The deterritorialisation of money: Digital monies and the international payment system

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Dear students and colleagues,

I'm delighted to be here and most grateful to LSE IDEAS for the invitation to speak to you today. I was asked to present on the topic of digital monies and the international monetary system. Both are highly intertwined as digital monies offer great promise to improve the international monetary system. The international economy is seemingly becoming increasingly complicated amid renewed geopolitical tensions that risk fragmentation that undermine the foundations of the rules-based multilateral system established after World War II.

I have taken considerable interest in digital monies and the international monetary system. I worked at the International Monetary Fund and had studied problems of cross-border payments for some time. The persistent deficiencies in the system attracted me to working with digital monies. In 2018, when I started, digital monies were still seen as rather exotic and niche. I have since had the privilege of supporting among the leading digital money projects with a focus on cross-border payments including project Jura with the central banks of France and Switzerland and the BIS Innovation Hub and project mBridge with the central banks of China, Hong Kong, Thailand and the UAE and the BIS Innovation Hub. Today most central banks work on digital monies.

Money and payments are the grease and plumbing of the economy. The functioning of the economy will depend on how easy it is to move money. Moving money will depend on the performance of the payment system. Improving money and payment systems is behind the drive towards digital monies.

I will focus on the notion of deterriorialisation of money. It is the idea that money will assume properties more like a good that can be moved anywhere. Money remains one of the least globalised products. Some of you may see a parallel to Friedrich Hayek's, one of LSE's most famous alumni, denationalisation of money. Hayek thought money should not have a nationality, not be subject to government control, as money is no different from other commodities and would better be supplied by competition between private issuers than by a monopoly of government. While my approach is certainly not intended to rival Hayek, I believe monies will keep their nationalities, but new money properties will allow more monies to become more competitive and able to move more internationally. The cryptocurrency industry has of course often evoked Hayek.

* This is not an Accenture or LSE publication.

I will first offer some remarks about money and some basic notions of payments and settlement and cover in broad strokes the international monetary system. I will then offer an overview of digital monies and finally attempt to outline a sensible explanation of why digital monies offer great hopes to strengthen the international monetary system. I will try to answer the question why digital monies are better equipped to address contemporary payment problems than conventional monies and why therefore it is important to adopting them.

Money

I will refer to money as being a liability of either a central bank or a bank to serve as payment and settlement mediums. Money is a medium of exchange and also a store of value.

Money issued by a central bank normally comprises currency (cash or banknotes) and reserves. Banknotes are accessible to anyone. Reserves can be held typically only by banks and serve mostly to settle interbank obligations. Banknotes are acquired by banks against reserves and reserves are acquired by banks through open market operations by the central banks usually through borrowing operations.

Table 1. Euro Area monies

Amounts outstanding, EUR billion

	2023	2019
M3	16,726	12,987
Repurchase agreements	253	80
Money market fund shares	873	520
Debt securities with maturity of up to 2 years	28	6
M2	15,572	12,381
Deposits	4,999	3,431
M1	10,573	8,950
Currency in circulation	1,557	1,224
Overnight deposits	9,016	7,726
ECB		
Reserves (deposit liabilities vis-à-vis Euro Area financial institutions) *	3,060	1,813

Source: ECB. December. *Deposit facility 27 December 2024. Current account, deposit facility and fixed-term deposits 2019.

Money issued by banks are typically bank deposits. Deposits can be held by anyone and serve as a store of value. They represent a book-entry or scriptural money and are issued normally against a credit transfer to the bank or an extension of a loan by the bank.

Money has remained very territorial. It is normally issued locally and accessible mostly only by national entities. It makes money one of the least globalised services. It complicates cross-

border payments and imposes undue barriers of entry. Changing the territoriality of money is set to be one of the critical changes that could bring greater efficiency, speed and lower transaction costs to payments.

Money's most important function may be to serve as unit of account. It is easier in a given economy to denominate all prices in the same currency. Central banks, typically guardian of the national currency, have an interest in ensuring economic agents find it attractive enough to use the national currency as unit of account. Prudent monetary policy to produce price stability is one. Equipping money with properties that make using monies denominated in the national currency competitive is another. It is why central banks consider digital monies as we will see later.

