

National Currencies in International Settlements: Main Mechanisms¹

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I consider the change in the standard mechanism for international settlements when the transition to settlements in national currencies happens. We assume settlements in national currencies as a bilateral foreign exchange market without the use of the banking system of a third country. This functioning should not be confused with the choice of the trade contracts currency, the reserve currency, or the currency of domestic banking products. In the case of the effective functioning of bilateral foreign exchange markets and the possibility of arbitrage transactions, the transition to settlements in national currencies does not affect the exchange rate or monetary indicators. With an imbalance in bilateral cash flows, market mechanisms (e.g. exchange rate fluctuations) prevent the systematic accumulation of foreign financial assets on the balance sheet of the banking system of one of the countries. In addition, there are quasi-market schemes in the foreign trade, which involve the accumulation of foreign financial assets on the balance sheets of specialised banking institutions.

Keywords:

cross-border settlements, settlement currencies, foreign exchange market, digital assets

JEL Codes: E42, F31, F32, F36

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1. Introduction

International interaction is impossible without a built-in system for cross-border settlements. Over the past few decades, this system has been characterised by the dominant role of traditional reserve currencies (the US dollar and the euro), but the escalation of geopolitical tensions in 2022 has prompted a number of countries, including Russia, to speed up the transition to settlements in national currencies for foreign trade transactions. Consequently, the academic discussion of this issue has significantly intensified. This discussion is quite necessary, but, unfortunately, the analytical materials coming out often do not focus on specific

¹ The views expressed herein are solely those of the author. The content and results of this research should not be considered or referred to in any publications as the Bank of Russia's official position, official policy, or decisions. Any errors in this document are the responsibility of the author.

elements of the international financial system but represent an eclectic set of considerations regarding various aspects of the ongoing transformation. This approach seems counterproductive, but it can be explained by the fact that the need to distinguish between different purposes for using reserve currencies may be unusual and that it may be difficult to do. The purpose of this paper is to examine in detail the modern mechanisms of international settlements. Understanding these mechanisms is a prerequisite both for setting the research goals effectively and, of course, for the correct formulation of relevant proposals and recommendations.

The paper is structured as follows. In Section 2, I discuss the change in the standard mechanism for international settlements in the transition to settlements in national currencies. In Section 3, I focus on the functioning of the foreign exchange markets in this transformation. In Sections 4 and 5, I analyse alternative schemes for international settlements (including those using digital assets). Section 6 concludes.

2. Standard settlement mechanism based on commercial banking system

To analyse the mechanics of international settlements, I use the standard scheme (Table 1) assumed in the applied literature (Bindseil and Pantelopoulos, 2022). This scheme is based on several assumptions.

The exporting firm and the importing firm conduct transactions using domestic bank accounts denominated in their respective national currencies. The transaction amount is denominated in the currency of the exporter's country.

Domestic banks serving exporters and importers conduct transactions using correspondent accounts with their central banks. There are also commercial banks that serve as intermediaries conducting transactions from the correspondent accounts of foreign banks (having them on their balance sheets).

In this scheme, cross-border payments are conducted as follows. The importer firm makes a payment, expending the corresponding amount from its bank account. The commercial bank serving the importer decreases the funds in its correspondent account with the central bank by transferring them to the intermediary's bank account. The intermediary bank in the importer's country reduces the balance in its correspondent account with the intermediary bank in the exporter's country. The intermediary bank in the exporter's country transfers funds from its account with the central bank to the account with the commercial bank serving the exporter. Consequently, the amount of funds in the exporter's account also increases.

The difference in the mechanism for cross-border payments using the currency of a third country compared to the mechanism described above is that, when using the currency of a third country, the commercial banks of the trading countries do not use the bilateral Nostro/Vostro accounts. Instead, they transfer funds from their correspondent accounts with an intermediary bank from third country C to one another, regardless of the country with which they are trading (Table 2).

Consequently, there is a single currency market in each economy, in which funds from the correspondent accounts of commercial banks with the local central banks are exchanged for funds in correspondent accounts with the intermediary bank from the third country.

