs] has to be augmented with creation and use of hedging instruments in BRICS currency pairs which might allow to reduce risk management costs. During the first stage leading public banks of BRICS countries may function as market makers on currency pairs to provide necessary liquidity" ¹⁶
- 3. BRICS Commodify Exchange with derivatives "Launching of a Commodity Exchange or some type of an e-trading platform for trade in

¹² https://www.rt.com/business/473418-brics-dollar-payment-system-cryptocurrency/

¹³ https://cointelegraph.com/news/brics-nations-discuss-shared-crypto-to-break-away-from-usd-and-swift

¹⁴ https://www.bseindia.com/static/markets/Derivatives/DeriReports/AboutFI.aspx

¹⁵ ibid. p.18

¹⁶ ibid.

goods and derivatives of various kinds can be one more instrument contributing to enhancing LCY [local currency] use in settlements in the BRICS countries....raw material trade could be mediated by setting market prices denominated in local currencies. With appreciable quantity of foreign investors trading on the exchange, this will lead to internationalization of contracts denominated in local currencies." ¹⁷

The most significant example of such an exchange creation was the Petro-Yuan futures market launched in China in 2016, which served as a viable alternative to the dominant dollar-denominated WTI and Brent oil exchanges. Though Russia had setup a similar exchange in the form of the Ural Oil Futures market, work remains to be done to achieve maturity and usage to the level of established commodities exchanges.

Combined with direct currency swap lines and an intra-BRICS free trade zone, the implementation of the above three exchange mechanisms would lower the transaction cost of BRICS national currency trade settlement, by lowering the risk premium for importers and exporters to set contracts in national currencies amidst exchange rate uncertainty, lowering the "cost of carry" or effective interest rate for futures contract. Thus, these exchanges would fulfill the BRICS goals of "focus[ing] joint efforts on providing companies engaged in foreign trade from BRICS countries with the same, or lower transaction (compliance) costs, guarantees of settlement and risk management that they currently have in utilizing the dollar, euro or yen."¹⁸ The exchanges would also facilitate greater intra-BRICS demand for the currencies themselves, which would smooth out volatility in exchange rate fluctuations. Finally, these exchanges would serve as a source of mutual trust amongst BRICS Central and Commercial Banks and Traders,

¹⁷ ibid. p. 112

¹⁸ ibid. p. 110-111

encouraging national currency settlement for purposes beyond trade, (e.g. investment, NDB loans for infrastructure and development) and thereby provide the facilitation of bringing the NDB CRA currency swap mechanism to its original goal by eliminating the need for IMF-linked on-track arrangements and de-dollarizing the swaps themselves.

In this context, special attention must be paid to the recommendation from experts at the Chinese Academy of Social Sciences:

"...establishing the BRICS cross-border interbank payment system on the basis of Blockchain technology might be a key step of BRICS cross-border financial infrastructural construction. Such infrastructure would not only significantly improve the efficiency of cross-border interbank payment among the BRICS countries but also exert a fundamental impact on the international monetary and financial system. Given that Blockchain is safe, trans-parent, distributed and tamper resistant, the trust model between financial systems would no longer rely on intermediation and many banks will establish "decentralized" ties and realize real-time digital transactions. The removal of the intermediary link of the third-party financial institution means cross-border payment will no longer depend on such systems as SWIFT and CHIPS."¹⁹

The simplest yet most advanced low-cost solution to enable the above exchanges to take place directly between BRICS traders and banks, and allow a seamless disintermediation of transactions between separate parties without the need to reinvest the wheel or invest in any heavy infrastructure are smart contracts and distributed ledgers, two core features of Blockchain.

Smart contracts, which use Oracles as a decentralized source of trust, are starting to be given consideration independently in trade finance, currency trading, and commodity trading in the mainstream dollarized economy.