Payments

Payments are acts to discharge obligations with money typically between non-banks, to buy a good or service or conduct a financial transaction, to acquire a bond or invest in a fund. Normally, except for payment in currency, only payment obligations are recorded but no funds are transferred. Settlement is to enable banks to discharge obligations among themselves with a funds transfer.

As a reminder, funds transfers do not involve the transfer or physical movement of funds. Most monies, except currency, are never transferred. In fact, money never moves. Only account adjustments showing credits and debits determine how much money one owns or is owed.

Payments are conducted predominantly by electronic means. In the Euro Area, currency (cash) remains the most accepted means of payment and second most used means of payment at the point of sale in terms of value but remains very small in total payments.[1] To conduct electronic payments, deposits are used in combination with different payment instruments to instruct payments like debit cards, PayPal, GooglePay or as credit transfers. Credit transfers usually represent the bulk of money movements in an economy (Table 2).

In domestic payments, payments to a payee at the same bank are a simple change in book-entry for the bank. Payments to a payee at a different bank require the payer's bank to make an equivalent transfer in reserves to the payee bank upon which the payee's bank will credit the payee.

In the European Union, the main retail payment systems are e.g. CORE in France for credit transfers and direct debit operated by the largest French banks; STEP2 Card Clearing in Germany for card clearing processing is owned and operated by the European Banking Association (EBA). Instant payments, by which a payment will need to be processed within 10 seconds 24/7, are being adopted and will need to be offered to clients in the E.U. for sending and receiving payments from October 2025 (other countries have already

[1] ECB, Use of cash by companies in the Euro Area in 2024.

successfully adopted instant payment). For large value payments, the Euro Area countries mostly use universally a TARGET component owned and operated by the central banks.

Table 2. Euro Area payments

EUR billion	2023	2019
Retail payments by payment service *	223,145	154,962
Credit transfers	208,414	143,968
Direct debits	10,072	6,911
Card payments	3,019	1,981
Cheques	1,152	1,907
E-money payments	488	194
Cash **	1,674	1,554
Wholesale payments ***		
T2 ****	391,243	455,350

Source: ECB. Annual earliest and latest data available.* Value sent of payment transactions involving non-financial institutions.** Data for 2024. Cash is derived from ECB SPACE surveys where POS and person-to-person payments represent 64 percent of day-to-day payments and cash represents 39 percent of transactions compared with 45 percent for cards.*** European Union.**** Eurosystem large value payment system.

Critically, if payer and payee do not share the same bank, for the transfer of money, a deposit at a bank, the payer needs to observe rules set by his or her bank and the payee to comply with rules set by his or her bank. Book-entry monies can only be transferred through novation, that is, the payee assumes a claim against his or her bank not against the bank of the payer. It makes transferring money where different banks are involved rather complicated. It is particularly complicated when conducting cross-border payments.

Cross-border payments enable commercial and financial exchanges between countries. Most economies are open economies and exchange goods, services and credit and investment flows represent an important proportion of economic activity. Cross-border payments are expected to increase from an estimated US$150 trillion in 2017 to over US$250 trillion by 2027.[2] Effective cross-border payments are therefore critical to enable orderly cross-border exchanges.

Cross-border payments remain in large part slow, opaque and unduly costly. It is still often faster to ship a parcel from London to New York than to make a payment in particular over the weekend. This has multiple reasons but in large part is due to regulatory constraints and high transaction costs. Regulation imposes considerable prudential burden on banks in connection with verifying that transactions are not subject to money laundering and terrorism financing. Regulation also in some instances penalises cross-border transactions compared with domestic transactions, e.g. to meet regulatory liquidity buffers. Transaction

[2] Bank of England, Cross-border payments.