Table 1. International payment mechanism for settlements in national currencies

Country A, currency A		
Firm A (importer)		
Assets		Liabilities
Inventories: $+abX$ Deposit with Bank A1: $-abX$		
Central bank A		
Assets	Liabilities	
Correspondent account of bank A1: $-abX$ Correspondent account of bank A2: $+abX$		
Bank A1		
Assets		Liabilities
Correspondent account with central bank A: $-abX$		Deposit of firm A: $-abX$
Intermediary bank A2		
Assets		Liabilities
Correspondent account with central bank A: $+abX$ Nostro B2: $-X$		
Country B, currency B		
Intermediary bank B2		
Assets		Liabilities
Correspondent account with central bank B: $-X$		Vostro A2: $-X$
Central bank B		
Assets	Liabilities	
Correspondent account of bank B1: $+X$ Correspondent account of bank B2: $-X$		
Bank B1		
Assets		Liabilities
Correspondent account with central bank B: $+X$		Deposit of firm B: $+X$
Firm B (exporter)		
Assets		Liabilities
Inventories: $-X$ Deposit with bank B1: $+X$		

Note: X is the payment amount in the exporter's currency, and ab is the exchange rate between currencies A and B.

Source: compiled by the author based on the paper of Bindseil and Pantelopoulos (2022)

Thus, the problem of choosing a settlement currency (vehicle currency) does not actually affect the non-banking sector, but affects only the functioning of the financial system. In this, the problems of the choice of domestic bank deposit currency (financial dollarisation) and of the choice of international trade contract currency (invoice currency) should be considered separately. Note that it is possible that even with the transition to settlements in national currencies, the firms may choose any currency for their contracts and deposits. At the same time, cash flows resulting from export earnings are not a significant determinant of the dollarisation of deposits. Exporters' settlement accounts are, in principle, a technical instrument for temporary use, and not a component of the money supply that systematically accumulates revenues from international trade. In turn, the deposit currencies of import firms are, to a certain extent, tools for hedging exchange rate risks linked to the invoice currency. However, in all cases, at the macro level economic agents

choose the currency structure of deposits based on traditional considerations related to the expected return (the interest rate differential and exchange rate expectations).²

Table 2. International payment mechanism for settlements in third country currency

Country A, currency A			
		Firm A (importer)	
		Assets	Liabilities
		Inventories: $+abX$	
		Deposit with bank A1: $-abX$	
Central bank A		Bank A1	
Assets	Liabilities	Assets	Liabilities
Correspondent account of bank A1: $-abX$		Correspondent account with central bank A: $-abX$	Deposit of firm A: $-abX$
Correspondent account of bank A2: $+abX$			
		Intermediary bank A2	
		Assets	Liabilities
		Correspondent account with central bank A: $+abX$	
		Nostro C: $-cbX$	
Country C, currency C			
		Intermediary bank C	
		Assets	Liabilities
		Vostro A2: $-cbX$	
		Vostro B2: $+cbX$	
Country B, currency B			
		Intermediary bank B2	
		Assets	Liabilities
		Correspondent account with central bank B: $-X$	
		Nostro C: $+cbX$	
Central bank B		Bank B1	
Assets	Liabilities	Assets	Liabilities
Correspondent account of bank B1: $+X$		Correspondent account with central bank B: $+X$	Deposit of firm B: $+X$
Correspondent account of bank B2: $-X$			
		Firm B (exporter)	
		Assets	Liabilities
		Inventories: $-X$	
		Deposit with Bank B1: $+X$	

Note: X is the payment amount in the exporter's currency, and ac and cb are the exchange rates between currencies A and C and currencies C and B, respectively.

