Digital currencies and the soul of money

Speech by Agustín Carstens, General Manager of the BIS, Goethe University's Institute for Law and Finance (ILF) conference on "Data, Digitalization, the New Finance and Central Bank Digital Currencies: The Future of Banking and Money", 18 January 2022

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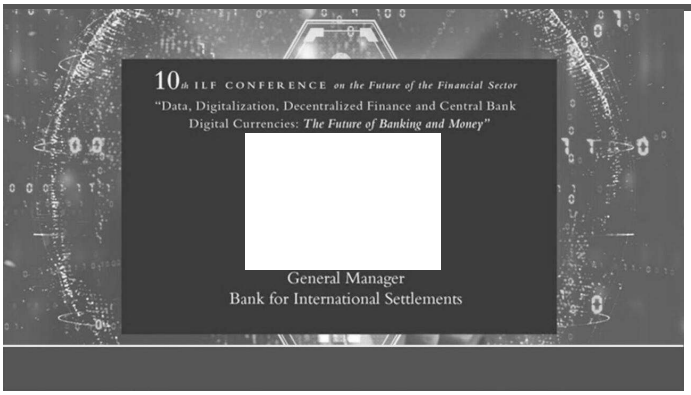

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What holds the monetary system together at its core? In a speech at @goetheuni, Agustín Carstens takes inspiration from Germany's literary giant Goethe to reflect on the soul of money in the digital era.

I'd like to express my gratitude to the organisers for inviting me here today. It's an honour to deliver this speech at Goethe University. Of course, I wish I could have been in Frankfurt in person.

In a speech at this university four years ago, I addressed the growth and pitfalls of cryptocurrencies such as Bitcoin.[1] Since then, the debate on the future of money has grown much broader, but it continues to touch on the very foundations of the monetary system.

Today I will take inspiration from your institution's namesake. The great Johann Wolfgang von Goethe was a well-travelled cosmopolitan and a true universalist. He was a poet and novelist, a playwright and theatre director, a scientist and statesman. Remarkably, his work anticipated some key economic issues of our time, including central bank independence.[2]

Goethe's work confronts fundamental questions. In his masterpiece, Faust, he addresses the "*Gretchenfrage*" – a term that has become synonymous with a fundamental question of life.

For central bankers, the Gretchenfrage has always been: what is the soul of money? Today, technologists, innovators and futurists are offering new answers to this question. Some say that in the future, money and finance will be provided by just a few big tech corporations. Others dream of a decentralised system in which blockchains and algorithms replace people and institutions. And maybe, all of this will take place in the Metaverse.[3]

My main message today is simple: the soul of money belongs neither to a big tech nor to an anonymous ledger. The soul of money is trust. So the question becomes: which institution is best placed to generate trust? I will argue that central banks have been and continue to be the institutions best placed to provide trust in the digital age. This is also the best way to ensure an efficient and inclusive financial system to the benefit of all.

Let me elaborate on this theme, starting with the institutional foundations of money.

The institutional foundations of money

Money is a societal convention. People accept money today with the expectation that everyone else will accept it tomorrow.

At its core, trust in the currency holds the monetary system together. Like the legal system, this trust is a public good.[4] Maintaining it is crucial for the effective functioning of societies.

Trust requires sound institutions that can stand the test of time. Institutions that ensure the stability of the currency as the economy's key unit of account, store of value and medium of exchange, and that guarantee the safety and integrity of payments.[5]

Throughout a history measured not in years but in centuries, independent central banks have emerged as the key institutions that underpins this trust in money. Alternatives have often ended badly.[6] It is for good reason that most countries have established central banks with a clear mandate to serve society. As public policy institutions, central banks have proven successful in upholding trust while adapting to societal and economic change.[7]

In pursuing these mandates, central banks have managed to constantly adapt to technological, economic and societal changes. This is why central banks are actively engaging with digital innovation. They are working on new central bank public goods such as wholesale financial market infrastructures, retail fast payment systems and central bank digital currencies.

Of course, in a market-based system, the private sector remains the main engine of the economy. In today's two-tier monetary system, deposits are by far the most prevalent form of money held by the public, since cash holdings are relatively small. Banks, in turn, place their own deposits with the central bank as "bank reserves".

In this case, central banks provide an open, neutral, trusted and stable platform. Private companies use their ingenuity and dynamism to develop new payment methods and financial products and services,. This combination has been a powerful driver of innovation and welfare.

But we cannot take this successful symbiosis for granted. Some recent developments may threaten money's essence as a public good, if taken too far.

