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New approaches to international reserves: The lack of credibility in reserve currencies

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Abstract

The ongoing international reserve paradigm based on trust will experience a major transformation despite being convenient, flexible and low-cost. The underlying issue is a loss of trust. Due to the massive financial sanctions imposed on Russia and other states, traditional reserve currencies have lost their footing, compromising confidence in international reserves. Consequently, countries will need a comprehensive revision of their reserve asset management options. This paper overviews these options, which range from trade-offs to non-orthodox solutions. In total, we list twelve options, which can be categorized into three groups according to their novelty and "degree of orthodoxy." The first group implies countries can expand the use of available instruments, i.e., investments in gold, renminbi, and currencies of friendly countries, and enlarge the network of swap lines and the toolbox of sovereign wealth funds. In the second group, options call for the introduction of new mechanisms for international reserves functions, such as accumulating physical resources and private cryptocurrencies, issuing stablecoins by central banks, and building up assets of regional financing arrangements. The third group includes options to shift the energy standard (currency) paradigm and establish a synthetic international currency or form a macroeconomic paradigm with no international reserves. Furthermore, applying our analysis, we move beyond Russia and look at the issue from the perspective of the Shanghai Cooperation Organization members and observers, as it is a leading platform where countries openly discuss this matter.

Keywords: international reserve assets, international reserves, reserve currencies, macroeconomic stability, Shanghai Cooperation Organization.
JEL classification: F02, F32, F33, F42, G15, H63.

1. Introduction

The freezing of Russian international reserves (IR) in 2022 was unprecedented in terms of volume; the ban on interest payments and debt repayments, however,

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is an exceptional instrument of financial sanctions, along with their potential seizure. Supposedly, it is a breach of trust between issuers of reserve currencies and the rest of the world. This begs the questions: is it possible at all to secure the reserves? And who may be interested in it?

In this paper, we scrutinize all possible solutions to theoretically replace/supplement reserves in traditional reserve currencies. In addition, we look at the issue from the perspective of the Shanghai Cooperation Organization (SCO) members and observers, as it is a leading platform where countries openly discuss this matter.

This work is part of our publication series about IR. Previously, we focused on approaches to the new principles of international reserve management (Vinokurov and Grichik, 2022). We assume that the fundamental principle would be ensuring the safety of reserve assets through diversification of instruments, management of reserves by multiple operators, and fragmentation of reserve functions between different instruments.

Diversification options for IR have not been thoroughly studied. This research furthers the domain of likely development scenarios for the global monetary and financial system because previous works have mainly analyzed the evolution of the proposed multipolar international monetary and reserve systems (e.g., Eichengreen et al., 2018; Eichengreen, 2019). They cite the declining importance of network marketing benefits in an increasingly high-tech financial environment and pinpoint the rapid advances in market service technologies that drive down costs and streamline transactions in alternative currencies.

Skeptics (Dooley et al., 2022) observe that even sanctions imposed on Russia are unable to undermine the U.S. dollar since the probable asset freezing is part of the deal for the accumulation of U.S. dollars as reserves. The authors argue that U.S. dollars are used as security deposits for foreign investments in developing economies, which may be withdrawn should they disobey the rules of the game.

There are also numerous papers discussing the opportunity costs of holding reserves. Aizenmann et al. (2014) point out that the opportunity cost of reserves might not be relevant to the central bank's operations. Rodrick (2006) concludes, however, that the accumulation of reserves leads to annual GDP losses of up to 1%, as opposed to short-term debt reduction by developing economies. We believe that countries should reconsider these costs in light of the loss of trust.

This paper comprises an introduction, three sections, and a conclusion. Data and methodology used for the research is given in Section 2. Section 3 presents all twelve identified options for diversifying IR. IR of the SCO member and observer states are discussed in Section 4. Finally, in section 5, we provide an overview of country actions to change approaches to managing IR.

2. Data and methodology

The paper consists of two separate blocks of analysis.

First, we reviewed the literature, assessed options to reform IR management, and compiled twelve theoretical solutions. We classified them by:

- Novelty of instruments: (a) reallocation of funds through investing in other currencies and assets, i.e., in existing instruments; (b) development of new instruments for deploying the funds; (c) a new national and global paradigm of reserve management, changing the nature of reserves instead of the structure.
- Functions of IR: (a) accumulation: reserves on the one hand, accrued current account surplus on the other, with their volume inspiring confidence in the solvency of the country and the security of the national currency; (b) smoothing: the liquidity of the reserves has facilitated prompt mitigation of variations in currency supply and demand; (c) stabilization: in crises, reserves were used to cover a balance of payments deficit, external debt repayments, additional capitalization of the banking system, etc.
- Number of participating states: (a) some countries may act unilaterally; (b) some groups of countries may coordinate their actions; (c) transformation of the IR management system will go global and involve all countries.

Second, we estimated the absolute volume of reserves, their resilience, and the opportunity costs of holding them in the SCO member and observer states. The panel data included twelve countries.

We collected data on the reserves and various macroeconomic indicators from the World Development Indicators Database[1] and the Data Template on International Reserves and Foreign Currency Liquidity.[2] The research covers the long-term period from 2011 to 2021 and reflects the years after the Global Financial Crisis and the turbulent years during the COVID-19 pandemic. We also used some data from the first decade of the 21st century for comparative purposes.

We performed stress tests for reserves in 2016 and 2021 using on preceding 5-year fluctuations of potential sources of shocks—a standard deviation of the current account balance, short-term debt, and broad money to GDP.