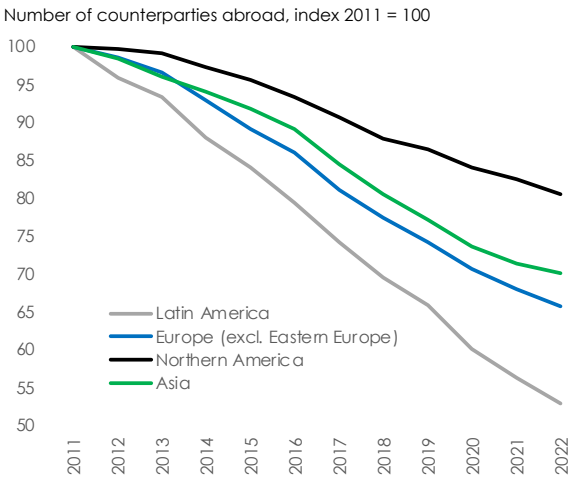
costs are higher in large part related to longer payment chains between payer and final beneficiary, and the cost of conducting foreign exchange.

Banks of different countries typically do not share the same payment system. They cannot transfer funds among themselves, cannot usually settle in central bank money or another very safe payment medium. Payment obligations in cross-border payments, payments to a payee at a different bank require the payee's bank to extend a credit in the equivalent amount to the payer's bank on the basis of a so-called nostro-vostro account relationship between domestic and foreign banks.

Nostro accounts are normally accounts held by the domestic bank at a foreign bank whereby vostro accounts are foreign accounts of domestic banks held by the foreign banks. Nostro-vostro accounts normally are the only mechanism to conduct payments between banks residing in two different countries (some large banks may have access to different to foreign payment systems through their foreign branches).

Correspondent banks are critical and may involve long payment chains as payments progress from the payer bank to the next until the payee bank is reached. For E.U. banks, in more than 40 percent of cross-border payments 4 banks or more correspondent banks are involved.[3] This has been accompanied by a decline in correspondent banking relationships leading to very high concentration and lack of competition.

Figure 1. Correspondent banking



Source: BIS. Number of active correspondents in each region.

The number of correspondent banks has fallen 30 percent in 2011-22 and for USD 40 percent.[4] The number of active corridors, at least one transaction per month between a bank and its correspondent, declined almost 20 percent over the same period (Figure 1). Anecdotal evidence suggests that the contraction of correspondent banking can be attributed to an unfavourable risk-reward profile due in large part to high compliance costs.

[3] ECB, Eleventh survey on correspondent banking in euro, 2020.
[4] BIS, New correspondent banking data—the decline continues.

The decline in correspondent banking poses a threat to the effective settlement of cross-border transactions.

CBDC projects Jura and mBridge had pioneered a new cross-border settlement architecture. Participants central banks issue CBDC onto the platform and allow all banks platform participants to directly take delivery of local and foreign CBDC. It enables instant settlement of cross-border transactions outright in central bank money peer-to-peer rather than through correspondent banks.

Foreign exchange market

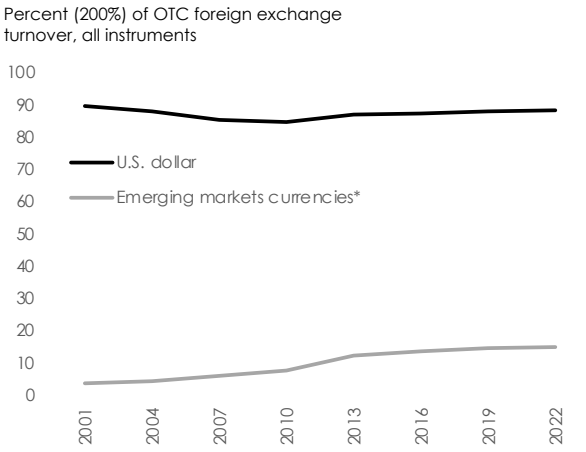
Foreign exchange transactions are the most important cross-border payment transactions. The foreign exchange market is the largest financial market with a daily average turnover of US$7.5 trillion and a critical component of most economic transactions. The foreign exchange market is characterised by high levels of concentration by currency and institutions and an increasing risk in currency settlement. The concentration is estimated to be attributable in large part to high capital and liquidity requirements to perform efficient currency settlement that pose high barriers of entry.