To illustrate this, let me offer three plausible scenarios for the future of money.

- In the first, big tech stablecoins compete with national currencies and against each other too, fragmenting the monetary system.
- The second relates to the elusive promise of crypto and decentralised finance, or "DeFi", which claims to offer a financial system free from powerful intermediaries, but may actually deliver something very different.[8]
- The third realises the vision of an open and global monetary and financial system that harnesses technology for the benefit of all.

You can probably guess which vision I espouse. I will close by discussing what it will take to achieve it.

Big tech stablecoins

Let's start with stablecoins issued by big techs. Stablecoins are cryptocurrencies that base their value on collateral, often in the form of deposits with commercial banks or other regulated financial instruments. They thus piggyback on the credibility of sovereign currencies. Stablecoins are issued in this first scenario by big techs, or large companies whose primary activity is digital services.

Big techs have made important contributions to financial services. Their new and innovative products have allowed hundreds of millions of new users into the formal financial system.[9]

In the process, they have also achieved systemic relevance in several major economies. For example, big techs channel 94% of mobile payments in China.[10]

This trend could accelerate if one of these firms were to grow in an unfettered way and create a dominant, closed ecosystem around its own global stablecoin.[11]

Once established, a company is likely to erect barriers against new entrants, leading to market dominance, data concentration and reduced competition. In addition, its stablecoin could disintermediate incumbent banks, which could even pose a risk to financial stability.

Moreover, if one big tech stablecoin takes hold, others will seek to imitate it. We may end up with a few dominant walled gardens that compete both with each other and with national currencies, thus fragmenting the national and global monetary systems. As the initial benefits fade, the well-known problems of market concentration will quickly follow.

In addition, the same economic forces that foster inclusion can also cause discrimination, privacy violations and market concentration. One reason is that data are subject to large externalities. For example, one person's data can reveal information about others.[12] Moreover, it is possible that the data holder ends up knowing more about users' behaviour than users do themselves.[13]

Armed with exclusive access to data, big techs can quickly scale up and dominate markets.

Let me be clear: it is undesirable to rely solely on private money. Users may initially find great convenience in paying with a big tech global stablecoin. But in doing so they may be handing the keys to our monetary system over to private entities, driven by profits and accountable only to their shareholders and other insiders. Such an arrangement could erode trust. A public good like money needs oversight with the public interest in mind.

The elusive promise of decentralisation

A second plausible scenario for the future of money has attracted a growing number of enthusiasts. This vision replaces institutions with distributed ledger technology (DLT), in principle allowing anyone to be a validator in a shared network. It is embodied in the growth of cryptocurrencies and applications that build on them, such as so-called decentralised finance, or "DeFi".[14]

DeFi's enthusiasts hold out some very appealing promises: DLT will "democratise finance", cutting out middlemen such as big banks. More generally, new decentralised protocols will lay the groundwork for "Web 3.0", or simply "web3". In this world, data will be reclaimed from the big techs, and entrepreneurs and artists will keep a greater share of the value they create.[15]

Decentralisation can be a noble goal. In many applications, governance improves when power is genuinely dispersed, with appropriate checks and balances. This principle is embodied in free and competitive markets.

But this principle is not what DeFi applications are delivering. There is a large gulf between vision and reality.

To date, the DeFi space has been used primarily for speculative activities. Users invest, borrow and trade cryptoassets in a largely unregulated environment. The absence of controls such as know-your-customer (KYC) and anti-money laundering rules, might well be one important factor in DeFi's growth.

Indeed, a parallel financial system is emerging, revolving around two elements.

The first is automated, self-executing protocols, or "smart contracts". But these contracts will never be smart enough to cover every possible eventuality, and someone must therefore write and update the code, and run the platform. In practice, there is a lot of centralisation in DeFi. BIS economists have discussed this "decentralisation illusion" in recent research.[16]

The second element is, again, stablecoins. These grease the wheels of DeFi. As they aim to maintain a fixed value to fiat currencies, they allow transfers across platforms, and form a bridge to the traditional financial system. Stablecoins are the settlement instrument in DeFi, alongside governance tokens and other more volatile cryptoassets.[17]

But stablecoins may not be sound money. One drawback is the fact that they have to tie their value to regulated assets to borrow their credibility. Their issuers have an inherent incentive to invest reserve assets in a risky manner to earn a return. Without appropriate regulation, issuers can diverge from full backing, or test the margins of what counts as a safe asset – as experience has repeatedly shown.[18]

More fundamentally, decentralisation comes at a cost. Trust in an anonymous system is maintained by self-interested validators who ensure the integrity of the ledger in the absence of a central authority.[19] So the system must generate enough fees, or rents, to provide these validators with the right incentive.