Following the methodology used by Aizenman (2014), based on market data on sovereign bond yields, we estimated the costs of holding excessive reserves. In our estimation, we only used five countries with market yield curves: China, India, Kazakhstan, Russia, and Pakistan. It is calculated for every year as the difference between the 10-year sovereign and the U.S. bond yields on the amount of reserves exceeding the three-month import threshold.

3. International reserve transformation

So far, there is no single straightforward solution or instrument to replace traditional currencies and guarantee the safety of assets. Countries can mitigate reserve loss risks through the maximum diversification of accumulation instruments, the fragmentation of reserve functions among instruments, and multi-operator modes of reserve management. The new reserve management system could end up bringing about increased volatility, complexity in management, and higher costs. We identified twelve available options in total (Fig. 1), which can be divided into groups according to their characteristics.

[1] https://databank.worldbank.org/source/world-development-indicators
[2] https://data.imf.org/?sk=2DFB3380-3603-4D2C-90BE-A04D8BBCE237

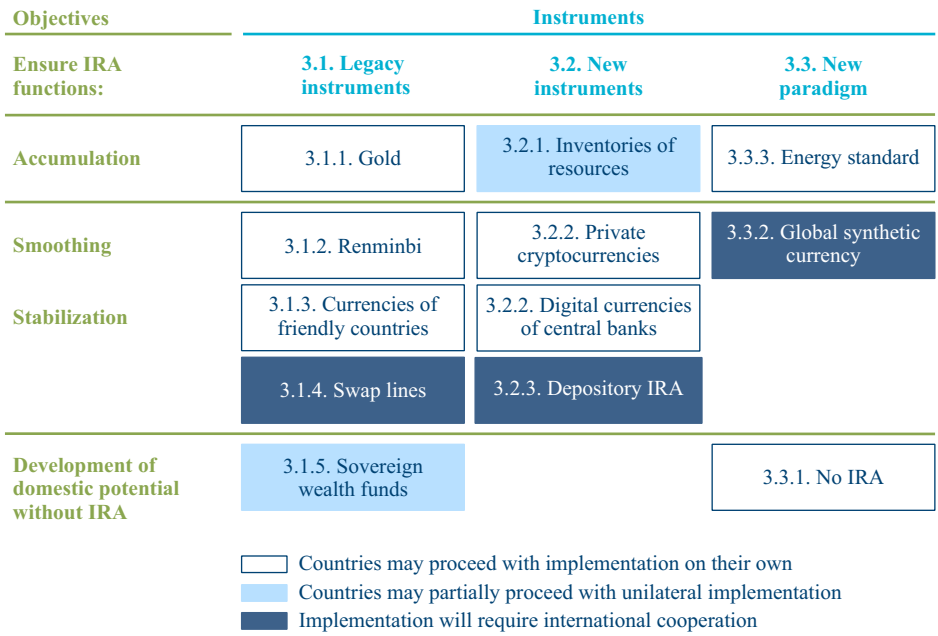


Fig. 1. Options for international reserve transformation.

Note: IRA — international reserve assets.
Source: Compiled by the authors.

3.1. Technical modification of the old paradigm

In response to the harsh restrictive measures imposed against Russia, both micro and macro agents set out to explore alternative non-dollar instruments for international trade transactions and reserve accumulation. Naturally, they first turned to available solutions, which, however, will only be temporary, for the short-to-medium term, while a new IR management architecture is in the process of being devised.

3.1.1. More gold in reserves

Gold has historically been an attractive asset, as it enjoys the highest degree of confidence due to its inherent value. The major reserve currency issuers and emerging economies no longer have mutual trust. The latter have accumulated considerable reserves, so diversification in favor of gold seems to be the best solution under the current circumstances. Countries have already started to take advantage of it: ever since the global financial crisis, central banks have acted as net buyers of gold. Over the first three quarters of 2022, their demand rose to 673 tonnes, more than the total purchases in any full year since 1967.

The stock of the SCO member and observer states amounts to 5,946 tonnes, or 19% of the gold reserves of all central banks in the world. Today, gold reserves account for approximately 13% of all IR around the world, but in some SCO countries, they already exceed 60% (Fig. 2), just like in the countries issuing reserve currencies, i.e., the USA (66.6%) and the Eurozone (65.4% in Germany, 62.4% in Italy, and 57.3% in France) who require liquid funds to a lesser extent.

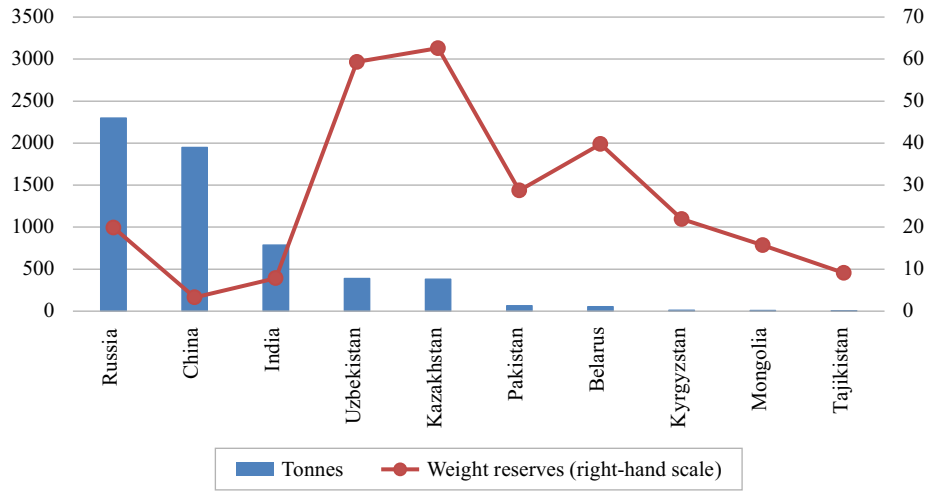


Fig. 2. Gold reserves in Shanghai Cooperation Organization member states in Q3 2021.
Source: World Gold Council (https://www.gold.org).

