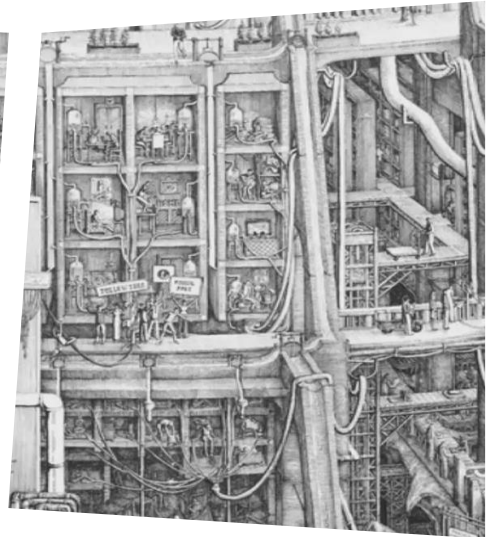
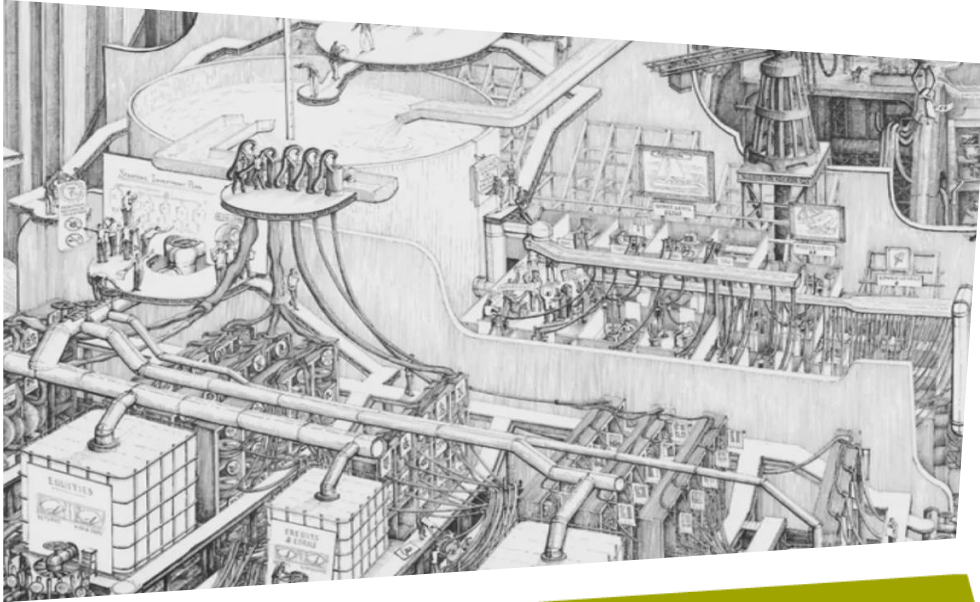


The digitalization of money

Public lecture



let's change
YOU. US. THE WORLD.

Martijn van der Linden
Professor of practice in New Finance
2023

THE HAGUE
UNIVERSITY OF
APPLIED SCIENCES

The digitalization of money

Martijn van der Linden

Public lecture at the event 'Towards a just monetary and financial system in the digital age'

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New Finance research group - Centre of expertise Digital Operations & Finance

The Hague University of Applied Science

1. Welcome

Thank you all for attending today's event. It is a pleasure to see so many friends, family members, colleagues and students.

Nearly five years ago, I started working at this university as a professor of practice in New Finance. Over the past years, researchers in my group have explored numerous topics, such as integrated reporting, blockchain, barriers for fintechs and local savings groups.

We also developed several courses, created an online learning platform¹, established a student investment fund² and advocated for the transformation of business education in various ways.

Over thirty lecturers and researchers have been part of the New Finance research group. Several of them have found their fascination and used research to find the next step in their careers. One of the best parts of being a professor is supporting others in their development.

2. Introduction: why are we now at an important moment?

For almost a decade, my main research interest has been the digitalization of money. I am particularly interested in how digital technologies can be used to improve the functioning of the monetary and financial system. This is also the topic of today's lecture.