These rents accumulate mostly to insiders, such as Bitcoin miners, or those who hold more governance tokens.[20] These rents are also a reason why DeFi platforms have been so attractive for venture capital investment.[21] Many protocols entrench insiders, as those with more coins have more power.

Ultimately, high rents for insiders mean high costs for users. So, while insiders who have sold coins to new users have made spectacular returns, efficiency gains for average users have so far failed to materialise. And in the absence of regulation, fraud, hacks and so-called rug pulls have become rampant.[22]

In addition, this structure makes it hard for fully decentralised systems to scale up. Achieving agreement in a large network takes time and effort, and consumes energy. The larger the ledger, the harder it becomes to update it quickly.

This is why many DLT systems can only handle a small volume of transactions to date, and often suffer from network congestion. This is also the reason why Bitcoin requires so much electricity. There are a variety of technical proposals to address this trade-off, but they all lead to greater complexity. Indeed, the need for rents to maintain incentives in a blockchain is a feature, not a bug; it is a case of "the more the sorrier" instead of "the more the merrier".

And the growing proliferation of different blockchains means that many competing candidates aim to be a single arbiter of truth.

Meanwhile, DeFi is subject to the same vulnerabilities as are present in traditional financial services. High leverage, liquidity mismatches and connections to the formal financial system mean vulnerabilities in DeFi could undermine the stability of the broader financial system.[23] As with money market mutual funds, there is a risk that, during a shock, stablecoins could face runs. With automated protocols, there may also be unpredictable interactions, as liquidity dries up and losses cascade through the system.

Thus, there is a risk that this "magic", once launched, may spin out of control. As in Goethe's *Zauberlehrling* ("The Sorcerer's Apprentice"), DeFi applications could take on a life of their own, interacting with one another in unpredictable ways. When a crash happens and money is lost, users will inevitably turn to a trusted and experienced party – the public authorities – to tame the unleashed spirits and restore order.

A better approach is possible. Building on sound money, new applications could stand on a stronger footing. They should not be based on anonymity but on identification and trust. And they should comply with financial regulation that is designed to keep the system safe. Wherever private stablecoins are issued, they need to be adequately regulated to address the risks that they pose, such as runs, payment system risk and concentration of economic power.[24] We also need effective and consistent international policy on stablecoin arrangements.[25]

Innovators should not fear regulators but work with them, to make their products more sound and more sustainable.

An open and global system as a public good

In a third scenario, incumbent financial institutions, big techs and new innovative entrants compete in an open marketplace that guarantees interoperability, building on central bank public goods. This means that end users can seamlessly interact across different providers – both domestically and across borders.[26]

This would bring about continued innovation, and ever better outcomes for the economy as a whole.[27] Trust in money remains the bedrock of stability. End users would see low costs and convenient services, with safety, privacy and a broad range of payment choices. This scenario harnesses the benefits of big data and DLT with market structures that foster competition and promote the public good nature of the monetary system.

In this vision, the monetary system is not fragmented into separate walled gardens, nor is it dominated by a few large corporations. There are also no high rents for insiders in anonymous networks.

At the core of this system are central banks. They do not aim for profits, but to serve society. They have no commercial interest in personal data. They act as operators, overseers and catalysts in payments markets, and regulate and supervise private providers in the public interest. Working together, they can provide central bank digital currencies (CBDCs). Unlike stablecoins, CBDCs do not need to borrow their credibility. As they are directly issued by the central bank, they inherit the trust that the public already places in their currency. They can thus serve as a sound foundation for future innovation.

Central banks can provide this foundation domestically, but also on a global scale.

Imagine a global network of CBDCs. Different central banks would design and issue a new form of public money, tailored to their economies and societies' preferences.

Importantly, central banks could work with one another, and with the private sector, to ensure that these domestic CBDCs are interoperable across borders. This would require technical compatibility, the ability for systems to "speak each other's language" and agreement on rights and obligations.[28] To obtain this, central banks could choose whether to build a network of bilateral links, or they could adopt a hub-and-spoke model or a single common

platform. DLT could be used to connect multiple CBDCs issued by different central banks. This would be useful as no single central bank could straddle all the different currencies in the system.

Such a network would be a global version of domestic monetary systems grounded in the trust placed in central banks. It could lower the cost of cross-border payments; increase their speed and transparency; and broaden access to users in different countries. Private providers could interact with clients, conducting know-your-customer and other compliance checks. The private sector could build a host of financial services on top of such a system, from innovative payments to lending, to insurance and investment services. But safeguards can give users control over personal data. This does not require the selling of speculative coins that serve only to enrich insiders.