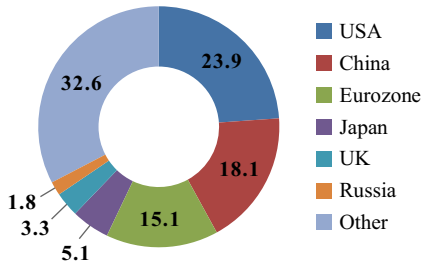
Countries may revert to the legacy practice, with gold as the main asset in the IR structure. There are a few limitations, however, when it comes to gold as the sole reserve asset:

- Gold does not serve as a means of payment: a current account surplus can be converted into gold, but gold may not be used for direct interventions in the foreign exchange market.
- Risk of price manipulation: the United States and other major economies could crash gold prices by selling their reserves to exert economic pressure on countries that are holders of gold. This will not affect long-term prices but may jeopardize economic security in the short term.
- Limited supply: about 3,000 tonnes of gold are mined annually, or $187 billion at its current price. It cannot accommodate the conversion of the majority of the reserves into gold, and any surge in demand coming from central banks will result in gold shortages and soaring prices.
- Transactions in gold may also fall under sanctions. That said, countries can maintain control over their physical reserves of gold and sell them via over-the-counter transactions.

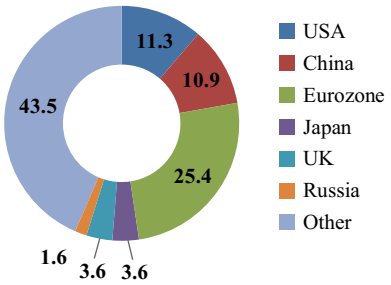
Gold will not be able to fully replace foreign exchange reserves and perform all their inherent functions. Yet the trends toward increasing demand for gold already exist and will most likely hold up in the future.

3.1.2. More renminbi in reserves

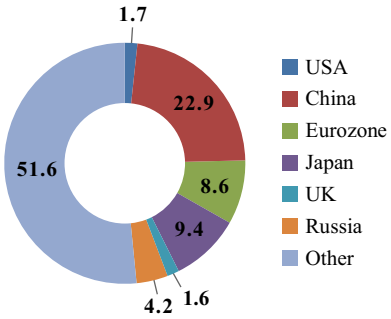
The renminbi's share in the global financial system is disproportionately small, compared to China's share in global trade and the world economy. This might compel this currency to grow in the future. China accounts for 18% of global GDP and almost 11% of foreign trade turnover, but less than 3% of global foreign exchange reserves are kept in renminbi, and only 2% of all transactions on the international foreign exchange market are executed in this currency (Fig. 3).



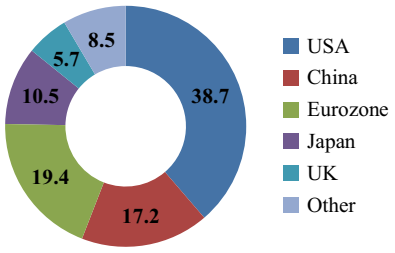
(a) Country weight in global GDP in 2021 (%)



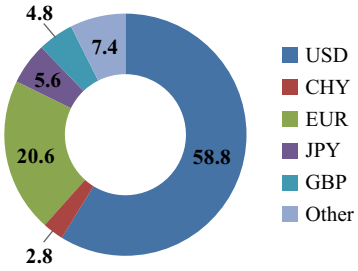
(b) Country weight in global trade turnover in 2020 (%)



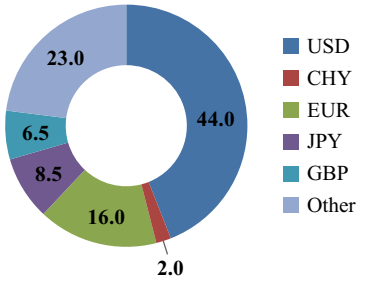
(c) Country weight in international reserves at the end of 2021 (%)



(d) Weight of resident issuers in countries across the global bond market in Q1 2022 (%)



(e) Currency weight in the structure of international reserves at the end of 2021 (%)



(f) Currency weight in transactions on the international foreign exchange market at the end of 2019, %

Fig. 3. Weight of countries and their national currencies.

Sources: IMF; World Bank; BIS; SIFMA.

China is committed to internationalizing the renminbi, and has formalized it accordingly: the 13th Five-Year Plan (2016–2020) defined the strategic goal of improving the convertibility of the yuan and its role in international transactions. Reducing dollarization of the Chinese economy will reduce its dependence on the United States, lower the risks inherent in the value erosion of Chinese dollar assets because of quantitative easing in the USA, and may potentially decrease the costs for the economy (Vinokurov, 2021).

Certain macroeconomic constraints, however, still prevent the renminbi from assuming a role in the global financial system commensurate with that of the U.S. dollar or the euro.

