

Fintech and Central Banks

Fintech and the Future of Retail Banking, Brussels, December 9, 2016
Colloquium of the Belgian Financial Forum in cooperation with SUERF,
The European Money and Finance Forum and Eggsplode

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Introduction

Ladies and gentlemen

It is my great pleasure to be here today and to have the opportunity to address this interesting conference on FinTech and the Future of Retail Banking. Although, – as indicated by the conference title and when scanning the conference programme – I suspect that most of you are interested in the FinTech topic from a business perspective, I would like to seize the opportunity to take a slightly different approach and instead present you the topic through the lens of a central banker.

Not that we are indifferent to the opportunities – but also challenges! – that FinTech innovations might present to banks and their business models. As you all know, our economy thrives well only if the financial sector is in good shape and that is also a necessary condition for a smooth transmission of monetary policy. In that respect, we deem it essential to understand the threats and opportunities brought by FinTech to the sector. These very reflections prompted the NBB more or less a year ago to create a dedicated Taskforce which is mandated to monitor – amongst others – the impact of new technologies on the financial services industry.

But, as you equally know, a central bank's mandate goes beyond monitoring the financial sector: in order to protect society's interests, central banks should safeguard financial stability and also promote macro-economic stability, the latter primarily by means of its monetary policy. Even if a sound and well-functioning banking sector is a necessary condition to reach these goals, it is far from sufficient. In other words, the story doesn't have to end here. In that respect, a central bank's interest in Fintech is not limited to its implications for the financial sector *per se*, but rather to its potential pros and cons for financial stability and the conduct of monetary policy.

Against this backdrop, let me structure my talk as follows. First, I will focus on what we have learned about Fintech, what came out from our discussions with financial markets participants, what role they see for the central bank and how we act in response to that. Subsequently, I will shift my attention away from the strict realm of the financial services sector and instead discuss what I think FinTech could imply for monetary policy and financial stability.

Distributed ledger technology: talk of the town and its economic promises

So, what have we learned so far? “A lot” would be an obvious reply, but if you would ask me to highlight a very promising development, I would say that the so-called distributed ledger technology – DLT in short and often referred to as blockchain – is *the* most revolutionary technology within the FinTech Industry. This might not come as a surprise to you; after all, the distributed ledger technology is the talk of the town at many FinTech fora. Having said that, we should be aware of the – potentially many – technical obstacles out there that can make its wide-spread practical application not that straightforward.

Abstracting for the moment from these and taking an economic perspective, the key is that – when appropriately managed – the distributed ledger technology could offer a solution to a trade-off problem that traditionally exists in the transaction of assets. It is the trade-off between guaranteeing, on the one hand, security and legality of the transaction and, on the other hand, its cost-efficiency and anonymity. Think, for instance, of the difference between using cash and traditional card payments – either debit or credit card payments

Cash payments guarantee anonymity. Indeed, banknotes and coins are bearer instruments. So, no record exists of how much cash one owns, let alone of how much cash one spends. Cash payments also imply a cost-efficient transaction process because the payment is also the settlement. In other words, it doesn't require any middleman and hence also avoids intermediation costs. On the other hand, with cash payments it is hard to control whether the underlying transaction is legal or whether any tax due has been paid. Moreover, cash payments are risky, especially if larger amounts are involved.

Debit and Credit card payments have exactly the opposite characteristics. They are safe, as the underlying bank deposits are registered instruments whose transactions can be traced back on bank accounts. That makes them also harder to use in the tax-evading and illegal economy. This feature comes with the price of abandoning anonymity, however. And, finally, although card payments seem simple on the surface, behind the scenes they involve a

complex and tiered transaction process, with different intermediaries that all need to be paid for.

Well, the distributed ledger technology offers a decentralised clearinghouse and record-keeping device which has the *potential* to process asset transactions without suffering from the aforementioned trade-off problem. I stress the conditionality of this statement. After all, every technology has its own promises, but also its own dangers; and what prevails, depends on its exact implementation. Bearing that in mind, the distributed ledger technology offers the possibility of a virtual ledger which is not centrally managed, but instead *lives in a decentralized manner* on a computer network.

The ledger's *de-centralised* nature comprises an interesting potential safety element. In fact, this feature implies that the ledger is shared among users of the system, which makes it hard to corrupt; as such practice would require deceiving all users. But safety as such, doesn't guarantee avoiding illicit transactions. However, the technology allows programming the ledger such that it makes hiding fraudulent transactions in it practically impossible.

By the statement that the ledger *lives* and is not managed, I mean that it works in a self-verifying fashion. More specifically, all actions in the ledger need to be verified by users of the system. The settlement mechanism for asset transactions on a distributed ledger network is therefore direct, and requires no trusted third party, such as a central bank or a credit card issuer, to confirm the transaction. This makes it potentially a cost-efficient tool for settling transactions. I say 'potentially', as the verification process can also be costly – depending on the underlying technology. Moreover, one could think of a hybrid model where for the sake of supervisory purposes a DLT network is still centrally managed by traditional third-party clearers.

Finally, if deemed appropriate, anonymity could be preserved on a distributed ledger network. More specifically, knowledge of the identity is not required for the network to work, nor is it a prerequisite for guaranteeing the security and legality of asset transactions that would run over such a network.

Let me wrap up my thoughts so far: talk of the town in the Fintech world is the distributed ledger technology; the financial sector is exploring its potential to transact assets more securely and more efficiently, while at the same time preserving anonymity. Knowing that, one can better understand the different interests that financial market participants express in this matter.

Why is it of interest to commercial banks?