We are at an important moment. Money evolves with technology, and digitalization is likely to lead to a new architecture of the monetary and financial system (Bordo 2022, van der Linden 2022; Carstens 2023).

In the digitalization of money, we can identify three phases. In the first phase, banks digitalized their existing forms of bank money (deposits and money market instruments) and payment infrastructures. In essence, existing banking processes were updated to the digital age.

After the systemic financial crisis of 2008, a second phase began. Thousands of new forms of private digital money, known as cryptocurrencies, were introduced as alternatives to bank money, with bitcoin being the most famous among them.

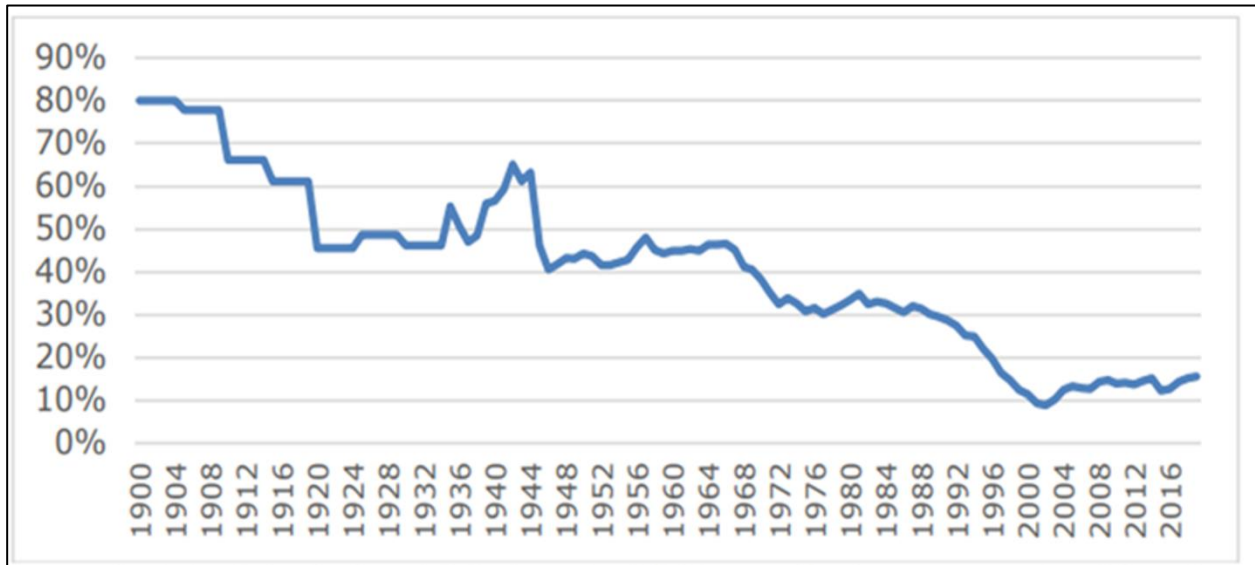
Today, all forms of private money are digital. Public money, on the other hand, is only available in physical form and can sometimes feel like a relic of the industrial age. You can no longer pay with public money at this university, on public transport or in many restaurants and bars. Furthermore, online shops obviously do not accept physical cash as a means of payment.

Before the digital age, bank money was already more practical for making payments over distance. The digitalization of banking has made bank money even more useful, reducing the role of physical cash even further.

¹ KOIOS, for more information: <https://koios.world/>.

² The Hague Student Investment Fund, for more information: <https://hsif.nl/>.

Figure 1: Cash in the Netherlands, 1900-2019 as a percentage of non-cash and cash money.

