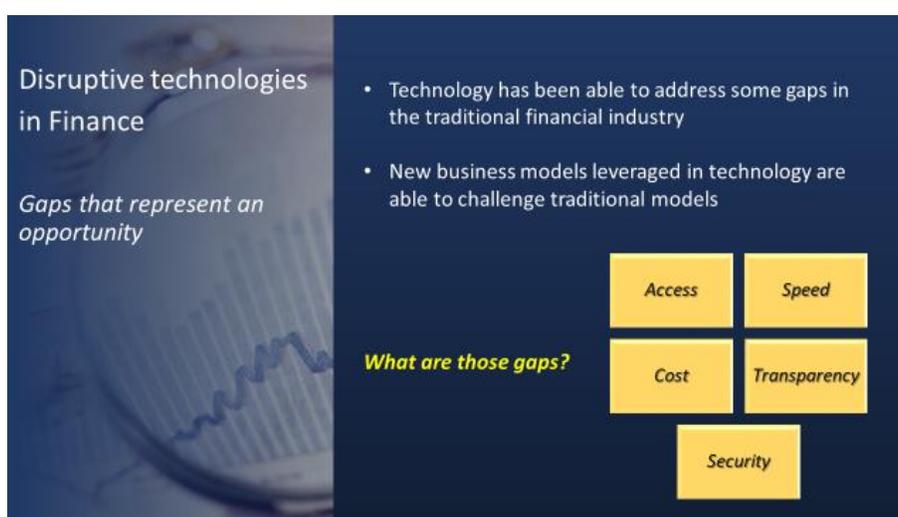


High-level Policy Panel Discussion on Central Bank Digital Currencies

Remarks by Mario Marcel, Governor of the Central Bank of Chile

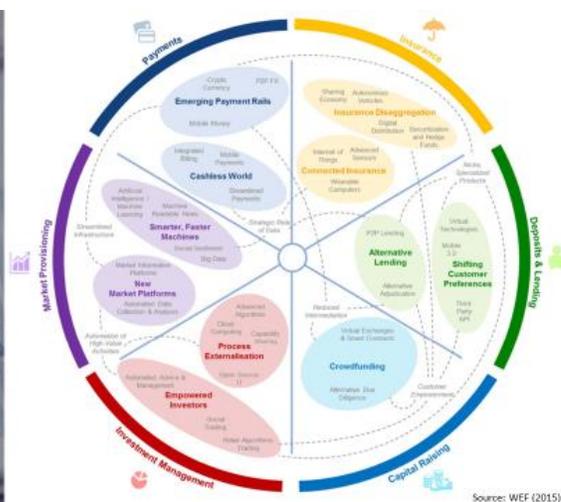
Disruptive technologies in Finance or “FinTech” are transforming the financial industry landscape, challenging traditional business models. These technologies have been able to address some gaps in the traditional financial industry that can be grouped into five categories: Access, Speed, Cost, Transparency, and Security.

Leveraging on open-source technologies and Smartphone penetration, FinTech has seen fast adoption, disrupting all areas of the financial services such as payments, investments, savings & lending, insurance and risk management.



One example of the innovation across different financial services is this research framework from the World Economic Forum. Fintech innovations are identified and grouped into clusters, which in turn are a result of innovation triggered by common themes that cut across financial services. These themes are enabled by different technologies.

The main takeaway here is to understand the potential of these technologies to innovate across all financial services and have a visual image of how this is reshaping the financial services. As this reshaping is taking place, the policy makers, regulators, and supervisors need to understand the forces driving this innovation wave, in order to assess the risks and opportunities of these new business models.



Our Central Bank understands that a new ecosystem is being developed and has responded to these new challenges with the 2018-2022 Strategic Plan, where the disruptive technologies are one of its five main focuses. Specifically, we have put in place two initiatives to address FinTech challenges: the *Technological Observatory* and the TechLab.

The *Technological Observatory* seeks to play an active role in financial technology research, assessing potential impacts, risks, and policy actions, as well as to strengthen coordination with other institutions. During 2018, the Observatory’s work focused on understanding the various business models, risks, and opportunities of the domestic FinTech ecosystem. Therefore, communication with the FinTech industry has been intense through articulated meetings, consultation, informal briefings, seminars, workshops and publications. Internally, the work has focused on agreeing on the areas in which we need to build knowledge.

The areas of interest are open banking, SupTech, securities and cash settlement of the CBC’s operations using DLT, cryptoassets from a financial stability perspective, digital payments (retail and cross-border, mainly), CBDCs, cybersecurity from a financial stability perspective, and Big data and digital economy.

The Central Bank of Chile’s approach

Strategic Plan for 2018-2022

- *Technological Observatory* (started first half 2018)
 - Created to play an active role in financial technology **knowledge**, **coordinate** actions within de CBC, as well as to strengthen **networks** with other institutions locally and internationally
 - Blockchain and CBDC are two of the eight topics the Observatory is monitoring actively

On the other hand, the TechLab’s objective is to implement in an experimental stage disruptive technologies that impacts cross-cutting processes within the CBC, such as cryptocurrencies, big data, artificial intelligence, and the

like. Currently we are experimenting with blockchain and machine learning techniques. Anyway, the TechLab was started only three months ago and we are also exploring initiatives with other technologies such as APIs.

The Central Bank of Chile's approach

TechLab (recent)

- The objective is to implement in an experimental stage disruptive technology that affects cross-cutting processes within the CBC, such as:

Big data, Artificial intelligence, Blockchain

Let us talk a little bit more about the technology that brings us together, blockchain. This technology has several use cases for a central bank: (i) Central bank digital currencies; (ii) Financial Market Infrastructures such as large-value payment systems and trade repositories, or more generally RegTech or SupTech implementations; (iii) Issuance and lifecycle of financial instruments; and (iv) opportunities of optimization of back office processes, such as settlement of operations and reconciliation.