I think it is fair to say that banks' interest in this new technology is preliminary driven by the promise of improved cost-efficiency.

Take, for instance, the case of the transfer of money, a major class of asset transactions that commercial banks are involved in. Banks typically eye two potential efficiency gains when investigating possibilities for running payment systems on a distributed ledger network. First, by allowing for direct settlement, the technology provides the potential to further speed up and lower transaction costs of existing processes. Second, banks are exploring the possibilities of the technology to complement current payment systems with attractive and competitive new services. Applications to provide customers with richer and enhanced real time information make up just one example.

To fully reap these potential benefits, however, it seems that commercial banks need central banks' support. After all, central banks typically operate at the centre of existing payment systems, in that they settle money transactions between banks. In practice, this interbank settlement works by transferring deposits – so-called reserves – across accounts that banks hold with the central bank. Consequently, in order for an interbank payment system to be able to run on a DLT network, central banks must be willing to grant that network also access to the reserve deposits it issues. In essence, this would imply that central banks allow interbank clearing and settlement transactions in central bank money on a 24/7 quasi-instantaneous basis.

Today, such a permissioned network does not yet exist. For that reason, financial market players increasingly approach central banks on the subject. Sometimes explicit cooperation is sought – and found! – to build a proof of concept interbank payment system using a distributed ledger. To give one example, last summer, the press reported about the Bank of Canada's 'CAD-coin' project where it teamed up with – among others – Canadian banks, to test drive distributed ledgers in the interbank environment.¹ We do not need to cross the Atlantic to find proof of such partnerships. In fact, also here at the National Bank of Belgium, we recently set-up a lab environment to experiment with the distributed ledger technology.

The idea of setting up this lab is to gain more practical experience on the matter. More precisely, the objective is, on the one hand, to analyse the potential benefits of using a DLT supporting central bank money settlement of payments: as already said, speed, costs and resilience might all be improved. But we equally want to identify the new risks that may arise.

¹ See, e.g., Shin (Forbes, 2016, June 16).

Indeed, the underlying new technology would change processes such as membership management and transaction validation. Security remains an important issue as well, and we want to test it thoroughly.

All of these examples might make one forget the very reason why the distributed ledger technology was set up in the first place. Wasn't it originally invented for the creation of peer-to-peer digital currency allowing to bypass current payment systems? And if banks would choose to create their own digital proxy for central bank money, would this not allow them to manage interbank settlement without central bank involvement? The brief answer to these questions is "yes". In fact, recently a consortium of four large banks (UBS, Deutsche Bank, Santander and BNY Mellon – to be more specific) has announced the development of what they call a Utility Settlement Coin. Simply put, this proposal puts an extra layer between the commercial banks and the central bank separating the means of settlement from the fiat currency backing the settlement.

Why is it of interest to central banks?

The example of the Utility Settlement Coin illustrates that, strictly speaking, a central bank's involvement is not required for running a payment system on a DLT network. Central banks, however, might have their *own* reasons – driven by their *own* interests – to be directly involved in the development of such a settlement system of central bank money. This can explain their willingness to participate in private sector initiatives in the first place. But it can go further. Indeed, the safety and cost-saving opportunities of the technology – allowing central bank money to be exchanged more securely and efficiently – could change the practice of central banking in a very profound way!

Because money can be exchanged more securely firstly means that the distributed ledger technology could help to further underpin trust in the monetary system.² This is an important feature, as trust is the cornerstone on which a fiduciary money system – such as ours – is built on. In fact, fiduciary money derives its intrinsic value solely from trust.³

When thinking of the efficiency argument, central banks are not reflecting on interbank applications of the distributed ledger technology per se. Nor do they think in the first place of the potential cost saving effects of such practices for private financial firms. Instead what

² See, e.g., Haldane (2015) and Raskin and Yermack (2016).

³ The safety argument could be interpreted even more broadly. Indeed, due to its decentralised nature, a distributed ledger provides complete transparency and visibility of the transactions recorded. In that sense, the DLT technology could empower a central bank's prudential policy work, in that it provides a tool to better monitor systematic leverage and counterparty exposure.

they have in mind – at least from a *conceptual* point of view – is the potential of this new technology to serve as a platform for the issuance of a digital form of banknotes – a so-called "central bank digital currency" or "CBDC" in brief. Hence, from a broader economic perspective, the DLT provides a potential efficiency gain for central banks to expand their role by widening access to their balance sheets – that is, beyond commercial banks.⁴

A couple of recent speeches by central bank officials testify of the growing interest in the CBDC idea within policy circles. For instance, just three weeks ago, Riksbank Deputy Governor Cecilia Skingsly openly pondered whether the Swedish central bank should play a pioneering role in issuing an electronic means of payment – what she calls an 'e-krona' – to complement physical cash.⁵ And earlier this year, in March, Bank of England's Ben Broadbent (Deputy Governor for Monetary Policy) expressed his views on the potential macro-economic consequences of a CBDC.⁶

But just because you *can* do something doesn't mean you *should*. Against this backdrop, let me, for the remaining of my talk, briefly elaborate on what I think are the merits and challenges that a CBDC presents to monetary policy and financial stability – the two yardsticks against which a central bank should assess the desirability of its actions. I should stress that we – both in the NBB and the ECB Governing Council – are still really in the early process of reflecting in depth about these issues; rather than contemplating the issuance of such a CBDC – like our Swedish colleagues appear to do. In that sense, in what follows, I am wearing more the hat of an economist rather than that of a central bank governor.

CBDC as a solution to the ZLB-problem?

One promising opportunity for monetary policy is that a central bank digital currency could relax the so called 'zero lower bound' constraint on nominal interest rates; at least, to the extent that it would substitute for banknotes and coins.