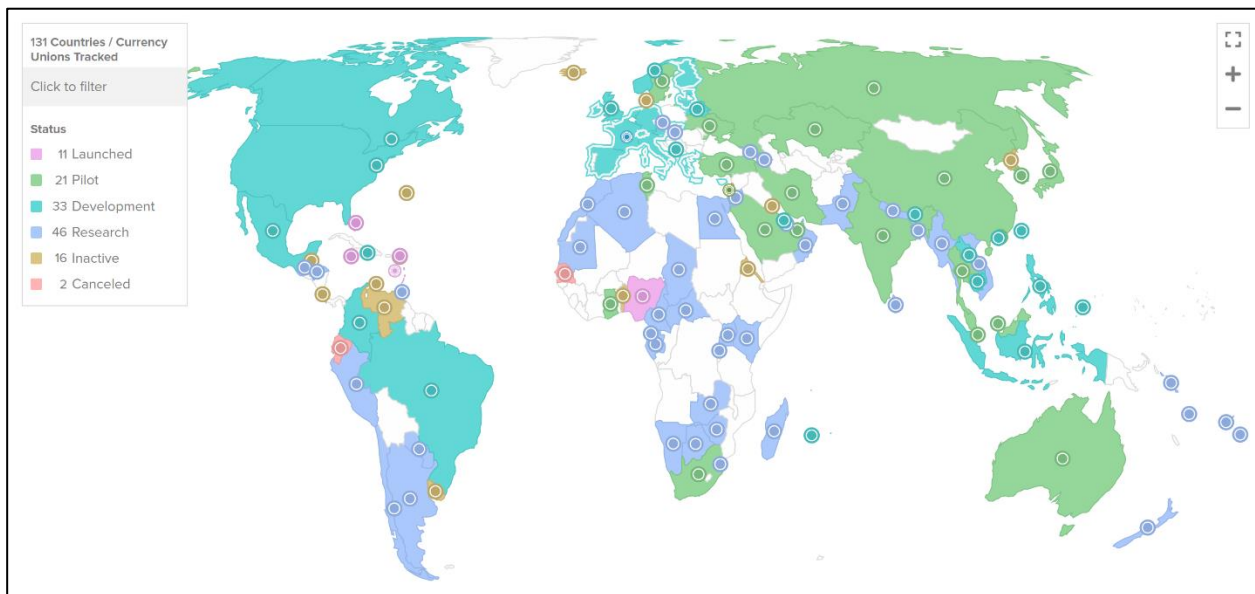


Source: Statistics Netherlands and DNB.³

In 1900, 80 per cent of the money supply in the Netherlands consisted of cash. At the beginning of the digital age, this figure was reduced to 30 per cent, and today it is just over 10 per cent.

In recent years, we have gradually entered the third phase of the digitization of money.

Figure 2: CBDC's around the world



Source: CBDC tracker of Atlantic Council

³ Note: the definition used for the money supply is M1, or the sum of cash and non-cash money. The erratic pattern shown before 1936 is explained by the data being available only once every five years from 1900.

Today, according to the Atlantic Council, 130 countries representing 98 per cent of global GDP are exploring a so-called central bank digital currency (CBDC). In non-central bank terminology, this is public digital money or digital cash. In addition, 19 of the G20 countries are now at an advanced stage of CBDC development and 11 countries have launched a CBDC.⁴

Several government officials recognize the importance of this moment and ascribe great potential to this new form of digital money. For example, European Commissioner Dombrovskis (2022) called the digital euro "a potentially revolutionary project", and the President of the European Central Bank, Lagarde (2022), argued that the digital euro has "the potential to affect society as a whole."

All new forms of money offer new opportunities and pose new risks. If we make the right choices, we can improve the efficiency and stability of the monetary and financial system, contribute to the well-being of citizens and uphold democratic values and principles (OECD 2023). But we can also make the wrong choices.

3. Changes in economic science

I will discuss the development of CBDCs in more detail later in this lecture, but first I would like to make a few comments about the changing nature of economic science. I am employed at a university of applied sciences and the motto of this university is "Let's change. You. Us. The world". Both our practical orientation and our motto align with the problem-solving nature of economics. There is a long list of economists who have emphasized that the primary objective of economics is to improve the world (Pigou 1932; Marx 1932; Hayek 1933; Agner 2023).

The Waterworks of Money⁵ visualizes the economy as a complex system. All its parts interconnected in various ways. This visualization aligns with the current understanding of economies. Before the 2008 crisis, most economic models viewed economies as simple, deterministic systems. This view is central to neoclassical economic theory, which dominated economics for decades.

After the crisis, the understanding of economies has gradually changed. There is a growing recognition that economies are complex, adaptive systems.