Source: compiled by the author

3. Foreign exchange market

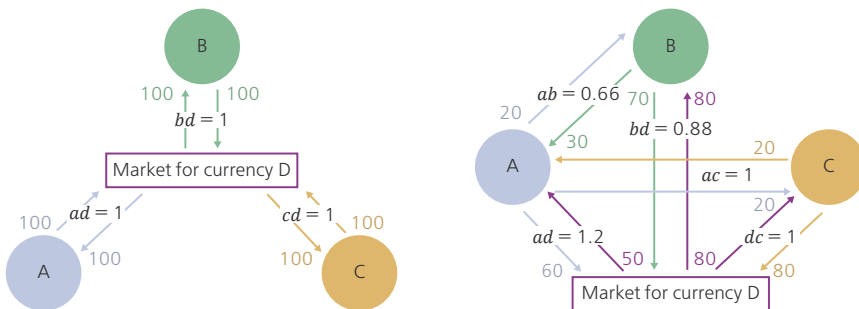
The foreign exchange market in this scheme (Tables 1–2) is an exchange between banks of funds in their correspondent accounts with their central banks for funds in their respective correspondent accounts with foreign intermediary banks at an agreed rate. I assume that banks have no demand for the formation of reserves through the accumulation of foreign assets. For the sake of simplicity, I also assume that the demand for foreign financial assets from the non-banking sector does not change with the transition to settlements in national currencies. Thus, supply and demand in the bilateral foreign exchange markets fully correspond to the

² See, for example, the paper by Neanidis and Savva (2009) and Corrales and Imam (2019).

cross-border cash flows³ that existed before the transition. This makes it possible to separate the problem of the choice of reserve currency from the choice of vehicle currency.⁴ With these assumptions, the change in the exchange rate will ensure the balance of cross-border transactions (that is, the balance of the current account surplus with the outflow of capital from the non-banking sector).

Figure 1 presents a schematic example of the transition to bilateral foreign exchange markets. Let initially the countries carry out settlements in the currency of country D (see the left-hand side of Figure 1) and let the cash flows in the foreign exchange markets be balanced overall (the total amounts of national and foreign currencies offered for exchange are equal). Let us also assume exchange rates of all currency pairs equal to one in the initial equilibrium. However, at the initial exchange rate the bilateral cash flows are not necessarily balanced (see the right-hand side of Figure 1, where, for example, exports of country A to country B equals 30 A, while exports of country B to country A equals 20 B). In this context, in the transition to bilateral markets with no arbitrage transactions, the market for currencies A and B will experience an excess supply of currency B. As a result, the exchange rate⁵ of currency A against currency B will strengthen, reducing the export revenue of country A (calculated in the national currency) to the level of spending on goods imported from country B. The reverse situation will be observed in the market for currencies A and D.

Figure 1. Scheme for transition of economy A to bilateral foreign exchange markets (with no arbitrage transactions)



Note: The figure shows cash flows in the respective currencies and with clearing exchange rates (calculated as flow ratios). In the left-hand part of the figure, 'Market for currency D' combines all international settlements in the currency of country D, including settlements between countries A, B, and C.

Source: compiled by the author

³ These cash flows may refer to both payments for goods and services or to the purchase/sale of securities by the non-banking sectors of the economy. Thus, it is possible to imagine any configuration of the balance of payments in which the current account surplus is balanced by the outflow of capital from the non-banking sector.

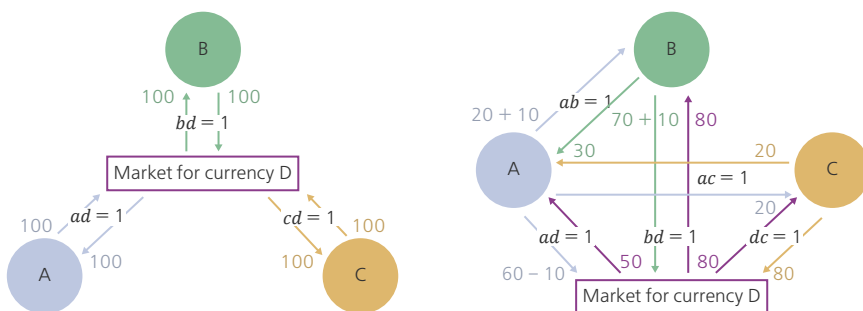
⁴ There are theories (Gopinath and Stein, 2021) linking the choice of invoice currency, reserve currency, and domestic banking product currency. A discussion of the realism of the preconditions and mechanisms of such theories is beyond the scope of this paper. Nonetheless, it is worth noting that in no case do they talk about the choice of the vehicle currency.