The fact that nominal market interest rates cannot fall much below zero arises from the fact that technological constraints hinder paying interests (both positive and negative) on physical cash.⁷ Central banks have no problem whatsoever paying negative interest rates on reserve deposits held by banks with them. Remember that in the euro area we currently charge

⁴ See also Broadbent (2016) on this point.

⁵ Skingsly (2016).

⁶ Broadbent (2016).

⁷ See Haldane (2015) for a recent discussion on the 'zero lower bound' problem.

banks 40bp on excess liquidity that they hold with the central bank. However, the transmission of such negative policy rates to other interest rates – retail bank rates in particular – can get impaired as soon as banknotes cannot be charged the same negative rate. Indeed, in this case, there exists an escape route from negative rates, in that deposits can be switched for banknotes. This practice hinders the effectiveness of monetary policy and is known as the Lower Bound problem (Ball, 2014).⁸

The lower bound constraint is not new. In fact, it exists as long as banknotes have been issued. So why should we now worry more about it than a decade ago? Key is that there are strong reasons to believe that the likelihood of this constraint becoming binding has increased. For one, current low interest rates tend to be not just cyclical in nature – by which I mean that they are not only the result of central banks' massive stimulus measures in the aftermath of the Great Recession. Instead, some of the deep roots of the ZLB constraint may be structural and, therefore, long lasting.⁹ For instance, lower trend growth, worsening demographic trends, rising inequality and savings gluts in emerging markets have all lowered average real interest rates over the past 30 years.¹⁰ Combined with central banks' success in bringing inflation down again from its too high levels in the seventies and eighties, also nominal interest rates have fallen. As a result, compared to a generation ago, monetary policy currently has less room of manoeuvre to fight recessions.

On top of that, macro-economic volatility has increased since the financial crisis, bidding farewell to more than two decades of 'Great Moderation'. This means that monetary policy's dwindled room for manoeuvre is expected to be exploited more often. As a result, in the future, central banks may find themselves bumping up against the lower bound constraint on a recurrent basis. Hence, policy options that would slacken the ZLB constraint on a durable basis deserve our attention.

Various proposals for circumventing the lower bound have been put forward, ranging from raising average nominal rates by revising upwards the inflation target, to finding means to levy negative interest rates on cash – such as a stamp tax on banknotes or a managed exchange rate between cash and deposits –, or to abolishing banknotes entirely.¹¹ However,

⁸ The usual concept referred to is the 'Zero Lower Bound problem'. I prefer, however, omitting the "zero" reference from this concept. In fact, the effective lower bound is somewhat below zero, as carry costs for currency (i.e., costs for storage, safekeeping and insurance) are typically higher than for bank and reserve deposits.

⁹ Buiter and Rahbari (2015).

¹⁰ See, e.g., Rachel and Smith (2015).

¹¹ See Haldane (2015), for a comprehensive overview of concrete proposals put forward in the literature. More specifically, see, e.g., Ball (2014) or Williams (2016) for a recent plea to increase the inflation target. Proposals for levying a stamp tax on currency date back to Gesell (1916). More recently, the idea has been re-introduced into the policy debate by, e.g., Goodfriend (2000) and Buiter and Panigirtzoglou (2003). The idea of installing a

to date, no central bank has attempted to implement one of these schemes. This is because each of these potential solutions also brings particular challenges.

For instance, the main objection against raising the inflation target is that it could jeopardise central bank credibility and, thereby, the anchoring of inflation expectations. Options to levy an implicit interest rate on banknotes, for their part, suffer from the problem that their practical implementation is not that straightforward or – at least – requires a costly infrastructure. Finally, a ban of cash and banknotes would face some important social acceptance issues. For one thing, access to publicly issued money – like banknotes – is regarded as a social convention. Challenging this convention could draw heavy public protest. Another often stated argument against eliminating cash is that it would infringe privacy rights, as paper currency allows making anonymous transactions. Moreover, the abolition of cash implies a loss of seigniorage income for the central bank.

Should we hence conclude that the lower bound is a constraint that we must learn how to live with, for instance, by making the – today still considered unconventional – QE measures part of the standard monetary policy toolkit? Well, some economic observers would say that the new distributed ledger technology can provide a way out. The reason is that a CBDC provides the option to not simply abolish cash, but instead to replace it by an electronic version. This approach would preserve the ability to hold direct claims on the central bank, even if banknotes would no longer be available. And it would not need to imply a loss of seigniorage income. What is more, as I mentioned before, when running on a distributed ledger network, a CBDC could – in principle – provide anonymity to its users, just like banknotes.

What would this imply for the banking sector? Many questions with no straightforward answers as yet

Hence, could we conclude that we have found the 'Holy Grail' to solve for the zero lower bound? I would not dare to make such a strong statement. Instead, I think some words of caution should be noted. For one, imposing negative rates on households might face political limits, even if there would be an economic rationale to engineer them. If that would be the case, a too long period of too negative rates could in fact threaten central bank independence. Moreover, a CBDC could have profound implications for the banking sector;

floating exchange rate between cash and deposits has been pitched by Eisler (1932) and recently revitalised and updated by, e.g., Buiter (2009b) and Goodfriend (2016).

at least to the extent that it is an attractive substitute for bank deposits and not only for banknotes.

This brings me to my last topic, turning back my focus to today's audience: retail bankers. In brief, it is indeed realistic to assume that a CBDC would not only partially substitute for banknotes, but also for bank deposits. More specifically, under a central bank digital currency scheme, citizens and business would be permitted to open and hold accounts at the central bank. Especially when these accounts would also pay interests, there remains little what distinguishes them from traditional commercial bank accounts. A CBDC, therefore, provides direct competition for commercial bank deposits, likely inducing a partial shift of deposits away from commercial banks towards the central bank.