10 institutions are estimated to represent two thirds of the foreign exchange turnover and in 9 out of 10 foreign exchange transactions the U.S. dollar is one leg of the transaction.[5] The United Kingdom and the U.S. together represent 3 out of 5 of the foreign exchange turnover by country.[6]

The foreign exchange market is subject to large absolute and increasing settlement risks amid a decline in settlement conducted with risk mitigation. While CLS Bank is estimated to cover 1 out of 4 foreign exchange transactions under risk mitigation, only 18 currencies are currently eligible for settlement through CLS and about 1 in 3 transactions overall are estimated to be settled without risk mitigation.[7]

[5] On the largest foreign exchange institutions see, e.g. Euromoney foreign exchange survey results 2022. On the concentration by currency see BIS triennial survey.
[6] BIS triennial survey.
[7] See e.g. Mark Glowka and Thomas Nilsson, FX settlement risk: an unsettled issue, 2022.

Figure 2. Currency concentration



Source: BIS. "Net-net" basis, daily averages in April.
* Member of the G20: Argentina, Brazil, China, India, Indonesia, Korea, Mexico, Russia, Saudi Arabia, South Africa

Settlement consists of exchanging one currency for another at a given exchange rate. Most settlement takes place through correspondent banks. In most cases, domestic banks cannot access foreign currency except through their correspondent banks.

Settlement-related risks of foreign exchange transactions have been usually found to remain significant despite improved settlement arrangements.[8] Mitigation continues to rely predominantly on netting that may produce unwanted market concentration and bias against adoption of smaller currencies.[9] Generally, there is pressure to improve settlement arrangements in particular amid criticism of the correspondent banking model.

The main currency pairs depend heavily on large network effects and high levels of market concentration to be able to offer efficient settlement. It has led to very few currencies dominating a market where in 9 out of 10 foreign exchange transactions the dollar represents either the bought or sold currency.[10] Settlement times are slow for the larger pairs being typically 2 days. Smaller currency pairs have little liquidity and languish between complicated and slow settlement arrangements often subject to considerable credit and settlement risks and significantly longer settlement times.

Existing settlement arrangements require high levels of regulatory capital and liquidity buffers that perpetuate concentration and impose high barrier of entry limiting scope for greater diversification.

International monetary system

The international monetary system is to facilitate cross-border payments. It is a construct that originated with early attempts to harmonise payments under the gold standard and

[8] Idem
[9] For an overview of netting, see e.g. Urich Bindseil and George Pantelopoulos, A brief history of payment netting and settlement, 2022.
[10] BIS triennial survey.

culminated with the International Monetary Fund (IMF) after World War II. The IMF aimed to establish a multilateral payment system. Those efforts largely failed as reflected in persistent considerable deficiencies in cross-border payments. Today, the international monetary system exists mostly only in name. Increasing geopolitical tensions now risk increasing fragmentation of the system.

The IMF was established in 1944 at the United Nations Monetary and Financial Conference in Bretton Woods, New Hampshire. It represented a unique effort and was driven in large part by a vision led by the U.S. administration to build a rules-based post-war economic order. It followed from the economic hardship of the 1930s that led to a collapse of the international economy and ultimately to war.

The IMF was set up to give countries access to foreign exchange to conduct cross-border payments. Cross-border payments were settled in gold or in gold-convertible currencies. After the war, most countries did not have sufficient gold to conduct cross-border payments, and the IMF provided a mechanism to facilitate access to foreign exchange. The purpose of the system is to ensure there is sufficient international liquidity, that is, countries have enough foreign exchange, to enable orderly external payments.

The IMF remains the only formal arrangement for monetary cooperation based on an international treaty, the Articles of Agreement. At the foundation of the IMF, countries were required to give up sovereignty on monetary policies and agree to observe a set of obligations to abstain from exchange restrictions. All countries fixed their currencies to the U.S. dollar while the dollar was fixed to gold. This was referred to the gold-exchange standard or Bretton Woods System. Any alternation of exchange rates had to precede consultation with the IMF.

The peg to the dollar gave rise to considerable criticism amid the advantage it brought the U.S. Unlike other countries, the U.S. could issue its own currency to meet its external obligations and thereby had no external payments constraint. This led to the notion of the "exorbitant privilege" of the U.S., a term coined by the French administration in the mid 1960s and that gave rise for the need of a neutral anchor like a return to the gold standard to give symmetric incentives for balanced external accounts. It followed criticism of large external imbalances of the U.S. In 1971, the U.S. abandoned gold convertibility leading to the main currencies to float.