⁵ This example sets a simple market clearing exchange rate, which is defined as the ratio of the cash flows in the respective currencies.

However, in this case, there will be an opportunity to generate income through arbitrage transactions, which will have an adjusting effect on the exchange rates. Arbitrage transactions are usually understood as financial transactions in the foreign exchange markets. To illustrate the profitability of such transactions, it is enough to simply note that, in the situation depicted in the right-hand side of Figure 1, as a result of the successive exchange of one unit of currency A for 1.52 units of currency B, then for 1.72 units of currency D, and then again for currency A, the arbitrageur receives 2.1 units of currency A, i. e. 1.1 units of net income. Implicitly, in well-functioning, liquid foreign exchange markets, exchange rates may not change at all in the transition to bilateral markets, even with unbalanced bilateral cash flows (Krugman, 1980).

It can be noted that transactions in financialised commodity markets (that is, markets where a significant number of participants consider a commodity as an asset for investment) can also be considered arbitrage opportunities. In addition, commodity flows themselves can be adjusted to generate arbitrage income. The following situation can serve as an example. Let consumers in country A import a commodity worth 1 D in the foreign market and, correspondingly, 1.2 A in the domestic market. This means that an entrepreneur from country B can buy this commodity on the world market (spending 0.88 B) and sell it on the market of country A at a price equivalent to 1.82 B. It can be assumed that such ‘parallel imports’ of commodities through country B will expand (crowding out direct imports) until the possibility of arbitrage income disappears. Thus, cash flows will change as a result of the transition to settlements in national currencies, but exchange rates will not, compared to the initial situation of settlements in the currency of country D (Figure 2).

Figure 2. Scheme of transition of economy A to bilateral foreign exchange markets (with arbitrage)



Note: The figure shows cash flows in the respective currencies and with clearing exchange rates (calculated as flow ratios). In the left-hand part of the figure, ‘Market for currency D’ combines all international settlements in the currency of country D, including settlements between countries A, B, and C.

Source: compiled by the author

Arbitrage involves the execution of currency exchange transactions in several foreign exchange markets. In this regard, the key condition for the exchange rates stability after the transition to settlements in national currencies is the effective functioning of the markets that arise. If they are insufficiently liquid and have high transaction costs, arbitrage may be unprofitable. It is traditionally assumed that such issues will be characteristic primarily of markets with small trade volumes. According to a number of theories, the ability of low-volume foreign exchange markets to function effectively and the transaction costs associated with this are key issues in determining the optimal structure of the global foreign exchange market (Krugman, 1980; Black, 1991; Devereux and Shi, 2013). In this regard, the effectiveness of bilateral currency markets for all currency pairs is unrealistic and the transition to hub currencies is quite likely. On the other hand, arbitrage is currently extremely efficient on all existing markets (Ito et al., 2012; Fenn et al., 2009), and is rapidly developing on newly appearing foreign exchange markets (Makarov and Shoar, 2020; Fang et al., 2022; Wang et al., 2021). The nature of the relationship between small trade volumes in the market and volatility and liquidity is ambiguous (see, for example, Bogousslavsky and Collin-Dufresne, 2023), and limited trade volumes cannot a priori be considered an insurmountable obstacle to the existence of effective arbitrage.

Capital flows regulations in developing countries might be another concern for the liquid markets for multiple currency pairs. Currently, there are no restrictions on currency conversion in export-import transactions in the vast majority of economies.⁶ However, many countries still impose restrictions on the non-residents' access to certain financial instruments. The main declared purpose of such restrictions is the protection of domestic markets from speculative impact, including arbitrage on the interest rate differential. It is not entirely clear to what extent the arbitrage on the exchange rate imbalance in different currency pairs is possible in such conditions. However, the financial regulators in countries interested in the development of settlements in national currencies recognise the need to address this concern (Sankar, 2022).