Importantly such a drain would not pass without any consequence. Under the prevailing order, banks are engaged in 'fractional reserve banking'. This is the practice whereby a bank accepts deposits, but holds as reserves with the central bank only a fraction of these deposits. In other words, bank deposits are only partially backed by central bank money, the difference of which is used to finance investments in the economy. Fractional reserve banking thus implies a maturity transformation: short-term deposits typically fund long-term loans. This maturity mismatch makes the current banking system inherently vulnerable to runs even if prudential regulation – stepped up significantly since the financial crisis – is making banks less prone to such risks.

It appears from the foregoing that, by draining deposits from commercial banks, the adoption of a CBDC would limit the practice of fractional reserve banking. This could make for a safer financial system, with less scope for impairment in the monetary policy transmission.

That sounds like a desirable outcome. However, I think one should first reflect more deeply about the potential consequences of this before drawing any firm conclusions.¹² To this end, it helps to structure our thoughts in terms of balance sheet effects. In fact, a shift of resources from deposits to CBDCs, would imply – at first instance – that banks' liabilities decline while those of central banks increase. The question then remains which balance sheet items would need to adjust to restore equilibrium. Different outcomes are conceivable, with no clear indication as to which is most likely. Hence, we face more questions than answers.

¹² See, e.g., Barrdear and Kumhof (2016) for a general and non-technical overview of the pros and cons of CBDC, as well as a static analysis of a CBDC's long-term effects within a theoretical general equilibrium model.

The most beneficial outcome would be the one that proponents of so-called “sovereign money systems” refer to as the '*narrow banking*' case. Under a narrower banking system, banks are indifferent to either funding their investments by liquid deposits or less run-prone liabilities, such as equity and longer-term debt. Hence, in this case, when a CBDC would dry up a bank's access to deposits, that bank would simply address private markets to step-up its debt and equity financing. Then what makes a bank 'narrow', is the fact that the liquidity structure of its assets and liabilities are better matched to each other. So, in brief: under this scenario, all what happens is that the banking sector becomes safer while credit supply is not affected. And that of course is a good thing.

But how likely is this optimistic scenario? For one, this depends on how indifferent banks actually are regarding their funding structure. Judging by today's debates, it turns out that they are not that indifferent, for the reason that deposits are often regarded – rightly or wrongly – as a cheap and reliable source of funding.¹³ Moreover, it could equally well be the case that banks would not succeed in attracting sufficient alternative funding. One might then expect to see a tightening of the credit market, or at least an increase in lending rates. And if that happens, it's likely that investment and economic activity would suffer as well. After all, households as well as many small and young firms depend on the banking sector to satisfy their credit needs, since they barely have access to capital markets.

It remains a question for discussion whether in such a case central banks should step in: they could do that as a provider of alternative bank funding or even – under an admittedly more extreme line of reasoning – by directly providing credit to the non-bank sector. Proponents could say that such practices would provide central banks with more discretion over financial conditions, allowing them to better safeguard macroeconomic stability. Opponents, on the other hand, would exactly challenge such increased central bank power; for instance, arguing that it opens up the backdoor for a planning economy.

And if all this were not enough to fuel the discussion, there is reason for concern that, even if banks would be both willing and able to attract alternative funding, the adoption of a CBDC could make credit supply more volatile. In fact, by offering the economy an additional and very easily accessible safe asset, a CBDC might facilitate flights to safety. One is then likely to observe resources flowing out of commercial banks during times of financial stress, and

¹³ Defenders of the so-called Modigliani-Miller (1958) theorem would claim that this presumption is false. For instance, the fact that equity funding appears today more expensive relative to deposits cannot be seen in isolation of banks' current funding structure. Indeed, the more a firm's assets are equity funded, the more any potential losses can be spread over a greater number of shareholders, and the cheaper the average unit of capital becomes.

back towards them when risk aversion is low.¹⁴ Limiting the practice of fractional reserve banking, therefore, doesn't necessarily make for a safer banking system, as it could equally well impair financial stability. And if that would happen, central banks could be forced to take up more – rather than less – often their role as lender of last resort.

Conclusion

Hence, to conclude, there are more questions than answers about a CBDC and how exactly it should be designed. This reminds us of the simple fact that *we should always think before we act*. However promising a new idea or a new technology may be, there might always be unwanted consequences that you should try to be fully aware of. As I have just shown you, from an economic perspective, the distributed ledger technology bears the promise to issue a sovereign digital currency. This could provide central banks a tool to solve for the lower bound problem; however, we might as well end up impairing financial stability, thereby undermining monetary policy efficacy instead. Having said that, I do not claim we shouldn't *talk* about this. In fact, even if new insights originate from thinking they can only progress by discussion. Bearing that final remark in mind, I wish you all a very fruitful conference with many insightful discussions!