The mandate of the IMF was and still is to establish a multilateral payment system. At Bretton Woods, this was understood to mean: "*[…] means must be found to increase the international liquidity of all countries, to give them assurance that temporary deficits in their international balances of payments can be met […] as one of the 'primary objectives of economic policy' […] so that each country can count on using the proceeds of its exports to any part of the world to pay for imports from any part of the world*."[11]

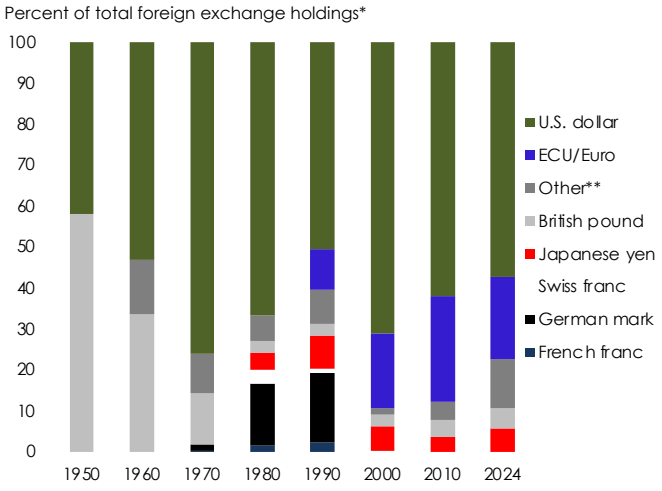
[11] Report of Commission I (International Monetary Fund) to the Executive Plenary Session, 20 July 1944, United Nations Monetary and Financial Conference, Bretton Woods, N.H. 1-22 July 1944, Final act and related documents, 3 November 1944.

Delegates at Bretton Woods were concerned about the implications if not all currencies were convertible or usable: "*If imports from countries other than the United States and the United Kingdom must be paid for in dollars and sterling, […] other currencies [will be] of limited usefulness in settling international payments.*"[12]

The use of currencies in international payments remains to this day highly constrained. Most international payments continue to be conducted in a very narrow set of currencies. The IMF still today only considers 5 currencies—dollar, euro, renminbi, sterling and yen—as freely usable out of 145 currencies in circulation. Central banks' foreign exchange reserves, seen as proxies for currencies used in international payments, remain mostly concentrated in four currencies representing 9 out of 10 currencies held as foreign exchange reserves (Figure 3).

The narrow set of currencies useable in international transactions is amongst the most important challenge for the stability of the international financial system. It produces and perpetuates critical external vulnerabilities including in particular for foreign indebtedness. Without the ability to use their currencies in international exchange, countries will depend on holding foreign currencies that can.

Figure 3. Central bank foreign exchange reserves



Source: IMF. *Allocated reserves. **Including predominantly Australian dollar, Canadian dollar, Chinese renminbi since 2012. Q2 2024

Digital monies

I will refer to digital monies as monies issued as digital tokens. They complement existing monies being the same monies only in a different format and issued and processed on a different payment system, the blockchain where blockchain will mean permissionless blockchain. Digital monies exhibit properties akin to bearer instruments. They afford additional functionalities e.g., through programmability to facilitate even the most complex payment transactions.

[12] Memorandum to Committee 2, Use of currencies held by the Fund, Kurt Schuler und Andrew Rosenberg, The Bretton Woods transcripts, New York, NY, 2012.

Digital monies comprise at least three classes of instruments: Digital monies issued by central banks often referred to as central bank digital currencies (CBDC); digital monies issued by banks or non-bank financial institutions typically represented as tokenised deposits, e-money tokens or tokenised money market fund shares; instruments issued by non-tangible entities like bitcoin and ether often designated as cryptocurrencies.

CBDC are liabilities of the central bank and tokenised deposits and e-money tokens are liabilities of banks and e-money institutions, respectively. Tokenised money market fund shares are issued by money market fund managers and represent claims on the underlying assets held as reserve.