¹⁹ Ibid, p. 113

However, rather than piling on these Western (mostly American and European) platforms, which unfortunately carry similar jurisdictional and U.S.-influenced control barriers as SWIFT (especially given U.S. regulatory bodies' increasing reach into digital currency and alternative payment industries), BRICS countries can chart an independent path free from potential financial weaponization by developing a comprehensive in-house Smart Contract and distributed ledger trade system incorporating the essential elements of trade finance, currency trading, and commodity trading and linking it with the new intra-BRICS settlement and payment systems under development. In such a system, smart contracts would enable a comprehensive set of conditional parameters, including interbank loans trade finance to take place in BRICS currencies combined simultaneously with forex options and futures contracts, and a special BRICS-only commodity exchange with its own derivatives and futures options.

Smart Contract Key Requirements and Implementation

To enable a comprehensive large-scale implementation of Smart Contracts and Distributed Ledgers for such an all-in-one platform for BRICS traders independent from existing western platforms and build new intra-BRICS exchanges towards derisking trade finance, a pilot step can start with an intra-BRICS Trade Finance Smart Contract Fulfillment system distributed app (aka "Dapp" as blockchain apps are known) that replaces traditional letters of credit between merchants and banks, and uses automatic production and shipment data rather than traditional bills of ladings as a source of fulfillment verification. This would allow on average a 35% reduction in costs and eliminated the 1-2 weeks of processing time for settlements, in addition to removing room for manual errors.²⁰



Figure 2: Smart Contract Simplification of Trade Finance²¹

In parallel, another Smart Contract based dapp for facilitating direct interbank transactions should be developed, replacing traditional correspondent-account based bilateral banking loans with decentralized Smart Contracts for interbank transfers for trade finance, in correspondence with the associated NDB CRA currency swap limit.

²⁰ Blockdata. "Blockchain: closing the \$1.5 trillion gap in trade finance" 2019, 9th April.

https://blog.blockdata.tech/2019/04/blockchain-closing-the-1-5-trillion-gap-in-trade-finance/ ²¹ Ibid.

Once these two pilot systems up and running, to ensure financial security free from external interference, ideally speaking both sysems should be prevented from using SWIFT or western transfer services; instead becoming operationally interwoven with intra-BRICS payment and settlement systems currently under development, integrated using Ethereum middeware such as ChainLink and sidechains to connect to a BRICS private distributed ledger network such as Hyperledger Fabric.

Once such an integration proves robust, parallel Distributed Apps should be designed on the BRICS private distributed ledger to establish intra-BRICS-only exchanges for Currency Options and Commodity Futures associated with trade transactions. Such an exchange would serve as a preferred market exchange to derisk national currency settlement in BRICS trade finance and be designed with restrictive access to prevent speculative manipulation of both currency and commodity rates. The key requirements for such an exchange are:

- Seamless Integration and Interoperability with Central Bank, Commercial Bank, New Development Bank swap lines and intra-BRICS settlement systems
- ii. Live feed-in to market pricing data at contract setup and prior to execution
- iii. Integration with cargo delivery data for fulfillment date change
- iv. Pre-set call/put and contract amount limits set by BRICS NDB
- v. Support for large-volume contracts with minimal latency
- vi. Scalability to expand transaction throughput further
- vii. Decentralized Oracle System for contract fulfillment verification via market data

- viii. Temporary Storage of Funds in special accounts via Distributed Ledger.
 - ix. Secure Permissioned Access. Not subject to SWIFT-like constraints.

I am proposing a high-level architecture for the decentralized de-risked all-in-one BRICS trade finance system as illustrated below. The high-level steps involved

would take place as follows:

- 1. Smart Trade Contracts are set up through the dedicated BRICS trade finance dapp for execution after a set period (e.g. next business day after anticipated delivery date).
- 2. Simultaneously, traders set up desired currency hedging options and commodity futures contracts through the respective dapps, in line with preset call/bid margins and cost-of-carry limits for all BRICS currency pair combinations established by BRICS NDB, and use live market data to aid them. These are coded as smart contracts designed to mature on the same date as trade delivery.
- 3. NDB CRA direct pair currency swap lines are reviewed daily to ensure adequacy of swap amounts for upcoming contacts maturing over the next 30-day period, and those contracts which fall outside of the credit swap limits are given an option to mutually annul the contract and use a third party currency for fulfillment instead.
- 4. At fixed intervals of 7 days, 3 days and 1 day prior to initial anticipated delivery date, delivery status is tracked to ensure timeliness. In case of anticipated delays, contract fulfillment date is pushed back and updated in the smart contract.
- 5. Initially, with the aim of building trust and de-risking, no margin buying would be allowed. Full funds would be required prior to settlement. Thus, 3 days prior to contract fulfillment date, the smart contract would output a "worst-case scenario" fulfillment amount under contract terms, and the new interbank settlement system would allocate funds in special accounts stored in BRICS distributed ledgers. After a successful 1-year pilot where trust is established, this step can be eliminated to allow trade loans.
- 6. As soon as goods delivery is confirmed, market data including current direct exchange rates, commodity prices, and other live rate data would be refreshed in the decentralized oracle network at the time of contract maturity