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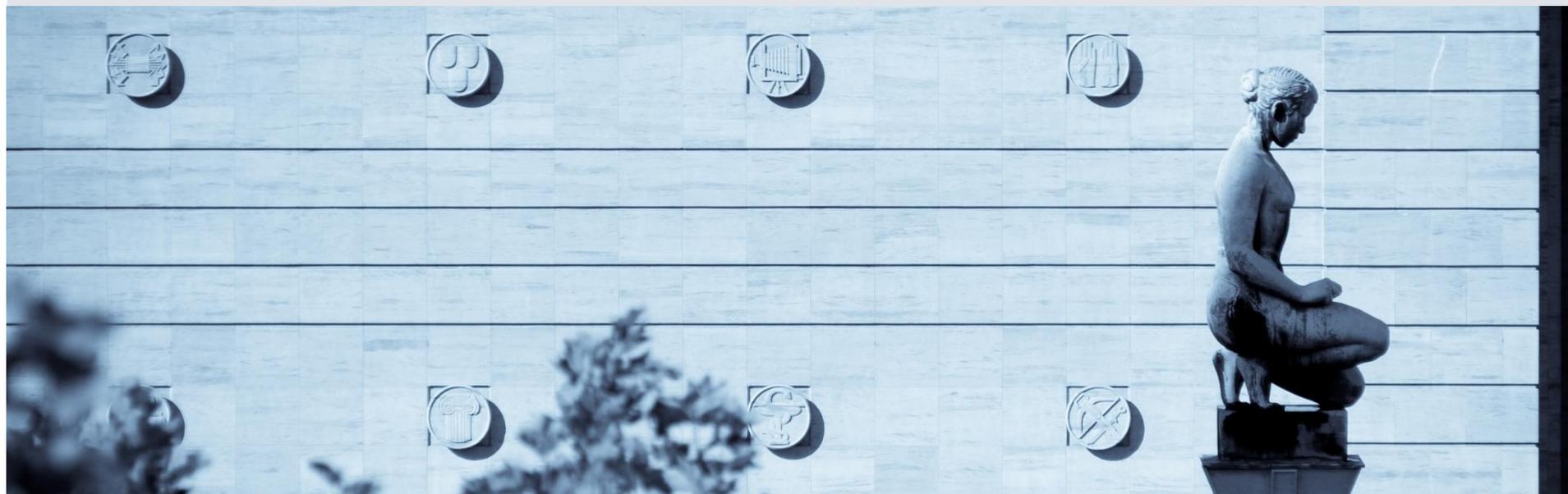
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FinTech and Central Banks

J. Smets
Governor

Fintech and the Future of Retail Banking - Brussels, 9 December 2016



My aim today: FinTech through the lens of a central banker

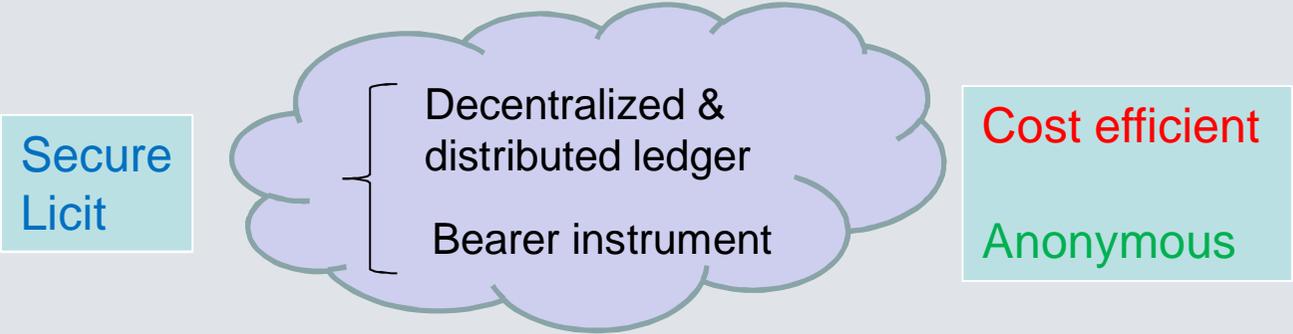
My focus will not be restricted to the strict realm of the financial services sector

↳ *Not that we are indifferent to the threats and opportunities that FinTech might present to banks and their business model...*

↳ *...but a CB's mandate goes beyond monitoring the financial sector: in order to protect society's interests, CBs should safeguard financial stability and promote macro-economic stability.*



Distributed ledger technology (DLT): talk of the town and its economic promises



Distributed Ledger Technology:

Offers a decentralized electronic transaction database which is distributed and shared by members in the network, thereby providing a tool to ...

...but with complete transparency and immutability...

process and record asset transactions without any trusted parties...

...and without necessarily revealing identity



Why is it of interest to commercial banks?

- ▶ DLT: the promise of improved efficiency seems the central interest.
 - Direct settlement provides the potential to further speed up and lower transaction costs of existing processes.
 - DLT might create possibilities to complement current payments systems with attractive and competitive new services.

- ▶ To fully reap these potential benefits, banks seek central banks' support.
 - After all, by managing interbank settlement, central banks typically operate at the center of existing payment systems.
 - NBB set up a lab environment to experiment with DLT to investigate opportunities and risks.

- ▶ But, by facilitating direct settlement, DLT offers a tool to circumvent central bank involvement in the first place.
 - 'Utility Settlement Coin' case.



Why is it of interest to central banks?

Distributed ledger:

The potential of exchanging CB money more efficient and secure



Makes it easier to widen access to the CB balance sheet:

→ Platform to launch a digital form of banknotes; a so-called: central bank digital currency (CBDC).

Helps to further underpin trust in the monetary system:

→ Crucial in a fiduciary system.



Solution to the so-called 'zero lower bound' (ZLB) constraint on nominal interest rates ?



CBDC as a solution to the ZLB problem?

The likelihood of the ZLB becoming binding has increased....

- ▶ Some of the deep roots of the ZLB constraint may be structural:

$$i \downarrow \uparrow = r^* \downarrow \uparrow + \pi \downarrow \uparrow e$$

CB: successful inflation targeting

- Lower trend growth
- Demographics: ageing
- Rising inequality
- Saving gluts

↳ **Dwindling wiggle room for monetary policy to cushion the effects of troughs in the business cycle.**

- ▶ Macro-economic volatility has increased since the financial crisis.