Stablecoins are hybrid digital monies that are economically similar to e-money or money market fund shares but issued under different regulatory regimes. Similarly, they constitute a commitment to convert at par the stablecoin into money typically denominated in a national currency and should normally be classified as money. In the European Union, stablecoins would be issued as e-money tokens. In the U.S., there is the expectation of new federal regulation for stablecoins to replace mostly state-based money transmitter licences.

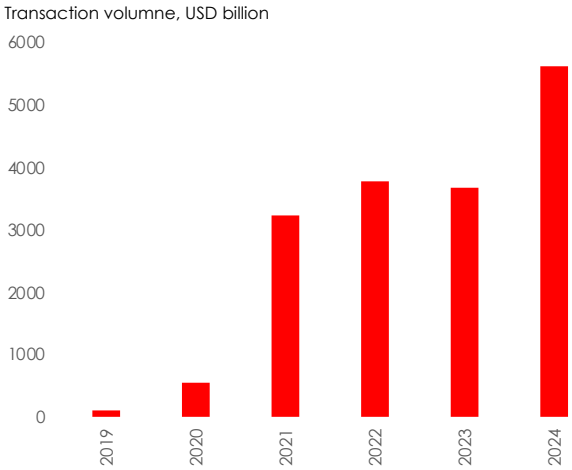
Cryptocurrencies are often not considered money and do not represent a liability of a financial institution though may exhibit properties comparable to money, e.g. to serve as a means of payment. They tend to be in character closer to gold and other commodities. While CBDC and tokenised deposits are normally denominated in a national currency, cryptocurrencies are denominated in a separate unit of account and typically float vis-à-vis national currencies, e.g., bitcoin prices fluctuate against the dollar.

Digital money is held in digital wallets and controlled by a cryptographic private key akin to a signature. Transactions are processed and recorded on a blockchain. Blockchains are typically decentralized computer networks that use consensus mechanisms to validate transactions. In a payment, the consensus mechanism verifies the transaction and that the transfer follows network rules, while the private key signature assigns control of the digital money token from payer to payee. The blockchain serves as a ledger recording transactions.

Digital monies offer important out-of-the-box functionalities highly conducive for payments. Tokens can be transferred instantly enabling instant payments (this will depend on the blockchain) and can also be exchanged in a token swap instantly and atomically, that is, both legs of the transaction have to succeed or none does. It offers the possibility to conduct e.g., delivery versus payment and payment versus payment transactions. The former is critical for securities and the later for foreign exchange settlement.

The payment life cycle normally comprises payment execution, clearing, netting and settlement. It consumes time and netting exposes banks to credit and counterparty risks. Digital monies collapse the settlement cycle such that execution is settlement similar to a cash transaction. This reduces risks and requires less liquidity to offer efficient settlement. As transaction proceeds are immediately available significantly less stock of money will be needed for a given transaction flow while liquidity demands shift from pre-funding requirements to real-time liquidity management.

Figure 4. Stablecoin transaction volume



Source: Visa. Transaction volume adjusted.

Digital monies have seen increasing adoption although levels remain small compared with domestic payments. The increase of stablecoin transaction volumes Is indicative of increasing traction. Tokenised deposits remain mostly experimental but have the potential to become the dominant digital monies (Figure 4).

Digital monies and the international monetary system

The international monetary system suffers from national borders. Money needs to become more globalised to serve the international economy well and the system more diversified and offer scope for the integration of smaller currencies. Digital monies extend critical features that seem well adapted to produce needed changes. Blockchains provide a highly inclusive environment that lends itself for cross-border transactions.

The system needs to overcome two critical constraints: To reduce cost of cross-border payments and to offer an inclusive network for exchange. The former will rely to a large extend on improving settlement conditions for foreign exchange and establishing more direct payments relations. The latter will require new governance arrangements and symmetric network access.

The international monetary system today is fragmented. Networks are separated and while connections within countries are normally well developed through the national payment system, connections among countries through correspondent banks are relatively few (Figure 5). This complicates transfers and establishes undue frictions and dependencies on relatively few entities and currencies, Network integration irrespective national borders would naturally improve payment relations and enable a more symmetric system (figure 6).