Complexity science teaches us two important lessons for the monetary and financial system. First, structures matter, and second, structures can be changed by policy.

4. Weaknesses of the current monetary and financial system

But to make wise policy choices in the digital age, we first need to understand the main weaknesses of the current system. What do we aim to improve? What systemic problems do we want to address?

From a societal perspective, I would argue that the current system has at least three systemic weaknesses.

⁴ See CBDC tracker of Atlantic Council (accessed September 5, 2023):

<https://www.atlanticcouncil.org/cbdctracker/>.

⁵ For more information: <https://www.waterworksofmoney.com/> (in English) and

<https://www.ftm.nl/waterwerk> (in Dutch).

First, there are several mechanisms in the design of the current system that perpetuate and increase inequality and make it difficult to achieve sustainable development. In the Waterworks project, we focused on the connection between the money system and inequality and found six mechanisms that exacerbate inequality. One is current monetary policy tools. All current monetary policy instruments are indirect. In the water metaphor, all functioning channels go through banks and financial markets to society. There is no direct channel between the central bank and its citizens, us. As a result, the main beneficiaries of monetary policy are banks and large financial market participants.

Let me give you two examples. In the aftermath of the crisis of 2008, central banks started with the policy of quantitative easing. They bought existing financial assets on the financial markets to achieve price stability. The sellers of these assets were mainly large financial institutions and already wealthy individuals. They used the money not for consumption but to buy other financial assets, which is why prices in these markets soared for a decade. Wealth inequality increased as citizens without financial assets did not benefit. And today, the main beneficiaries of interest rate rises are private banks. Banks pass on higher interest rates to account holders only to a limited extent (Bollen, Dommerholt & van der Linden 2022; De Grauwe & Ji 2023).

A second weakness is the recurrence of systemic financial crises and the persistent risk of a systemic financial crisis. The recent collapse of several banks in the U.S. and of Credit Suisse has shown once again how fragile the current system is. The risk of a bank run and contagion is always present.⁶

The current monetary system is unstable because bank money and banks are inherently fragile. Or as Martin Wolf (2023), chief economic commentator at the Financial Times, recently put it: “Banks are designed to fail - and they do.”

In the aftermath of 2008, dozens of economists and several, mostly former, central bank governors (e.g., King 2016; Ordóñez 2018a, 2018b) have pointed to the fragility of private money creation and fractional reserve banking. Thus, the problem of fragility is well-known but remains unresolved.

A third major weakness is that the current system does not operate according to the principles of market economies. In my dissertation, I explain how a dynamic of protecting and constraining private banks by governments has emerged over the last century (van der Linden 2022: 162-169). This dynamic takes the form of privileges and public protections on the one hand, and a growing number of increasingly complex regulations on the other hand.

Regulations include, among others, capital reserves, liquidity reserves, leverage, counter-cyclical buffers, remuneration, governance and exposure, and there are at least fifteen bank privileges and protections for banks⁷.

I don't have time to explain those protection mechanisms in this lecture, but it's interesting to share how I started researching them. At a conference in Stockholm in 2019, I met Miguel Fernández Ordóñez, the former governor of the Banco de España. He was giving a presentation on banking reform, and he mentioned some protections and privileges. Since then, we have been researching this imperfect market together. We collect articles on banking protections and privileges, have regular online discussions and expand the list. Over the last decade, I have gradually come to the conclusion that banking is the most protected and intervened of all economic sectors.

The underlying driver of the ever-increasing volume and complexity of regulation is that each regulation tends to create new (moral) hazards and thus, indirectly and usually with a time lag, the need for more regulation. As a result, banking regulation is now literally thousands of pages long and almost three times the size of the Bible.

⁶ Many scholars show that the growth of banking and the frequency of systemic financial crises have gone hand in hand since the 17th century (Kindleberger 1984; Kindleberger & Aliber 2005; Reinhart & Rogoff 2009, 2013; Cencini & Rossi 2015). For example, Kindleberger (1984: 283) emphasizes that “it is virtually impossible . . . to compare financial crises before and after about 1700”.

⁷ Appendix A summarizes the protections and privileges.