4. Settlements based on specialised banking institution

In a situation when it is not possible to base the national currency market on the commercial banking system, or due to some strategic and geopolitical considerations, settlements can go through a specialised banking institution (SBI). SBI must have access to financing from the local central bank and to a correspondent account in a similar foreign institution.⁷ To make an international payment, the the

⁶ In particular, there are no such restrictions in any of the G20 countries (International Monetary Fund, 2022).

⁷ If the balances of SBI and the central bank are consolidated, then the scheme becomes similar to the opening of a credit facility between the central banks.

bank servicing the importer turns to the SBI of its country and transfers funds from its correspondent account with the central bank (which reduces the importer's deposit by the corresponding amount). The SBI of the importing country increases its obligations to the SBI of the export country. The export country's SBI receives financing from its country's central bank and transfers funds to the correspondent account of the bank servicing the exporter. In doing so, the export company's deposit also increases. The transaction scheme is presented in Table 3.

Table 3. International payment mechanism for settlements through SBI

Country A, currency A			
		Firm A (importer)	
		Assets	Liabilities
		Inventories: $+abX$	
		Deposit with bank A: $-abX$	
Central bank A		Bank A	
Assets	Liabilities	Assets	Liabilities
Loan to bank A: $+abX$	Correspondent account of SBI A: $+abX$		Deposit of firm A: $-abX$ Debt to central bank B: $+abX$
		SBI A	
		Assets	Liabilities
		Correspondent account with central bank A: $+abX$	Debt to SBI B: $+X$
Country B, currency B			
		SBI B	
		Assets	Liabilities
		Loan to SBI A: $+X$	Debt to central bank B: $+X$
Central bank B		Bank B	
Assets	Liabilities	Assets	Liabilities
Loan to SBI B: $+X$	Correspondent account of bank B: $+X$	Correspondent account with central bank B: $+X$	Deposit of firm B: $+X$
		Firm B (exporter)	
		Assets	Liabilities
		Inventories: $-X$	
		Deposit with bank B: $+X$	

Note: X is the payment amount in the exporter's currency, and ab is the exchange rate between currencies A and B.

Source: compiled by the author

It is obvious that the opportunities for a market-driven exchange rate are limited in the case of international settlements through SBIs. However, this does not mean that the exchange rate must necessarily be fixed. If a clearing exchange rate that equalises the volumes of cross-country money flows is established, the net position of the SBIs relative to one another does not change, and the situation does not radically differ from the settlement option based on the commercial banking system. This transition to bilateral foreign exchange markets also does not affect the dynamics of monetary indicators, since the cash flows between the economies are balanced (that is, the trade surplus is compensated by the outflow of capital from the non-banking sector). However, if a certain exchange

rate is established, that does not depend on bilateral cash flows,⁸ the systematic imbalance of cash flows between the countries will be accompanied by a number of macroeconomic effects.⁹ In the country with a surplus of cash flows, there will be (1) an accumulation of foreign assets on the SBI's balance sheet, (2) an accumulation of debt from the SBI to the central bank, and (3) an increase in the monetary base (banks' correspondent accounts with the central bank) and the money supply (firms' deposits with banks).¹⁰ These processes will require compensatory measures from the monetary authorities.