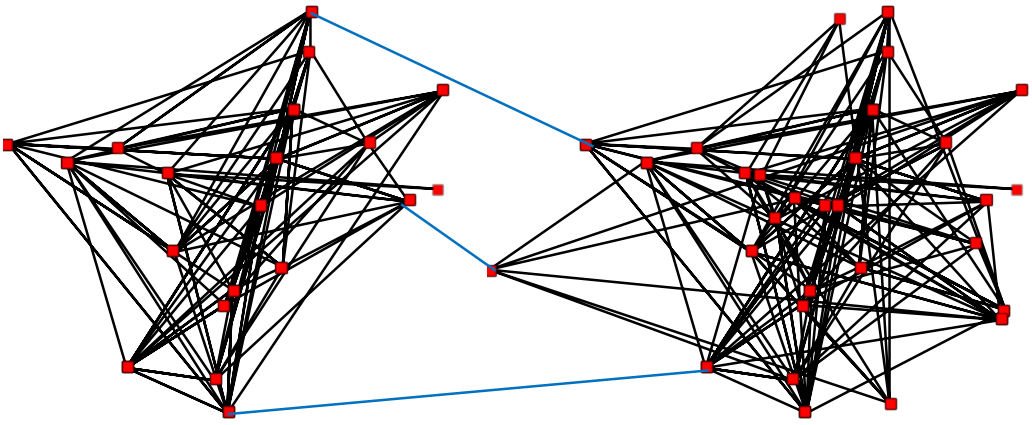
The integration of networks is of course not a technical problem. It is a governance problem. Payment system operators are reluctant or impeded to give access to foreign entities. Foreign entities may be reluctant to join a network whose rulebook they may find

contentious. Blockchain solves for governance by externalising governance for all participants.

The objective of blockchain is to produce "*an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party.*"[13] Blockchains are decentralised networks of independent computers. Digital monies can be issued on blockchain and transactions are validated on the basis of set rules, the consensus mechanism, and ensure that a digital money token cannot be spent twice (double spending problem). It implies that the blockchain operate without a central entity. Where different entities agree to follow the rules of the blockchain, a common platform can be established to exchange data and values.

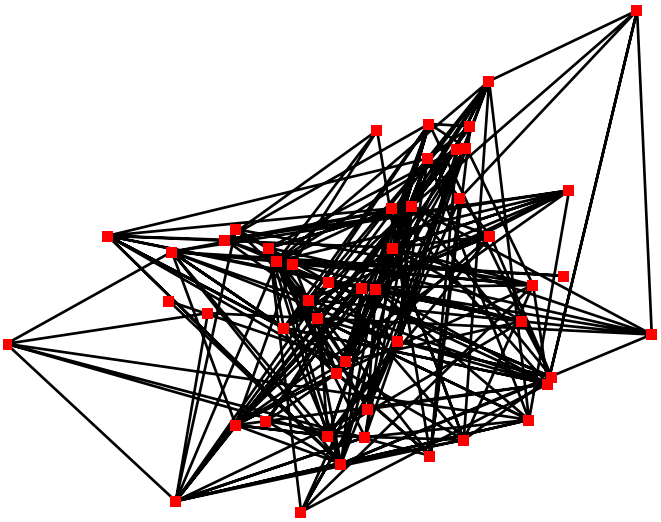
The consensus mechanism implies an externalisation of governance guiding transactions. Governance is delegated to the blockchain.[14] The rules are normally not guided by technical considerations and national preferences. The network governance is external to any given jurisdiction and offers symmetric treatment of all participants on the basis of set criteria. It makes blockchain a natural infrastructure for conducting cross-border payments.

Figure 5. Network separation



[13] Satoshi Nakamoto (2008), Bitcoin: A peer-to-peer electronic cash system.
[14] See also E.U. Enhancing financial services with permissionless blockchains, 2024

Figure 6. Network integration



Blockchains are accessible similar to the internet. To publish a website, no one normally builds his or her own internet. It is the same with blockchain. It is leveraging a payment system that is in the public domain.

There are many blockchains. It seems unlikely that market participants will all agree on a single chain. Different blockchains will therefore need to communicate with one another. Interoperability is a critical function that allows blockchains to be synchronised to exchange information cross-chain sufficient to allow cross-chain instant and atomic transactions. This is normally sufficient to ensure tokens can live on different blockchains and yet be transferred or exchanged.