The results of the protective and restrictive dynamic are manifold: high barriers to entry, a concentrated – oligopolistic –market structure in many countries, rising regulatory costs for both banks and regulators, an expanding role for central banks in financial risk management, and a lack of competition and innovation.

Despite all the protective measures and regulations, it is noteworthy that, according to several studies, trust in private banks remains largely negative in most developed countries (OMFIF 2020; Radar 2019; WRR 2019: 28-29).

5. Future directions

Now that we have a better understanding of the vulnerabilities of the current system, we can try to address them, at least to some extent and gradually, using digital technologies and new policies.

First, to increase stability and reduce reliance on fragile bank money and fragile banks, we should introduce public digital money. A key feature of public money is that it is an inherently stable form of money. Like physical cash, public digital money can function without public protections and privileges. A bank run on public money is simply impossible.

This new form of money should combine the positive features of public cash and private bank money. This idea is not new. In 1985, Tobin was one of the first economists to propose providing the public with a medium that offers the convenience of bank deposits and the security of cash (Tobin 1985, 1987). We need to bear in mind that this new form of public money can, in the long run, become the stable backbone of the monetary and financial system.

Second, we can create new channels to circulate money more directly and more evenly. The two most promising options are: opening the channel between the central bank and the government and/ or opening the channel between the central bank and its citizens. The first channel is currently blocked due to fear that politicians will tap the central bank's money source for their own benefit. Of course, it's important that no one can print money just to win souls for the next election. But we can implement mechanisms to prevent abuse.

A second channel that could be opened to manage the quantity of money is the channel between the central bank and the people. In the economic literature, this is known as helicopter money. When Friedman coined the term in 1969, it was very difficult to implement. But today, with digital technologies and if we have public digital money, it is much easier. Our central bank could provide equal, individual grants to all of us, essentially letting money rain down on society. It is probably more effective to put money directly into people's hands than to hope that it will trickle down through banks and financial markets.

Third, with a stable backbone, public protection and privileges for banks can be gradually removed and regulatory complexity can be reduced. In other words, banks can be liberalized and we can develop better functioning markets for payments and finance. However, pleas for "more markets" or, more precisely, "better functioning markets" are not very popular today, especially among progressives (Dur 2023). But it is important to remember that better functioning markets are not only an important tool for getting better services and prices, but also an important tool for tackling inequality. In well-functioning markets, oligopolists and mediocre firms tend to lose, while consumers and workers tend to gain.

A key consequence of removing safety nets is that markets will force banks to fund themselves much less with fragile forms of money. In recent decades, equity markets have become fully digital, and bonds are following suit (van der Linden 2022: 198-201). Market liquidity has increased significantly and is accessible to many more people than a few decades ago. As a result, financing with tradable securities has become much easier.

As with other liberalization proposals, it is not easy to show that markets perform better in the long run than continuous public protections and state interventions. Moreover, it is hard to imagine a future that does not yet exist when our present reality is so different. For most of us, it is difficult to imagine money, payments and financing without large private banks. Or to imagine a monetary policy that does not focus on interest rates. But imagine trying to explain how our current monetary system works to market economists of the past, such as David Ricardo or Adam Smith.

In my view, we should strive for a monetary and financial system with low barriers to entry, a wide variety of payment service providers and a diverse financial landscape consisting of investment funds, credit unions, mutual funds, stock exchanges (including for SMEs), platforms for direct lending and crowdfunding, and banks that can operate without public protections and privileges.

6. The Dutch debate on the future of money

For some, these directions may sound unrealistic. But it is important to realize that things are moving faster and faster. Just before the summer, the European Commission presented a legislative proposal for a European CBDC, the digital euro. This would have been unthinkable for most of us a few years ago.

After the financial crisis of 2008, economists developed several proposals for structural monetary reform (e.g. Kotlikoff 2010; Chamley, Kotlikoff & Polemarchakis 2012; Benes & Kumhof 2012; McMillan 2014; Ricks 2016). However, the consensus among most policymakers, influenced by the arguments of the banking lobby, was that we should make the banking system safer by expanding public safety nets (e.g., deposit insurance was increased to €100,000 in the euro area) and by implementing more and 'better' regulation.