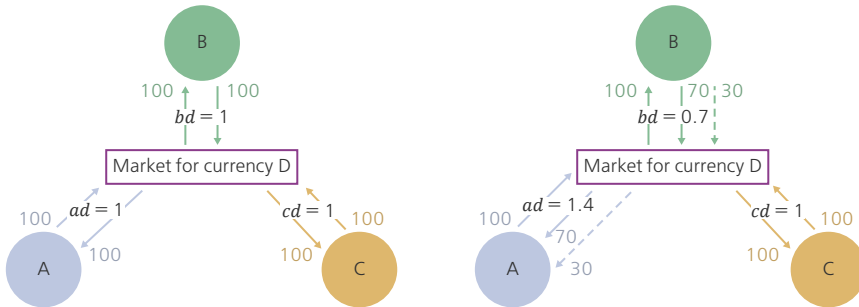
As another possible situation with international settlements, we can consider an extreme case in which only the exporters of one country are inclined to avoid settlements in the currency of third countries. This situation is a special case of the scheme described above, in which only the exporters of one country turn to the SBI. In addition, there is a number of options for financing exports, which involve an increase in the net foreign assets of the exporting country's banking system. The export financing scheme, in fact, leads to a decrease in the demand for the national currency of the exporting country in the existing foreign exchange market and a weakening of the exporter's currency (Figure 3). The use of schemes that involve the accumulation of foreign assets by the banking system (including the central bank or SBI) has an effect on the growth of the money supply.¹¹ Note that in the case of the use of SBI for international settlements, money supply growth corresponds to the magnitude of the imbalance in bilateral cash flows (in the current and financial account of the balance of payments) and, in the case of the direct trade financing of exports by commercial banks and the central bank, to the value of exports (that is, presumably a materially larger value).

⁸ It is worth considering separately the controversial approach based on the use of the cross rate when making payments in national currencies. Suppose that, in the situation described above (Figure 1), country A switches to settlements in the national currencies with country B. At the same time, only exchange rates against currency D are established on a market basis (currency A weakens against D, while currency B strengthens). In this case, the exchange rate of currency A relative to currency B, set on the basis of the cross rate, will be $ab^{cross} = ad/bd = 1.36$. Thus, the currency A exchange rate, against the background of a significant surplus of bilateral cash flows, will be artificially set at a weaker level compared to the situation before the transition to settlements in the national currencies.

⁹ This paper does not consider financial stability issues. None of the schemes proposed involve the accumulation of a significant amount of foreign assets/liabilities on private sector balance sheets. Financial risks of the central bank and the SBI should be considered a separate issue not directly related to the traditional issues of the stability of the financial system. In relation to the current situation, note that replacement of financial assets denominated in traditional reserve currencies with financial assets in alternative currencies is quite possible. However, this process is not directly related to the international settlements scheme and may take place without the transition to settlements in national currencies. Presumably, the existing methods of banking supervision and other financial stability related activities may need adjustment, but, in general, they are able to curtail such risks.

¹⁰ It is noteworthy that such a scheme is often implied in a number of descriptions of the transition to settlements in national currencies (Times of India, 2022; Sankar, 2022).

¹¹ Money creation from the accumulation of net foreign assets by the banking system is an expected phenomenon and is not associated with the transition to settlements in national currencies (for more details, see Kuzin and Schobert, 2015; Ponomarenko, 2017, 2019). In addition to the scheme discussed in this paper, the accumulation of central bank foreign reserves (due to foreign exchange interventions or the opening of a credit facility with another central bank) and direct lending to importers by commercial banks will have a similar effect on the money supply.

Figure 3. Scheme of transition to bilateral foreign exchange markets

Note: The figure shows cash flows in the corresponding currencies and the clearing exchange rates (approximated as flow ratios). 'Market for currency D' combines all international settlements in the currency of country D, including settlements between countries A, B, and C. The case illustrated is the case of the financing of exports from country A in the amount of 30 units of currency B and the reduction of the corresponding cash flow by the same amount.

Source: compiled by the author

5. Settlements with digital assets

The idea of using digital assets has recently been gaining ground (Bindseil and Pantelopoulou, 2022). This solution appears promising from the point of view of payment technologies development and the number of attractive properties for users (including anonymity)¹². Unfortunately, the downsides of these properties include potential cybersecurity risks and a number of unresolved legal issues (Bolt et al., 2022; Dark et al., 2022). Nevertheless, the technological promise of such instruments as a means of payment can already be acknowledged.