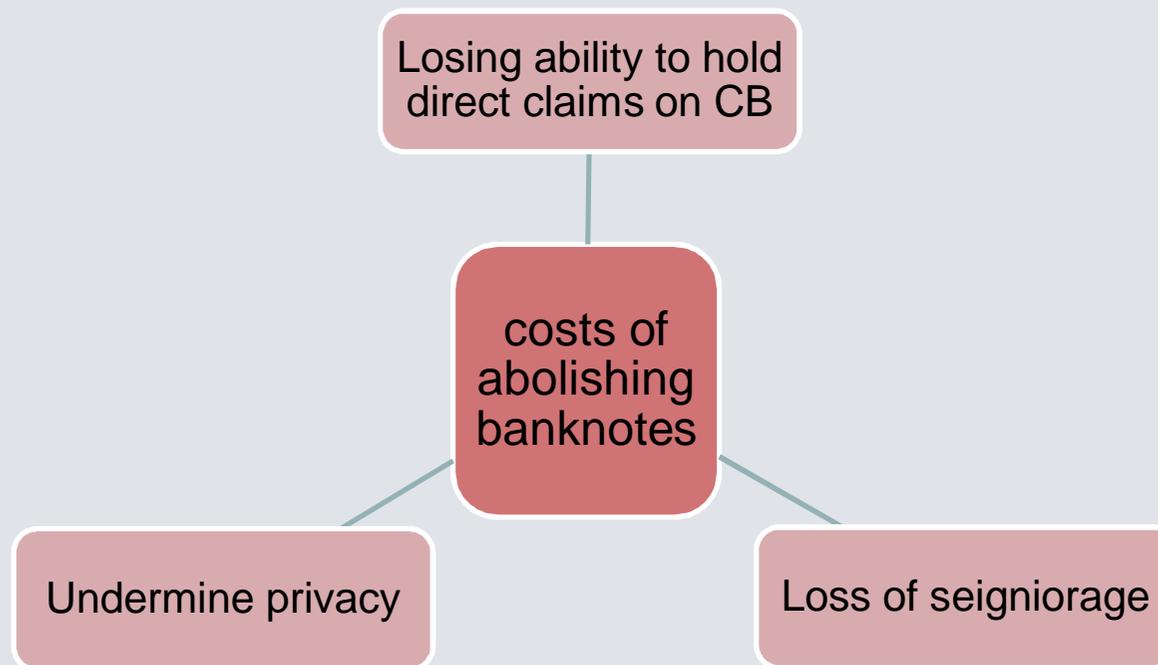
↳ **Dwindled monetary policy room for manoeuvre is expected to be exploited more often.**



CBDC as a solution to the ZLB problem?

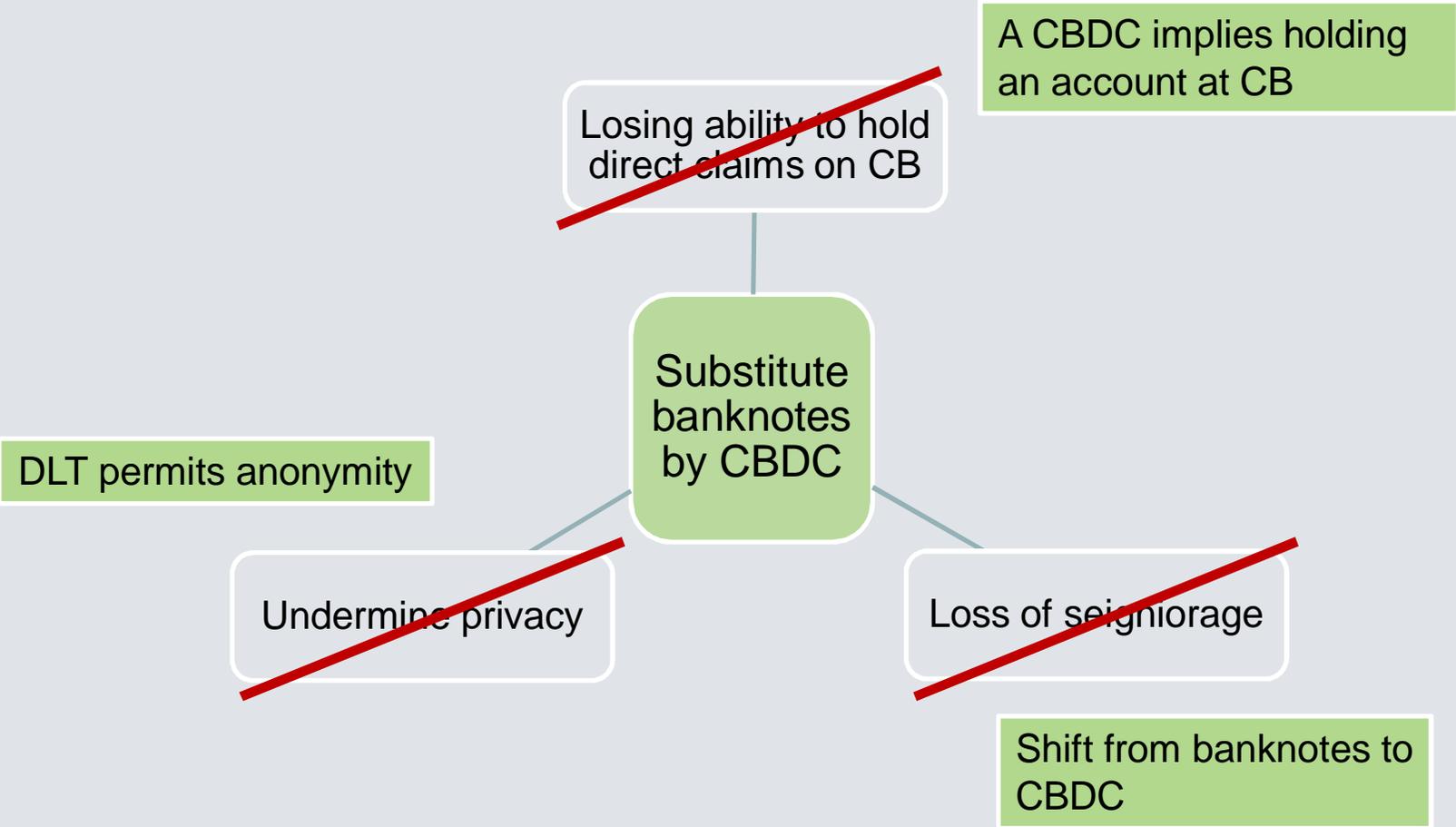
...the ZLB problem, therefore, deserves attention to consider policy options that would slacken the ZLB constraint....