Dissatisfied with the narrow scope of the political debate, citizens in several countries subsequently launched initiatives to put fundamental reform of the system's architecture on the political agenda. Examples include Positive Money⁸ in the UK, Vollgeld⁹ in Switzerland, and Ons Geld¹⁰ in the Netherlands.

In 2015, one of the proposals of the citizens' initiative Ons Geld (2015) was the introduction of '*digitaal contant geld*'. In March 2016, the Dutch parliament debated the citizens' initiative and an initiative to establish a private deposit bank¹¹. A deposit bank is a bank that solely stores money and does not invest it. The House of Representatives was unanimously in favor. All members wanted to "give the Dutch people the choice (...) to also save with an institution that stores the money for them purely in digital form"¹².

Freedom of choice and the ability to exit are key elements of market economies, as described by many economists and political scientists, such as Hirschman (1970) in his treatise *Exit, Voice and Loyalty*, and Adam Smith (1776) in *The Wealth of Nations*. Of course, you can only exit if alternatives are available. You can quit car driving because alternatives such as trains, airplanes and bikes are available.

In 2016, the House of Representatives not only supported the initiative for a deposit bank but also asked the Netherlands Scientific Council for Government Policy to research the advantages and disadvantages of the current money system, as well as alternative designs.

⁸ See: <https://positivemoney.org/2013/04/the-positive-money-proposal-plan-for-monetary-reform/>.

⁹ See: <https://vollgeld-initiative.com/>.

¹⁰ I co-initiated this initiative: <http://www.burgerinitiatiefonsgeld.nu/>.

¹¹ See: <http://www.fullreserve.nl/>.

¹² TK 34346-13, available at :

<https://www.tweedekamer.nl/kamerstukken/moties/detail?id=2016Z05514&did=2016D11294>.

In July of that year, two Bank of England economists, Barrdear and Kumhof (2016), published a working paper entitled 'The macroeconomics of central bank issued digital currencies' and coined the term CBDC. For the next three years, CBDC remained a topic for monetary geeks in central bank research departments and universities.

In October 2017, Ons Geld (2017) recommended to the European Commission the introduction of 'a virtual euro'. The European Commission (2017) responded: "While your idea of creating a public digital currency is noted, the Commission is currently neither considering the creation of a digital currency in general as means of payment next to euro cash nor as a measure to enhance the stability of the financial and monetary system in particular."

In January 2019, after three years of research, the Dutch Scientific Research Council published its report titled Money and Debt (*Geld en Schuld*, WRR 2019). The Council identified two problems: the uncontrolled growth of debt and money and a public-private unbalance in the current system. Although these problems are significant, the Council did not recommend any structural changes to the system, stating "no experiments with the monetary and financial system, the backbone of the economy." However, the Council did recommend what they referred to as "a safe haven." They argued that a safe haven would have a disciplinary effect on private banks. The exit option would force banks to finance themselves more responsibly, with more long-term debt and equity, and would also limit the creation of money and debt by private banks.¹³

My criticism of the report remains that the Council has done very little research into the threats and opportunities of digital technologies to the system. My own research indicates that digital technologies are general purpose technologies (GPTs). GPTs drive technological progress and affect the development of the entire economic system (Bresnahan and Trajtenberg 1992; Helpman 1998), i.e. they lead to structural changes in systems.

Some, mostly bankers, questioned the idea of a safe alternative (e.g. Boonstra 2019; Houben and Reijnders 2019). However, I think it is fair to say that more than a decade after 2008, the consensus in the Netherlands was that a 'safe alternative' outside the private banking system was a good idea.¹⁴

But even though citizens, the House of Representatives, the Research Council and think tanks such as the Sustainable Finance Lab all agreed, it never happened. The Dutch government put the report of its own research council in a drawer, and Hoekstra, then finance minister, said in June 2019 that the government had high expectations for the CBDCs and would wait for a report from De Nederlandsche Bank on the subject. In other words, the Dutch government would not act proactively to implement a safe alternative. Instead, it would wait for the central bankers.¹⁵

In the weeks that followed, CBDC went mainstream. The reason? Not concerned citizens or proposals from academics, but an American big tech company that understood the potential of digital technologies. In that same month, June 2019, a consortium led by Facebook announced plans for its own digital currency, named Libra. The consortium had the network and digital skills to create a global payment system outside the banks. This was a wake-up call for central bankers. Suddenly, public digital money became a hot topic and central banks stepped up their work on CBDCs.