Within the Impossible Trinity hypothesis,[3] China chooses a fixed exchange rate over the open capital account. Closed capital accounts limit investments in renminbi assets aimed at accumulating reserves.

China relies on the suppression of domestic demand as its savings constantly exceed its investments. To enable the accumulation of renminbi reserves by other countries, China will need to give up its current growth model to build current account deficits. There is much to be changed, however. In order to make sure other countries can accumulate RMB reserves in amounts equivalent to their current U.S. dollar volume, China would need to increase its share in global reserves by $6.8 trillion, or 7% of global GDP and 39% of China's GDP.

Turning to the renminbi is not a panacea for other countries; they will still be dependent on one country, only now it will be China and not the United States.

3.1.3. Fragmentation of the system within a group of alternative currencies

Before the introduction of the gold standard, gold and silver shared the role of reserve currencies, while in the 19th century, large amounts of global foreign exchange reserves were held in British pounds, French francs, and German marks (Demianenko and Overchenko, 2022). The era of U.S. dollar dominance might also result in the formation of a fragmented system, where reserves would be made up of a broad group of alternative currencies.

There are numerous advantages to a system in which multiple countries issue reserve currencies (Farhi and Maggiori, 2018; Carney, 2019). This requires more coordination and ensures diversification, unlike under the dollar-centric system; the overall volume of issued currencies remains adequate but each country's share is relatively small. This also suggests competition between issuing countries and a consequential reduction in the premiums they receive. Such a diversified system would also reduce the synchronization of trade and financial flow cycles among countries, ensuring consistency in capital flows.

Non-traditional reserve currencies are gaining popularity. In late 2021, over $0.8 trillion was held in currencies other than those included in the special drawing rights (SDR) basket, with $10 billion held by 13 countries. The major diversifying currencies are currently issued by developed countries, with no protection against sanctions. Currencies pegged to the U.S. dollar are underused, although they could ensure the nominal value of reserves and reduce the risk of a freeze-up, for example, the Hong Kong dollar and currencies of the Gulf States, including the UAE dirham, Qatari riyal, and Bahraini dinar.

Under this scenario, the key limitations are the low capacity and liquidity of the majority of national financial markets. U.S. Treasury bonds outstanding at the end of 2021 were worth $7.7 trillion, comparable with European, and, arguably, Japanese markets. At the same time, the Eurozone countries and Japan have a current account surplus and cannot substitute for the American market. The debt market in the emerging economies is limited; following the pandemic, debt has already boomed, requiring increased government attention. Furthermore,

[3] The impossible trinity is a concept in international economics which states that it is impossible to have all three of the following at the same time: a fixed foreign exchange rate, free capital movement (absence of capital controls), and an independent monetary policy.

borrowing is becoming increasingly expensive as developed economies tighten monetary policy.

Countries whose securities will substitute for U.S. Treasury bonds will face the same negative impacts as the U.S. economy: reduction of the current account surplus or widening of the current account deficit, strengthening of the national currency, a growing budget deficit, and/or increased unemployment. Eichengreen (2011) and Pettis (2013) list Germany, Japan, and Korea as examples: their central banks did not encourage massive purchases of the countries' debt securities and took action to curtail foreign investment inflows.

There are contributing factors driving countries to increasingly use alternative currencies (Iancu et al., 2020, Arslanamp, 2022):

- Financial (development of the domestic debt market in developing countries with higher rates relative to developed countries);
- Economic (localization and regionalization of supply chains);
- Geopolitical (consequences of commercial disputes and international sanctions);
- Technological (development of financial technologies and payment systems).

Investments in non-traditional reserve currencies, however, have some disadvantages. They are exposed to higher risks because of the lower debt sustainability of their issuing countries and incur additional transaction costs due to exchange rate volatility.

Alternative currency countries could accumulate reserves provided that they comply with certain conditions: they should be engaged in extensive trade relationships with the issuing countries; their external debts should be denominated in the currencies of those countries; and, therefore, they could be used for interventions in the foreign exchange market.

3.1.4. Swap lines

Bilateral swap lines pursue economic, financial, and geopolitical objectives, though those may be interpreted differently by the creditor and the beneficiary. The network of swap lines expanded significantly following the global financial and economic crisis; their number increased from a few units in 2007 to 74 at the end of 2019, and up to 91 during the pandemic. By the end of 2020, the total value of bilateral swap lines reached $1.9 trillion (Perks et al., 2021).

Countries have entered into bilateral swap lines with the Fed, the ECB, the People's Bank of China, the central banks of Japan, Qatar, and the UAE. Eight SCO countries have signed bilateral swap lines with China amounting to RMB 213.7 billion (approximately $30 billion), and India and China also have bilateral swap lines with Japan to swap their local currencies (either Japanese yen or Indian rupee) against the U.S. dollar for an amount of up to $75 billion (Table 1). This means the total amount of swap lines in the SCO members exceed their total reserves. The interest of the recipient countries in borrowing from renminbi swaps consists of expanding trade turnover, servicing Chinese loans, and replenishing their national reserves (Vinokurov et al., 2020).

Bilateral swap arrangements can finance balance of payments gaps. Swap lines are different from other ways of financing balance of payment deficits: they do not require the adoption of specific macroeconomic and structural policies. In certain cases, bilateral swap lines may allow for unsustainable poli-

Table 1
Bilateral swap lines in the Shanghai Cooperation Organization member states.