...What about abolishing cash?



CBDC as a solution to the ZLB problem?

A CBDC could facilitate abolishing banknotes.



What would this imply for the banking sector? Many questions with no straightforward answers yet

A CBDC could provide competition for deposits

↳ This, in turn, could limit the practice of fractional reserve banking...

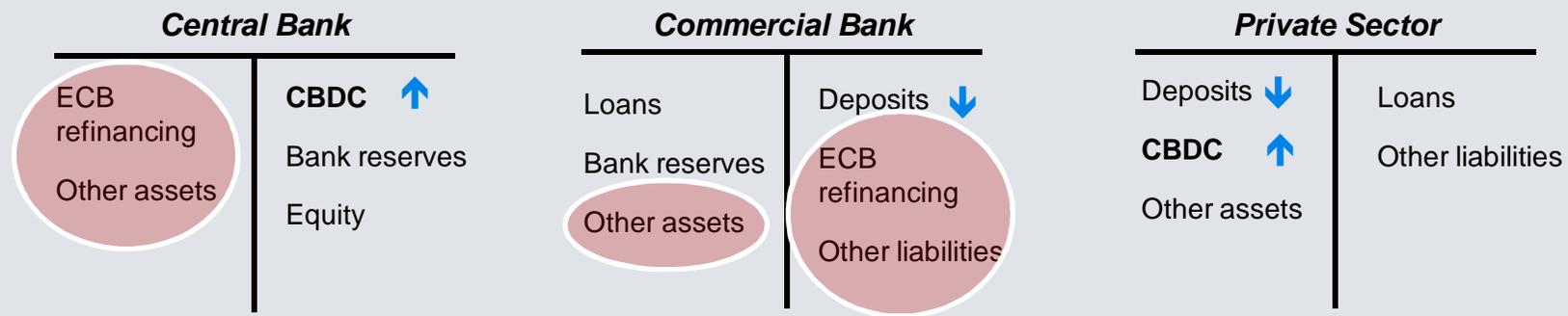
↳ ...and make for a safer financial system, with less scope for impairments in the monetary policy transmission.

At first sight, this seems a desirable outcome. But is this indeed the case?



What would this imply for the banking sector? Many questions with no straightforward answers yet

A CBDC could provide competition for deposits

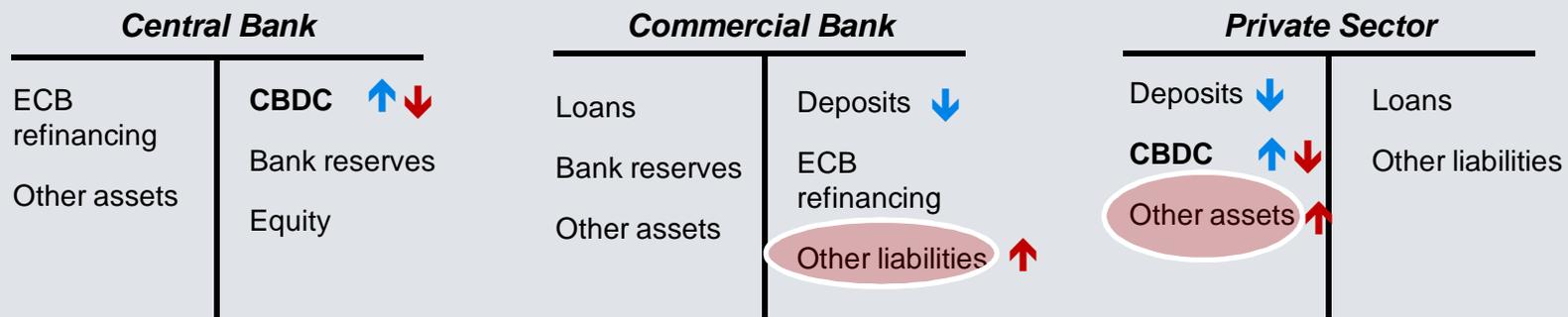


Which balance sheet items need to adjust to restore equilibrium?