The BIS Innovation Hub is working actively to make this vision a reality, with several experiments involving cooperation between central banks and the private sector. What is notable is that many of these projects are based on DLT, where the central banks play the key role. Based on trust instead of rents, these systems overcome the inherent issues with scaling up. They also offer greater safety and efficiency. Three important BIS Innovation Hub projects all make use of a DLT platform upon which multiple central banks issue their own wholesale CBDCs so that they can be traded between participants to enable faster, cheaper and safer cross-border settlements.

- In Project Jura, each central bank maintains individual control over its own CBDC on a single platform with separate subnetworks.[29]
- In project mBridge, each participating central bank issues its own CBDCs and operates a validating node in a shared system.[30]
- Project Dunbar explores the advantages and disadvantages of different DLT prototypes and validating mechanisms to support a common multi-CBDC platform.[31]

Overall, these projects show that there is significant potential in new technologies, including DLT, if they are applied in a way that builds on the monetary system's existing institutional framework. Central banks, as validating nodes, are not there to make money by mining coins. Instead, they perform this role as part of their public service mandate.

Working in a controlled environment and with industry partners, the BIS and host central banks are developing public goods that can be thoroughly tested and ready to be rolled out in the real world.

Conclusion

Let me conclude. The future of money is ours to shape. While central banks share the excitement around digital innovation, we are aware of the potential consequences of some of its incarnations.

The design of money has consequences that concern all of society: the integrity and stability of money and payments, market concentration, consumer rights and efficiency. Hence, central bankers must work with other public authorities and private stakeholders to make the vision I have described a reality.

Let's innovate in a sound, sustainable way, harnessing the benefits of digital technology in a way that is consistent with our shared values. In particular, let's ensure that our financial system builds on the existing governance of money, serves the public interest, and works cooperatively with the private sector.

So, let me go back to where I started, to Goethe. The answer to the Gretchenfrage has not changed: central banks and public authorities are still the glue that holds the monetary and financial system together. Private sector services and innovation are essential and should thrive on this foundation. But trust can never be outsourced nor automated.

Herzlichen Dank für Ihre Aufmerksamkeit!

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[1] See A Carstens, "Money in the digital age: what role for central banks?", speech, House of Finance, Goethe University, Frankfurt, 6 February 2018.

[2] See J Weidmann, "Money creation and responsibility", speech, 18 September 2012; H Binswanger, C Binswanger and J Harrison, *Money and Magic: a Critique of the Modern Economy in the Light of Goethe's Faust*, University Of Chicago Press, 1994.

[3] See P Clark, "The Metaverse Has Already Arrived. Here's What That Actually Means", *Time*, 15 November 2021. The concept of the metaverse is

often traced back to N Stephenson, *Snow Crash*, New York: Bantam Books, 1992. This fictional metaverse was conceived of as a 100-metre-wide street around a spherical planet that users could access with virtual reality goggles or from booths, and in which users would be represented as "avatars".

[4] A Carstens, "The future of money and the payment system: what role for central banks?", lecture at Princeton University, 5 December 2019.

[5] BIS, "Central banks and payments in the digital era", *Annual Economic Report*, Chapter III, June 2020; C Borio, "On money, debt, trust and central banking", *BIS Working Papers*, no 763, January 2019.

[6] See J Frost, H S Shin and P Wierts, "An early stablecoin? The Bank of Amsterdam and the governance of money", *BIS Working Papers*, no 902, November 2020.

[7] C Giannini, *The age of central banks*, Edward Elgar Publishing, 2011.

[8] DeFi refers to financial applications built on permissionless distributed ledger technology (DLT). See below.

[9] See K Croxson, J Frost, L Gambacorta and T Valletti, "Platform-based business models and financial inclusion", *BIS Working Papers*, 10 January 2022.

[10] In India, big techs provide third-party services in the Unified Payment Interface (UPI), accounting for 90% of transactions on UPI, but the funds remain with banks. See D D'Silva, Z Filkova, F Packer and S Tiwari, "The design of digital financial infrastructure: lessons from India", *BIS Papers*, no 106, 15 December 2019.

[11] There is an important distinction between big techs offering payment services with other firms' stablecoins, and issuing their own stablecoins. In the United States and Guatemala, Meta's subsidiary Novi is currently piloting a wallet product using the Paxos stablecoin. The issuance of the Diem stablecoin is on hold. See Novi, "Pilot Version of Novi Now Available", press release, 19 October 2021.