Counterpart	Counterpart of BSL	Signed	Characteristics
Reserve Bank of India	Bank of Japan	Feb. 2019	USD 75 billion / local currencies
People's Bank of China	Bank of Japan	Oct. 2018	RMB 200 billion / JPY 3,400 billion
Central Bank of the Republic of Uzbekistan	People's Bank of China	Apr. 2011	RMB 0.7 billion / UZS 167 billion
Central Bank of Armenia	People's Bank of China	Mar. 2015	RMB 1 billion / AMD 77 billion
National Bank of Tajikistan	People's Bank of China	Sep. 2015	RMB 3 billion / Somoni 3 billion
National Bank of the Republic of Belarus	People's Bank of China	May 2018	RMB 7 billion / BYR 2.22 billion
National Bank of Kazakhstan	People's Bank of China	May 2018	RMB 7 billion / KZT 350 billion
Bank of Mongolia	People's Bank of China	Jul. 2020	RMB 15 billion / MNT 6 trillion
State Bank of Pakistan	People's Bank of China	May 2018	RMB 30 billion / PKR 720 billion
Central Bank of the Russian Federation	People's Bank of China	Oct. 2020	RMB 150 billion / RUB 1.75 trillion

Sources: Bank of Japan; People's Bank of China.

cies, according to IMF assessments. Swap lines could potentially complement the alternative illiquid forms of resource accumulation, although their net should be expanded to other currencies, including Russian roubles.

3.1.5. Investment in foreign assets through sovereign funds

Assets accumulated in sovereign wealth funds total over $10 trillion, with the top 10 holding $7.3 trillion, which is comparable to the global IR volume. Some of their resources tend to overlap and duplicate, given the specifics of certain countries' statistics.

Such funds are operated differently from the IR, governed by the Santiago Principles.[4] They are established and owned by the government based on general macroeconomic goals and designed for investing in foreign assets in line with specific financial objectives. Most of the resources of the funds, as well as IR, are concentrated in the assets of developed countries, and a reorientation to emerging markets is limited by supply.

Almost 20 SWFs operate in nine SCO countries (not including public pension funds) with assets of $2.9 trillion (Table 2).

[4] International Forum of Sovereign Wealth Funds (IFSWF). All IFSWF members adhere to the 24 Santiago Principles. These principles define the legal and institutional framework of operations, as well as the structure of investment and risk management. Compliance therewith demonstrates to the international financial markets that sovereign wealth fund mechanisms are properly configured and that investments are made on sound economic and financial grounds.

Table 2
Sovereign wealth funds in the Shanghai Cooperation Organization member states.

Country	Funds	Total assets, billion U.S. dollars
China	China Investment Corporation	1,303
	State Administration of Foreign Exchange (China's FX reserve management authority)	980
	China-Africa Development Fund	10
Russia	Russian National Welfare Fund	178
	Russian Direct Investment Fund	28
Iran	National Development Fund of Iran	139
Kazakhstan	Samruk-Kazyna	70
	National Fund of the Republic of Kazakhstan National Investment Corporation (NIC)	58
	Baiterek	9
Azerbaijan	State Oil Fund of Azerbaijan	45
	Azerbaijan Investment Holding	22
Uzbekistan	Fund for Reconstruction and Development of Uzbekistan	23
Mongolia	Erdenes Mongol	4
	Fiscal Stability Fund	0.1
	Future Heritage Fund	0.1
India	National Investment and Infrastructure Fund	4
Armenia	Armenian National Interests Fund	1

Source: Global SWF (https://globalswf.com/ranking).

We believe that sovereign wealth funds could revise the way they operate. For example, countries could create a special fund focusing on investments in foreign markets of friendly countries to generate highly diversified investments, both in instruments and geography, including strategically important investments. Another option is to expand the shift of investments towards top priority national economy projects. The third scenario, in the case of developments proceeding along a multilateral track, involves the formation of regional funds that would accumulate resources of several countries, building sanctions resilience.

3.2. Quantitative expansion of the paradigm with other instruments

New safeguards could improve the safety of reserve assets without fiat money or any attributes of national identification.

3.2.1. Accumulation of valuable resources inventories

Countries may opt for spending reserves on acquiring and holding limited physical assets. Their volume would significantly exceed domestic market needs, and if necessary, their resources would be traded to obtain the required currency. They can form reserves using non-ferrous metals and rare-earth metals, energy commodities, and food products.

There are numerous benefits to accumulating reserves of valuable resources, namely:

- Countries can ensure production output in several sectors, offsetting the impacts of economic, commodity-related, and other cycles;
- The marginality of specific sectors can be maintained by managing the supply of goods on the global or regional markets;
- Countries can control their physical assets, ensuring maximum protection of their integrity.

The constraints are their storage costs, maximum storage period, significantly lower liquidity than foreign exchange reserves, and volatility of their value.

Reserves will be pro-cyclical for commodity-exporting countries (the majority of the SCO countries). The benefits resulting from the formation of commodity reserves, however, may accrue to importing countries like China or India.

Reserve accumulation by commodity exporters may have an impact both on the domestic foreign exchange market and on foreign exchange transactions with the outside world. On the domestic foreign exchange market, commodity-exporting companies will become more relevant because they will act as the reserve managers instead of central banks. On foreign markets, exporting countries can potentially generate stronger leverage for their national currencies.