¹³ In Dutch: "Het feit dat men een daadwerkelijk alternatief heeft, zal een disciplinerend effect hebben op de bestaande banken. Het zal banken dwingen zich verantwoord te financieren, met meer eigen vermogen (kapitaal) en vreemd vermogen met een lange looptijd. De creatie van geld en schuld door commerciële banken wordt op die manier ook beter begrensd" (WRR 2019: 237).

¹⁴ For example, in June 2019 almost all experts participating in a round table discussion in the House of Representatives supported the idea of 'a safe alternative'. Here a summary in Dutch:

<https://www.youtube.com/watch?v=oP3AbTEh51Y&t=39s>.

¹⁵ See her the reaction of the government:

<https://www.rijksoverheid.nl/documenten/kamerstukken/2019/06/11/aanbiedingsbrief-kabinetsreactie-wrr-rapport-geld-en-schuld-en-initiatiefnota-sp>.

7. The digital euro project

In Europe, too, it was not elected politicians but central bankers who took the initiative. The ECB (2022a, 2022b, 2023) has published three reports which emphasize three main objectives:

1. preserving European strategic autonomy in payments;
2. reduce rent extraction by domestic and foreign payment service providers; and
3. serve as a robust monetary anchor when cash transactions decline.

However, as several independent economists, including myself, have pointed out, there is another very important but implicit objective: do not harm the banks and protect their business model (e.g. Monnet and Niepelt 2023; van der Linden *et al.* 2023). This implicit objective currently dominates the entire digital euro project of the ECB and contradicts the consensus of the Dutch debate.

Panetta (2022), the ECB board member responsible for the digital euro, has stated several times that the digital euro should be attractive but not too successful. To limit its attractiveness, the ECB proposes holding limits for consumers (three or four thousand euros), zero holding limits for merchants, and negative interest premiums in times of financial turmoil. These unattractive features are not only suggested for a transitional period, but permanently. For me, the limits are just another form of public protection for the banks: number 15.

Today, the ECB and the European Commission are thus not really trying to develop an attractive alternative to private bank deposits. Consequently, the narrative has become so modest that some argue that the digital euro is 'a solution looking for a problem' (e.g., Financial Times 2023 and Financieel Dagblad 2023). Several of them are bankers, and they certainly have a valid point here. The objectives of the digital euro project have become so narrow that it is hard to see which systemic problem or problems are being addressed.

The challenge lies in the fact that the case for the digital euro and other CBDCs is weak from an individual user's perspective (Giordano 2023, Monnet & Niepelt 2023, Haans *et al.* 2023). However, from a systemic and societal perspective, the digital euro could improve stability, reduce dependence on fragile too-big-to-fail banks, open a new pipeline for monetary policy, and pave the way for banking liberalization, that is, more competition and innovation. As we move in this direction, businesses and citizens are likely to benefit from better quality, lower prices and greater stability in the long run. These potential benefits are significant and should therefore be carefully considered. Unfortunately, these potential benefits are not discussed in the ECB reports and in the EC proposal.

8. Conclusions & recommendations

In summary, digital technologies provide a unique opportunity to rethink the design of the current monetary and financial system and to re-evaluate some of its core features. As explained, from a systemic perspective, the current system has at least three persistent weaknesses: 1) there are several mechanisms in its design that perpetuate and increase inequality, making it difficult to achieve sustainable development; 2) the system is inherently fragile, with systemic financial crises recurring and a persistent risk of such crises; and 3) the functioning of the system does not align with the principles of market economies. Today, the banking sector is the most heavily protected and constrained of all sectors.

Unfortunately, the ECB and the European Commission are not in the process of re-evaluating. Instead, they have chosen to protect the status quo of conventional banking, making it increasingly likely that the digital euro project will be a missed opportunity. Or, in the words of Monnet and Niepelt (2023), the digital euro will be sacrificed "on the altar of banking as we know it."