Blockchains offer few rules but are no substitute for local regulations. Participants will be able to engage with one another using the same network but will have to observe local regulations. Blockchain is a transfer mechanism but not a rulebook.

Conclusion

To conclude, money has remained very territorial. Recent attempts by stablecoins to offer a universal payment instrument may be promising but seems to rely largely on regulatory avoidance. For money to play a universal role, it will need to be accepted locally. A new geography of money is therefore needed.

The national character of money is as is well known a policy decision. Nothing prevents a payment system operator to invite foreign institutions to open an account with it. It would allow foreign institutions to have access to and process payments in central bank money. But for some reason it remains very rare.

To solve cross-border problems, I believe at least the following conditions will have to be met: Payments need to be derisked; accessing and transacting in a broader range of currencies

has to become more attractive; neutral international payment systems need to emerge. I will not entertain the idea of a universal currency as while appealing in theory, I find it too difficult and improbable to be implemented in practice.

Payments can be derisked through a combination of high-grade mediums, shorter settlement cycles, atomic settlement and allowing foreign institutions to take outright delivery of domestic monies. Central banks may be reluctant but the approaches used in CBDC projects Jura and mBridge with the use of CBDC offer one of the most promising paths towards derisking cross-border payments. Alternative high-grade mediums exist like tokenised government debt money market fund shares.

The adoption of a broader range of currencies in cross-border payments will depend in large part how onerous it is to provide efficient settlement. This will depend on regulatory capital provisions and liquidity. Instant and atomic settlement in combination with a high-grade medium would offer riskless settlement and allow banks to reduce regulatory capital and liquidity buffers. This will reduce transaction costs, lower the barriers of entry and can make use of other currencies relatively more attractive.

The emergence of international payment systems will depend in large part on governance. Blockchain's peer-to-peer layout and typically denationalised infrastructure may be more acceptable to be used in a cross-border setting. Its programmable features will still allow to limit exchanges among select participants.

Rising mistrust, national preferences will make it more difficult to agree on common arrangement. Neutral platforms are required that offer functionalities that produce needed efficiency gains in payments. The externalisation of governance may make blockchains the preferred environment.

Blockchains do not solve for digital monies to become transferable cross-border. Regulation normally permits domestic banks to hold net foreign assets. But blockchain may offer the mechanics to ensure clearing of foreign claims is effective and trusted in a multilateral setting. Foreign banks will need to accept domestic payment instruments but will need a mechanism to assert the instrument is genuine.

In a future transaction, a domestic bank receives a foreign tokenised deposit from a foreign payer and instantly verifies that it is a genuine claim (similar to a cashier's cheque), holds on to it and uses it for future transactions. Alternatively, a domestic bank receives a foreign tokenised deposit from a foreign payer and immediately presents it to its central bank against reserves that immediately clears it with the payer bank's central bank against CBDC that immediately debits reserves from the payer bank (similar to the intermediation by national central banks within the Eurosystem). Blockchain can provide the trusted architecture to process these payments.

The notion of using a payment system that is not controlled and maintained by a single entity may sounds alien to many. Payment systems are typically maintained by either banks or for the large value payment system by the central bank. It is therefore possible that blockchain will not see universal acceptance in payments. But similar to banknotes it could.

Banknotes are issued by the central banks by handled by the general public. Payments are validated and settled upon inspection of the banknotes. The central bank only ensures the banknotes are difficult to counterfeit and durable. The general public at large as anyone can handle banknotes implying that the "payment system" of banknotes is not controlled or organised by any single entity. They can be used anywhere including in cross-border and offshore transactions. Most U.S. banknotes are estimated to circulate outside the U.S. Naturally, banknotes exhibit numerous limitations and require persons conducting payments to be in physical proximity to one another. They are also few if any controls regarding transactions made with banknotes.

Blockchain-enabled payments are a lot about bringing the features of banknotes to the digital space. Money issuers will need to make sure they can find a secure way of issuing their monies while forgoing any control of processing transactions. Most importantly and in contrast to banknotes, blockchain offers numerous controls to make payments very safe.

Digital monies may thus sound a bit like going forward to the past. But sometimes the past has some rather good ideas on offer.

Thank you very much for your attention.