As part of the reorganization of international assets, the accumulation of physical resources serves virtually no purpose aside from the actual accumulation. To perform other functions, physical reserves could become part of swap agreements with other countries, which would guarantee the exchange of resources and currency and increase their liquidity and potential for expeditious use.

3.2.2. Private cryptocurrencies

Central banks view private cryptocurrencies as competitors, undermining their monopoly on the emission of money, and as a tool for money laundering and the circulation of funds on the black market. So they prevent cryptocurrencies from being granted the full-fledged status of legitimate currencies. Secured stablecoins issued by the Big Techs have the potential to fundamentally impact global monetary and financial stability due to the large user base and its fairly high confidence in this cryptocurrency (IMF, 2020). Hayek (1996) explored the theoretical performance fundamentals of such systems in his theory of "private money."

Due to the fact that they circulate extensively in transactions between economic agents, central banks may be forced to accumulate some reserves in such currencies. Given the current penetration of tech companies' products (Facebook, Telegram, etc.) into people's lives, stablecoins may well spread in an instant. This will follow the traditional pattern: currencies would be granted the status of "reserved" once traded in different countries.

It is hard to imagine central banks viewing the accumulation of stablecoins issued by the Big Techs as the primary source of diversification of IR. Central banks would most likely decide against the legalization of private stablecoins as a currency and produce their own solutions for the digital money market, which would compete with private cryptocurrencies.

3.2.3. Digital currencies and central bank stablecoins

When developing digital currencies, central banks do not consider changing reserves their priority. Streamlining such currencies from a technological perspective would somewhat increase the demand for currencies in countries with trustworthy macroeconomic policies. According to the IMF (IMF, 2020), digital currencies of foreign central banks may gain momentum in replacing national currencies, but only in countries with weak macroeconomic policies. Their supply, however, will still be constrained by macroeconomic factors, which would limit the growth of non-SDR currencies in the IR structure.

As opposed to central bank digital currencies, central bank stablecoins could become an alternative national currency, provided they are granted legal status. Nationally backed stablecoins could fill the niche of reliable money, serving as a means of payment, exchange, and accumulation. In contrast to existing stablecoins issued centrally and secured by gold assets (for example, Digix Gold), stablecoins issued by a central bank will be different in that their issuer will be the central bank and not a private company. They will be duly secured, as opposed to fiat money issued by central banks. Central banks may consider options for securing stablecoins. The most obvious and least expensive solution involves gold reserves, but reserves of other valuable resources may also serve as security (see above).

Such an unprecedented move, however, would require countries to revise key macroeconomic laws and financial security regulations as it generates significant risks for financial security and monetary policies. The impact of the central banks' controls over inflation may decline because the key rate will affect only a portion of the national currency in circulation. It may lead to an outflow of deposits from the banking system for the benefit of savings in stablecoins, and a decline in the assets of banks.

In the future, an intergovernmental agency could be established with the authority to keep records of the amounts of gold reserved by each of the central banks, to issue supplementary stablecoins subject to additional security deposits in gold, and to handle the logistics of the exchange of physical gold for stablecoins.

3.2.4. Formation of quasi-reserves in the capital of Regional Financing Arrangements

Currently, the resources of all RFAs (Regional Financing Arrangements) total about $1.3 trillion, ten times less than the total foreign currency reserves (Vinokurov, 2019). But RFAs functions and coverage expand over time. In the beginning, they were just regional lenders of last resort, but gradually they started fulfilling unique functions, such as reserve management, treasury, clearance, and financing of investments in basic infrastructure.

One safeguard against the freezing of reserves would be to elevate them to a supranational status by endowing the RFAs with friendly countries with the role of "depositary" of reserves as their national affiliation presents a vulnerability.

Principles of operation of RFAs as "depositaries":

- There are two flows of member countries' contributions to RFAs. The first generates funds for subsequent lending to member countries suffering (or

likely to suffer) from liquidity shortages or balance of payments problems, as in the past (Vinokurov et al., 2019). The second builds the liquid reserve assets of the RFA, which can be expeditiously drawn on by member countries.

- Member countries make contributions to RFAs' reserve assets in their national currencies. The RFA converts these contributions into foreign currency or other financial assets, based on the requirements for maintaining their liquidity, value, countercyclical nature, and current market conditions.
- Member countries are entitled to promptly draw on the funds of RFAs' reserve assets according to what they actually contributed, with no approval from the other members of the RFAs required.

Obviously, the more countries take part in the formation of reserve assets, the more reliable the RFA will be.

3.3. New paradigm of international reserve management

In the 1920s, economists could not imagine a global financial system without the gold standard, and now the current dollar-centric system appears to be just as indispensable. In reality, though, entirely new and radical approaches can be adopted with regard to the management of international reserve assets.

3.3.1. Rejection of international reserves in favor of domestic investments

To ensure economic security, countries might prioritize increasing the internal capacity of the economy because of the vulnerability of the reserves. Domestic resources will consequently act as a buffer, absorbing potential shocks.

That would require an increase in domestic demand, a reduction in the current account surplus and accumulated reserves, a restriction on foreign currency loans and credits, an increase in domestic production of critical goods, and the use of national currencies in foreign trade. It all may increase exchange rate volatility, but its impact would diminish due to the reduction in the imports-to-GDP ratio and the extent of financial dollarization.

Countries can deal with the shortage of reserves by entering into swap agreements with trading partners (for smoothing purposes), expanding the functionality of the RFAs (for macroeconomic stabilization), and accumulating resources in other instruments (gold or a sovereign wealth fund).