Table 4 presents an example of a transaction based on a secured digital asset (Stablecoin). In this scheme, an importer purchases Stablecoins from a digital intermediary and transfers them to an exporter in exchange for a commodity. The exporter, in turn, sells the Stablecoins to an intermediary operating in the exporting country. This scheme is somewhat different from the simpler options presented by Bindseil and Pantelopoulou (2022). Here, I emphasise that the firms do not need to accumulate Stablecoins and hence they are not vulnerable to fluctuations in the price of the digital asset. This risk is taken by specialised intermediaries that act as a crypto exchange and payment system. The digital intermediary sets the exchange rate of the Stablecoin against the local currency as part of its portfolio management. The exchange rate of a currency pair will thus be the cross rate of the currencies against the Stablecoin. Presumably, the dynamics of this rate will be similar to the dynamics of the clearing rate that balances cross-country cash flows. Regardless of the instrument used for settlement, the trade volume in the foreign exchange market (and, presumably, liquidity) is determined by the demand for external transactions. Thus, it can be assumed that the liquidity of the Stablecoin

¹² See, for example, Vinogradova (2023).

market will not differ from the liquidity of the foreign exchange market described above. However, if trading with all partners is carried out through one digital asset, there is a single (and presumably more liquid) foreign exchange market, and this can be considered a potential advantage of this approach. In addition, a balance of prices can be achieved through arbitrage in the case of the use of various digital assets or the simultaneous operation of the traditional currency markets.

Table 4. International payment mechanism with digital asset settlements

Country A, currency A	
Firm A (importer)	
Assets	Liabilities
Inventories: $+ac \times cb \times X$	
Deposit with bank A: $-ac \times cb \times X$	
Bank A	
Assets	Liabilities
Deposit of firm A: $-ac \times cb \times X$	
Deposit of digital platform A: $+ac \times cb \times X$	
Digital platform A	
Assets	Liabilities
Deposit with bank A: $+ac \times cb \times X$	
Stablecoins: $-cbX$	
Stablecoins issuer	
Assets	Liabilities
Stablecoins of digital platform A: $-cbX$	
Stablecoins of digital platform B: $+cbX$	
Country B, currency B	
Digital platform B	
Assets	Liabilities
Stablecoins: $+cbX$	
Deposit with bank B: $-X$	
Bank B	
Assets	Liabilities
Deposit of digital platform B: $-X$	
Deposit of firm B: $+X$	
Firm B (exporter)	
Assets	Liabilities
Inventories: $-X$	
Deposit with bank B: $+X$	

Note: X is the payment amount in the exporter's currency, ac and cb are the exchange rates of currencies A and B against the digital asset.

Source: compiled by the author

6. Conclusion

I review the standard mechanism for cross-border payments. Settlements in national currencies are understood to be the functioning of the bilateral foreign exchange market without the use of the banking system of a third country. Settlements should not be confused with the choice of the currency of trade contracts, the reserve currency, or the currency of domestic banking products.

In the case of the effective bilateral foreign exchange markets and the possibility of arbitrage, the transition to settlements in national currencies will not affect the exchange rate or monetary indicators. However, with limited opportunities for arbitrage (for example, due to the high transaction costs), there may be multidirectional fluctuations in the exchange rates for currency pairs. At the same time, exchange rate fluctuations are an important catalyst for arbitrage, so exchange rate fixing (for example, based on the cross rate) can discourage these processes.

With an imbalance in bilateral cash flows, market mechanisms will prevent (including through exchange rate fluctuations) the systematic accumulation of foreign financial assets on the balance sheet of the banking system of a country with surplus cash flows. However, there are quasi-market schemes for organising foreign trade, which involve the accumulation of foreign financial assets on the balance sheets of specialised banking institutions. This process is accompanied by an increase in the money supply. In the case when the entire volume of export is financed by the domestic banking system the increase in the money supply will correspond to the value of exports, regardless of the size of the imbalance in bilateral cash flows.

The use of digital assets for international payments has a number of attractive properties for users. The downside includes potential cybersecurity risks and a number of unresolved legal issues.

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