But there is still a big and attractive story for our elected leaders to tell: We can introduce public digital money (liquidity) and gradually make this form of money widely available. We can then create new channels for monetary policy and gradually align the banking system with market principles. In the long run, this could significantly improve stability and lead to better financial services at lower cost.

Finally, three recommendations. First, what is needed above all is not just vision, but leadership. Finance ministers and central bank governors play a pivotal role in changing the system's architecture. They can mobilize their institutions. Today, discussions are taking place within these institutions, but their scope is often limited. This is why Carstens (2023), the head of the Bank for International Settlements, recently urged central bankers to "think big." However, the ECB's reports show how difficult this is for central bankers.

Finance ministers also find it difficult to think big. In the Netherlands, finance ministers Dijsselbloem and Hoekstra never presented a vision for the monetary and financial system in the digital age. There is some improvement under Kaag. In her letters on the digital euro, she occasionally presents a kind of vision, albeit a cautious one.

It is very clear to me that digital innovation and change cannot occur without disrupting the status quo, or at least some elements of it. I am also convinced that innovative banks with deep roots in society can adapt and that productive investments will survive.

Second, we need a gradual and practical transition proposal for the full implementation of the digital euro, the introduction of new monetary policy instruments and the gradual liberalization of banking. I am working on this, so if you are interested in collaborating, let me know. Banking liberalization is a fascinating area of research and policy.

Third, we need to improve financial literacy, and in particular systemic financial literacy, which is crucial (van der Linden, Bollen & Kingma 2023). As the American economist Cochrane wrote: "We voters need to tell politicians what kind of central bank we want." This is indeed true, but only if we, the voters, understand the current role of the central bank and alternative roles.

What I have proposed in this lecture is to gradually transform the central bank in the digital age, shifting its role from being the bank for private banks to becoming the monetary authority of the citizens, of us. Wouldn't that be great?

Thank you for your attention.

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Appendix A

Today, there are at least 15 protections and privileges for banks¹⁶:

1. Access to safe money: only banks can hold current accounts at central banks.
2. Renumeration on central bank reserves; only banks receive interest on the safest form of liquidity available.
3. Liquidity support: only banks have access to lender-of-last-resort facilities.
4. Deposits insurance: only bank can participate in these legally-required schemes.
5. Bail outs; in the case of a systemic financial crisis, politicians are forced to use tax-payers money to rescue the savings of ordinary people and the payment system.
6. Bankruptcy laws are not enforced: banks have special resolutions and exceptions are made (e.g. Credit Suisse).
7. Competition and antitrust laws are often not enforced: bank oligopolies exist in several countries.
8. Money creation: only banks can create money denominated in the public unit of account.
9. Seniorage; although the exact amount is hard to calculate, only banks benefit from the privilege of money creation.
10. Consumer protection waivers: banks are for example allowed to continuously use the word bank deposit and rarely mention their pivotal role in money creation. Moreover, banks do not use risks alerts in the case of bank money (which is an investment in a bank).
11. Entry license: a license is required to enter the market and this protects existing players. After 2008, several applications for new banks failed, including those for full reserve / narrow banks in several countries.
12. Prospectus exemption: only banks do not have to publish a prospectus if they attract other's people's money.
13. Public guardians: only banks have public institutions as back-stop. Last decades, supervisors and central banks have increasingly become "de facto" guardians of the profitability of banks, i.e., banks know that these public institutions will intervene in the case they expect large losses and there is a threat of a systemic financial crisis. This includes stress tests which led to the idea that banks passing the stress test are safe. In the case of troubles, banks that passed the stress test are expected to get assistance from supervisors. Supervisors cannot allow bankruptcy because this will negatively influence their credibility. The expectation of assistance leads subsequently to lower funding costs.
14. Other protections as QE, TLTRO injections, credit guarantees, and lenient supervision (for example in the case of share buybacks and anticyclical buffers).
15. Implemented and proposed limitations on the use of public digital money (CBDCs). For example, the ECB is proposing a limit of €3,000-4,000.

¹⁶ Identified together with Miguel Fernández Ordóñez (former governor of Banco de España).