to compute execution fulfillment amount for both the trade settlement and associated currency option and commodity future bought as relevant.

7. The oracle network will execute the contracts and release final computed settlement to the seller in their exporting currency (or, if agreed prior, importing currency as an exception) – the difference between the worst-case maximal funds and actual fulfillment amount will be refunded to the buyer's account (can be retained for future purchases if desired).



Figure 3: Decentralized De-risked all-in-one BRICS trade finance system

Implementation Considerations

The key considerations in designing and implementing a distributed multifunctional large-scale integrated solution such as above on blockchain are: 1) latency and throughput 2) interoperability, scalability, and versatility 3) data privacy and security, and finally, 5) costs of energy consumption and token fees.

To address these concerns, it is necessary to integrate the latest developments in protocols underway.

Ethereum 2.0, to be released in November 2020, will increase transaction throughput from a current bottlenecked 14/second to 100,000/second, as well as moving computations from an energy-intensive proof-of-work blockchain to a proof-of-stake one and have enhanced data security.²² Furthermore, it will be necessary to deploy scriptable smart contracts to both program variable fulfillment criterion and tie-in with external data. Chainlink has modular "middleware" for external data connectivity as well as a decentralized Oracle network which is necessary for trust validation amongst BRICS transacting parties. For data access control, BRICS-on dapps can be built on a permissioned version of an enterprise blockchain, and integrated using secure APIs for the intra-BRICS payment systems. Current western trade finance tracking systems such as MAERSK's Tradelens, IBM's WeTrade, and R3's Marco Polo use enterprise blockchains Hyperledger Fabric and CORDA; BRICS may be interested in either adapting these existing platforms or developing its own, depending on its core requirements and integration requirements with the BRICS settlement interbank messaging systems.

There is however an inherent issue of token fees, which in Ethererum are known as gas fees. With the Ethereum native token Ether (ETH) constantly rising in price, and Ethereum 2.0 not being a viable solution to this²³, an alternative implementation is possible by using Smart Contracts with a Centralized Ledger,

²² https://decrypt.co/41664/ethereum-2-0-on-track-for-november-launch-says-dev

²³ https://cointelegraph.com/news/defi-experts-say-that-ethereum-20-is-not-the-answer-to-high-gas-fees

without blockchain, tokenization or distributed ledgers. The world's biggest commodities pricing firm, S&P Global Platts, has implemented such an exchange (TradeVision), sacrificing an additional level of security and verification in return for greatly lowered cost and efficiency.²⁴ BRICS may be interested in tracking this model for feasibility.

In assessing implementation steps towards this all-in-one integrated solution for de-risking trade finance, BRICS working committees should perform a gap analysis of key requirements for an ideal comprehensive intra-BRICS trade finance solution, supplementing some of the key concerns this paper has outlined. The most important factor to keep in mind is interoperability between all of the BRICS trade, settlement, payment, and crypto solutions under development, individual Central and Commercial Banks, and the NDB CRA's swap line facilities. Only then can a comprehensive IT architecture be performed, followed by large-Scale feasibility studies, project budgeting, and , and cost-benefit analysis before deciding whether such a comprehensive system can be commissioned. This paper is high-level effort to set the ball rolling in that direction, in the hope that Smart Contracts will be used to disintermediate and de-risk BRICS trade finance in the near future.

²⁴ https://medium.com/swlh/worlds-biggest-commodities-pricing-firm-using-smart-contracts-without-blockchain-8af80dc3ee2