3.3.2. Establishment of a global synthetic currency

It may be challenging to handle all macroeconomic adjustments in the global economy as they stem from unilateral moves to restructure the IR. Countries could consider renegotiating and reaching a new multilateral agreement on reforming the IMF to potentially establish a global synthetic currency (GSC). It would eliminate and prevent the accumulation of macroeconomic imbalances, as well as make reserve accumulation easier.

It was J. M. Keynes who first defined the fundamental principles of the GSC at the Bretton Woods Conference. He advanced the idea of creating a supranational unit of account (bancor) and introduced the concept of the International Clearing Union (ICU). The ICU was governed by the principle of equitability of assets

and liabilities, which was intended to rule out deficits in settlements between national central banks, and did not contemplate the accumulation of reserves in foreign currencies. In other words, the ICU was conceptualized as a bank with responsibilities for financing temporary imbalances in trade between countries. But, unlike the IMF or any regular commercial bank, the proposed ICU would not lend funds from its assets (deposits or equity). Instead, a member state of the Union would simply be allocated a current account denominated in the international unit of account, the bancor. According to Keynes, it is created *ex nihilo,* and its formation does not depend on any decisions by government authorities or central banks (Fantacci, 2013).

Economists have repeatedly revisited the concept of a supranational currency, including Zhou (2008) and Carney (2019). Their comments, however, were interpreted by some experts as political statements rather than economic propositions.

Such a unit would make sense only if all countries joined the system, as in the IMF pattern, because a new regional currency created by a group of countries would simply force the imbalances into this system.

The GSC is the most effective solution for reforming the global financial system. The countries, however, must be willing to accept the restrictions associated with the introduction of the GSC, and this is a major issue.

3.3.3. Energy Standard (Energy currency)

An Energy Standard is yet another revolutionary solution for the financial system. As a commodity, it is universal, which makes energy valuable and unique in all its various forms. It is a crucial factor of its indispensability. The critical value of energy will only continue to grow amid the decline in fossil energy sources, current technology development, and global energy transformations (including a future transition to green energy).

Over the past decades, researchers have advanced many concepts and models of energy currencies (derivatives) (Odum, 1995; Swann et al., 1997; Douthwaite, 1999; Collins et al., 2013). There have been numerous experimental projects: the Wära quasi-currency in Germany in the first half of the 20th century (Collins et al., 2013); the WAT quasi-currency in Japan in 2000, which was pegged to renewable power sources: one WAT corresponds to one kWh of "clean" electricity; and the complementary currency, CHARCOAL, secured by charcoal (one unit of CHARCOAL equals one gram of charcoal) (Lietaer, 2004).

An energy currency might be superior to traditional fiat money as a more reliable means of accumulation (forming critically important reserves), as a currency with a more stable value over the long term (energy will always be in demand), and as a universal measure of value. The technical design of an energy currency might vary: energy-based money can be generated either with reference to a specific type of energy (to serve as a unit of value), or can be physically secured by energy resources. The latter could also be convertible (based on its security) or non-convertible.

An Energy Standard currency poses a lot of challenges given its technological sophistication, but it could also preserve the value of accumulated assets in an entirely unique way, and provide the much-needed flexibility to manage and dispose of them.

4. International reserves of the SCO members and observers

The SCO consists of nine member states and three observers from Eurasia, which owned approximately $4.8 trillion in their IR in late 2021. Although reserves were steadily growing throughout the last 20 years, they skyrocketed between 2001 and 2011 and multiplied 13 times; the growth slowed down in the next decade to increase by 14% (Table 3).

Not only do the reserves in all the SCO members and observers except for Belarus exceed the benchmark of three months' worth of imports, but they can also easily cushion potential shocks. The first five-year period from 2012 to 2016 was relatively stable for most of the countries, while the second one from 2017 to 2021 covers the COVID-19 crisis. Consequently, combined data for two periods better substantiate our conclusion. Both times, the reserves were able to withstand potential shocks. In 2021, they could absorb from two to twelve potential shocks (Table 4).

Opportunity costs of holding excessive reserves vary across the countries. Upper middle-income countries issue debt under general conditions, while lower middle-income countries acquire significant concessional debt financing. We believe that China, India, Kazakhstan, and Russia incur consistent direct losses ranging from 0.2 to 1.5% of GDP as their government bonds' long-term interest rates exceed corresponding U.S. Treasury bond interest rates. Pakistan's smaller losses are due to its lesser reserves (Table 5).

The calculations above prove that reserves are not only sufficient, but their amount exceeds potential shocks multiple times, and their accumulation bears losses for the countries. The freezing of Russian reserves made their vulnerability more evident.

Table 3
International reserves of Shanghai Cooperation Organization members and observers.