What would this imply for the banking sector? Many questions with no straightforward answers yet

A CBDC could provide competition for deposits

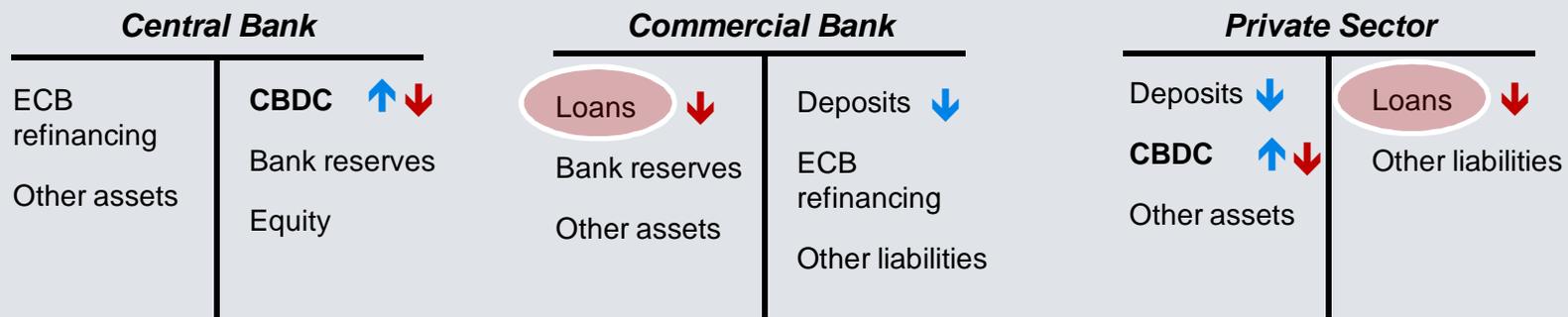


Narrow banking: Banks could step-up their alternative funding...



What would this imply for the banking sector? Many questions with no straightforward answers yet

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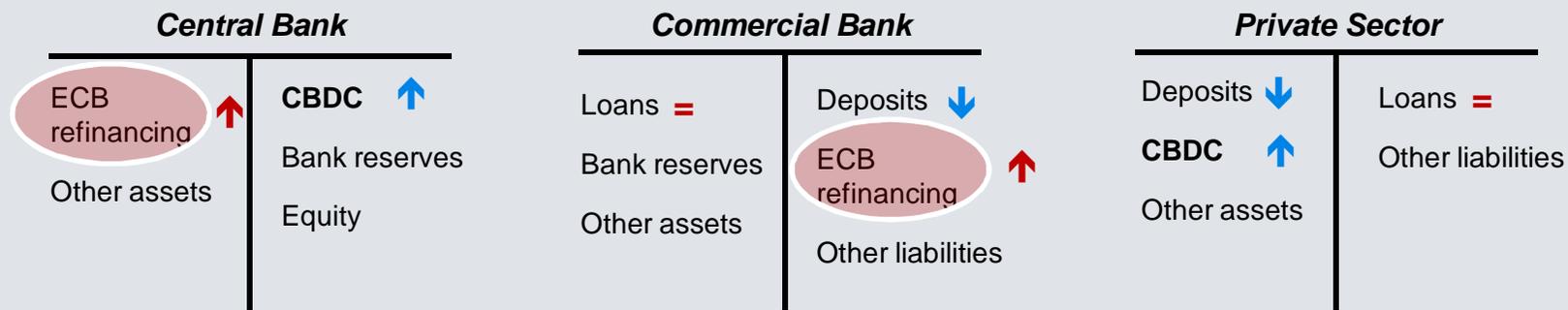
...But how likely is this optimistic scenario?

- Banks might not be willing or able to attract alternative funding
- One might then expect to see a tightening of the credit market, or at least an increase in lending rates.



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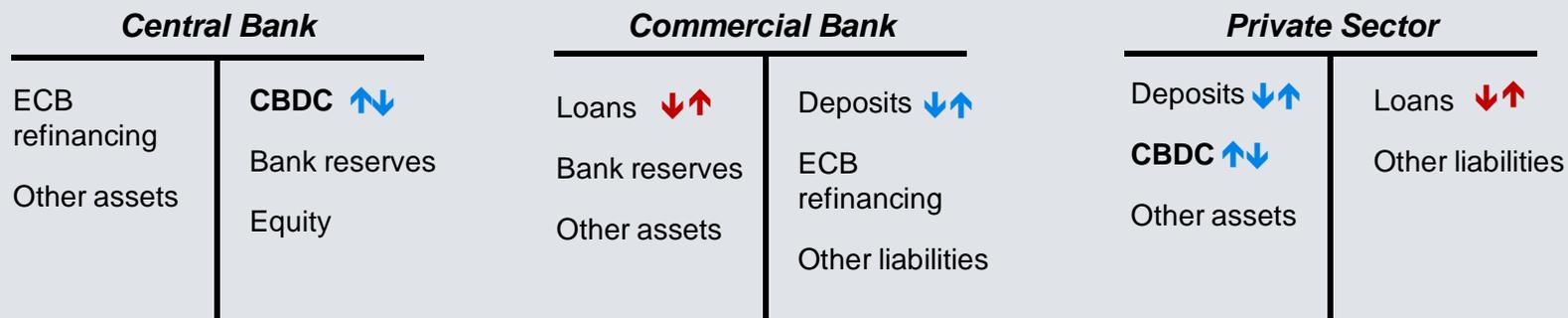
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- Or should the central bank step in, for instance as provider of alternative bank funding?



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...But how likely is this optimistic scenario?

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- One might then expect to see a tightening of the credit market, or at least an increase in lending rates.
- Or should the central bank step in, for instance, as provider of alternative bank funding?
- Moreover, the adoption of a CBDC could make credit supply more volatile.



Thank you for your attention

**I wish you all a very fruitful conference with many
insightful discussions**