[12] See D Bergemann, A Bonatti and T Gan, "The Economics of Social Data", *Cowles Foundation Discussion Papers*, no 2203R, September 2019.

[13] M Brunnermeier, R Lamba and C Segura-Rodriguez, "Inverse Selection", working paper, 2020.

[14] See S Aramonte, W Huang and A Schrimpf, "DeFi risks and the decentralisation illusion", *BIS Quarterly Review*, December 2021; F Schär, "Decentralized Finance: On Blockchain- and Smart Contract-Based Financial Markets", *Federal Reserve Bank of St Louis Review*, vol 103, no 2, 2021; N Carter and L Jeng, "DeFi Protocol Risks: The Paradox of DeFi" in B Coen and D Maurice (eds), *Regtech, Suptech and Beyond: Innovation and Technology in Financial Services*, Risk Books, 2021.

[15] See B Allen, "People are talking about Web3. Is it the Internet of the future or just a buzzword?", NPR, 21 November 2021. For critical takes, see J Geuter, "The Third Web", 17 December 2021; M Elgan, "You can safely ignore Web3", *Computer World*, 28 December 2021.

[16] Aramonte et al (2021).

[17] Governance tokens are a cryptoasset that grants voting power to its holder for decisions in the shared system

[18] D Arner, R Auer and J Frost, "Stablecoins: risks, potential and regulation", Bank of Spain, *Financial Stability Review*, no 39, Autumn. There are also decentralised stablecoin designs that eliminate the need to trust an intermediary, but these generally must be highly overcollateralised, limiting their usefulness for mainstream applications. See C Catalini and A de Gortari, "On the Economic Design of Stablecoins", mimeo, 5 August 2021.

[19] R Auer, C Monnet and H S Shin, "Distributed ledgers and the governance of money", *BIS Working Papers*, no 924, November 2021.

[20] In some automated trading platforms, there is the potential for large validators to front-run other users and "win" the next block in the ledger. This is sometimes referred to as "miner extractable value".

[21] See G Cornelli, S Doerr, L Franco and J Frost, "Funding for fintechs", *BIS Quarterly Review*, September 2021. Investment in crypto and DLT firms has boomed in 2021, in line with strong interest in DeFi applications.

[22] A rug pull refers to the development team of a cryptocurrency or Defi project abandoning their project and absconding with the investors' funds.

According to Chainanalysis, investors around the globe were defrauded by over USD 2.8 billion in 2021 alone. See www.afr.com/companies/financial-services/the-rug-pull-crypto-investors-lose-4b-in-a-new-scam-20220111-p59nan.

[23] Aramonte et al (2021).

[24] See US President's Working Group on Financial Markets, Federal Deposit Insurance Corporation (FDIC) and Office of the Comptroller of the Currency (OCC), *Report on stablecoins*, November 2021.

[25] In this light, the BIS Committee on Payments and Market Infrastructures (CPMI) and the International Organization of Securities Commissions (IOSCO) have proposed guidance on the application of their standards, the *Principles for Financial Market Infrastructures*, to stablecoin arrangements. See CPMI and IOSCO, "Application of the Principles for Financial Market Infrastructures to stablecoin arrangements", 6 October 2021.

[26] See C Boar, S Claessens, A Kosse, R Leckow and T Rice, "Interoperability between payment systems across borders", *BIS Bulletin*, no 49, 10 December 2021.

[27] On the ability of ("neck-and-neck") competition between firms to drive innovation, see P Aghion, N Bloom, R Blundell, R Griffith and P Howitt, "Competition and innovation: An inverted-U relationship", *Quarterly Journal of Economics*, vol 120, no 2, 2005, pp 701–28.

[28] Boar et al (2021).

[29] Banque de France, BIS and Swiss National Bank, "Project Jura: Cross-border settlement using wholesale CBDC", 8 December 2021.

[30] BIS Innovation Hub Hong Kong Centre, Hong Kong Monetary Authority, Bank of Thailand, Digital Currency Institute of the People's Bank of China and Central Bank of the United Arab Emirates, "Inthanon-LionRock to mBridge: Building a multi CBDC platform for international payments", 28 September 2021.

[31] BIS, "BIS Innovation Hub and central banks of Australia, Malaysia, Singapore and South Africa will test CBDCs for international settlements", press release, 2 September 2021. The project involves the Reserve Bank of

Australia, Central Bank of Malaysia, Monetary Authority of Singapore and South African Reserve Bank.

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