Country	2001			2011			2021		
	billion U.S. dollars	% of GDP	months of imports	billion U.S. dollars	% of GDP	months of imports	billion U.S. dollars	% of GDP	months of imports
SCO members									
China	220.1	16.4	12.6	3254.7	43.1	19.1	3427.9	19.3	11.7
India	49.1	10.1	7.5	298.7	16.4	6.2	638.5	20.1	9.8
Kazakhstan	2.5	11.3	2.5	29.2	15.2	4.3	34.4	18.0	5.6
Kyrgyzstan	0.3	18.8	5.3	1.8	29.5	4.0	3.0	34.9	5.3
Pakistan	4.2	5.3	3.6	17.7	8.3	4.2	22.8	6.6	3.4
Russia	36.3	11.8	5.2	497.4	24.3	11.6	632.2	35.6	15.1
Tajikistan	0.1	8.7	1.1	0.5	8.0	1.5	2.5	28.6	6.7
Uzbekistan	1.2	8.3	5.4	22.5	30.7	12.9	35.4	51.1	14.2
Iran	3.7	1.1	1.5	92.2	14.7	13.1	17.7	1.1	5.7
SCO observers									
Afghanistan	n/a	n/a	n/a	7.0[a)]	34.4[a)]	8.3[a)]	n/a	n/a	n/a
Belarus	0.4	3.2	0.5	7.9	12.7	1.9	8.4	12.3	2.1
Mongolia	0.2	16.3	2.9	2.4	23.5	3.1	4.4	29.0	5.8

[a)] Data for 2012.
Source: World Development Indicators Database.

Table 4
Stress tests for international reserves of the Shanghai Cooperation Organization members and observers.

Country	Reserves / max shock		Shocks					
			Current account balance to GDP, std. deviation		Short-term debt to GDP, std. deviation		Broad money to GDP, std. deviation	
	2016	2021	2012—2016	2017—2021	2012—2016	2017—2020	2012—2016	2017—2020
SCO members								
China	2.5	2.6	0.5	0.7	2.1	0.2	11.1	7.4
India	9.8	3.1	1.6	1.4	0.7	0.1	1.5	6.6
Kazakhstan	4.2	7.8	3.1	2.1	0.6	0.6	5.1	2.3
Kyrgyzstan	7.7	4.9	3.8	7.2	0.9	1.0	1.5	5.5
Pakistan	7.5	3.2	0.4	2.0	0.3	0.6	0.9	1.6
Russia	5.0	6.5	1.5	2.1	0.3	0.4	5.9	5.5
Tajikistan	3.1	7.2	2.7	4.0	0.8	2.8	3.0	2.0
Uzbekistan	22.2	12.7	1.4	4.0	0.1	1.3	0.9	2.3
Iran	11.6	0.5	2.3	2.3	n/a	n/a	n/a	n/a
SCO observers								
Belarus	2.8	7.9	3.1	1.4	2.3	0.9	3.7	1.6
Mongolia	0.7	6.3	16.6	4.6	6.6	2.8	2.8	4.2
Afghanistan	14.6	n/a	2.8	n/a	n/a	n/a	n/a	n/a

Source: Authors' calculations.

Table 5
Opportunity costs of holding excessive international reserves (% of GDP).

	Russia	Pakistan	China	India	Kazakhstan
Average for 2012–2016	1.3	0.1	0.4	0.6	n/a
Average for 2017–2021	1.5	0.1	0.2	0.6	1.0[a)]

[a)] Data for 2019–2021.
Source: Authors' calculations.

The SCO members and observers may be the first to take steps toward reserve diversification and the introduction of new instruments for their accumulation to develop collective self-sufficiency and strengthen self-defense against global financial and geopolitical turmoil.

Previously, members of the SCO launched various dedollarization initiatives. For example, they founded the SCO Interbank Consortium in 2005, entered into bilateral currency swap agreements with China in 2011–2020, and developed a road map for expanding trade in local currencies in 2022. The members also considered establishing the SCO Development Bank on multiple occasions. Recently, Iran went as far as proposing a single SCO currency.

The management of IR is of particular concern to the SCO members, as they accumulated significant foreign currency reserves, but three members have already suffered from their freezing.

Consequently, it seems plausible for the members of the SCO to expand bilateral currency swaps in the future, promote local currencies in trade and development finance, develop alternative payment and settlement systems, and eventually take action on reducing the U.S. dollar in their reserves.

5. Results

The freezing of Russia's reserves was not the first case of such financial sanctions, but it contributed to the ongoing loss of confidence in traditional reserve currencies. Breaches of trust may eventually lead to significant evolution of the international financial system and pave the way for a new system for managing national reserves. Safety will become a priority, so countries will seek to ensure the utmost control over them.

They will also combine instruments to fit their specific targets. Furthermore, it all comes down to whether or not the countries are ready and willing to cooperate. There will be new different approaches to changing the reserves' management, either unilateral or multilateral.

Accumulation of gold will likely reach an all-time high, along with assets in non-traditional reserve currencies, including the renminbi, and inventories of valuable resources or, probably, cryptocurrencies, and investments in various classes of assets via specially created sovereign funds. A long-term strategy, in turn, may require structural policies to reach the domestic economic potential. The above combination of instruments will facilitate the performance of all functions of traditional IR.

The developing economies will tend to act on their own as there is no common platform or set of objectives. Unorganized actions may generate severe threats to the global financial system.

Countries can also collaborate on more effective solutions, granting multinational status to reserves; for example, they can establish international sovereign funds or use regional financing arrangements to fulfil "depositary" functions. These actions may be supplemented by swap lines involving the exchange of both currency-for-currency and currency-for-resources options.

States could also consider a new international institutional agreement to forge a more equitable and sustainable international financial system, in particular by introducing a global synthetic currency. This will work, however, under specific conditions.

In the long term, countries may adopt unorthodox solutions, such as reducing foreign currency-denominated debt liabilities and promoting national currencies, thus refusing to accumulate IR, or developing new forms of money, such as Energy Standard-based currencies.

Overall, the proposed transformation of the reserve management system is likely to advance gradually throughout the 2020s.

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