Blockchain uses in central banking

- *Central Bank Digital Currency*
- *Financial Market Infrastructures (FMI) operated by central banks*
 - Large-value payment systems
 - Trade repositories (*RegTech* or *SupTech*)
 - Others
- Debt issuance and life cycle
- Back-office processes

Notwithstanding the potential this technology has, there are some yellow flags that need to be addressed:

- a. DLT technology is still on an early stage and there might be unidentified drawbacks. Smart contracts that can build on top of this technology make it significantly more powerful, but there is little experience on how this works in practice.
- b. Borderless technologies raise concerns in regulatory compliance across regions. Coordination and information sharing may be especially relevant.
- c. Proof of Work (PoW) consensus protocol is slow and needs intensive use of energy. Other consensus protocols have limited use at this point: Proof of Stake or Proof of Authority.

- d. Regulatory gaps may arise: identifying these gaps is a central point in the exploration of the technology.

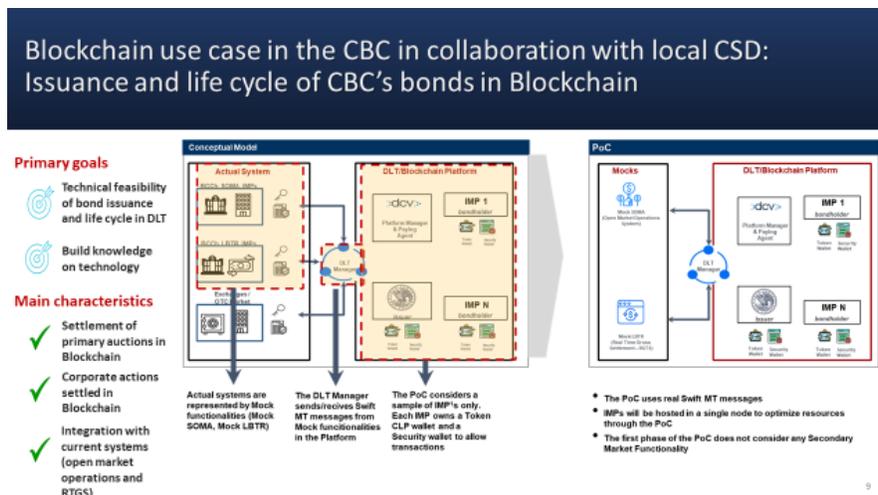
DLT/Blockchain frameworks might have potential, although they still raise some concerns:

- DLT (distributed ledger technology) is still on early stage and there might be unidentified drawbacks. Smart contracts that can build on top of this technology makes it significantly more powerful, but there is little experience on how this works in practice
- PoW (proof of work) consensus protocol is slow and needs intensive use of energy. Other consensus protocols have limited use at this point: *Proof of Stake* or *Proof of Authority*
- Borderless technologies raise concerns in regulatory compliance across regions. Coordination and information sharing might be specially relevant
- Regulatory gaps may arise: identifying these gaps is a central point in the exploration of the technology

Therefore, we need to understand this technology in order to embrace its benefits and mitigate the risks that some use cases may involve.

With that in mind, we started a Project in collaboration with our local Central Securities Depository (CSD). This project explores the feasibility of issuing bonds in a blockchain platform, and managing the whole life cycle of the bonds in this platform. Hence, settlement of primary auctions and corporate actions are done in blockchain.

First, we discussed a conceptual model that would be a better fit to our regulatory framework. Secondly, two use cases were selected and implemented as a proof of concept (PoC). Dummy versions of our real systems simulated interaction with the DLT platform. Finally, a report with our conclusions will be released in November, once the PoC is completed and possible corrections of the conceptual models are included.



Having several other use cases that we could have implemented, why did we choose this one? The most important reasons are: (i) duplicity of ledgers in current systems needing reconciliation periodically; (ii) more than one entity access and write on the ledger, even though this conceptual model only had the Central Bank issuing, this model was conceived to be used by other primary issuers (this is where the business model makes more sense!); (iii)

opportunities in optimization of settlement processes for issuance and corporate actions; and (iv) to study the feasibility of this technology (as an alternative) for the renewal of the current systems that manage our issuance and the lifecycle of our bonds.

As a consequence of our first hands-on experience with this technology, some questions which are still unanswered were raised during the process:

- a. How could this primary market be integrated with the secondary market? Could this same model be useful?
- b. There is the need for further analysis of our legal framework and identify possible gaps (the PoC scope only has a high-level legal analysis).
- c. When will this technology be mature enough to be considered as an alternative for critical systems?

Issuance and life cycle of CBC's bonds in Blockchain

Why did we choose this use case?

- Duplicity of ledgers in current systems needing conciliation periodically
- More than one entity writes on the ledger (for this PoC only the CBC and CSD, but if implemented, all bond issuers can use this model)
- Optimization of settlement processes for issuance and corporate actions
- Study feasibility of this technology (as an alternative) for the renewal of the current systems that manages our issuance and lifecycle of our bonds

Some questions raised during the process, or areas that need further research

- How could this primary market be integrated with the secondary market? Could this same model be useful?
- There is a need to further analyze our legal framework and identify possible gaps (the PoC scope only has a high-level legal analysis)
- When will this technology be mature enough to be considered as an alternative for critical systems?

Now, I will narrow the topic of blockchain to *Central Bank Digital Currencies* (CBDC), which is the focus of our panel, and talk about the motivations, benefits and concerns.

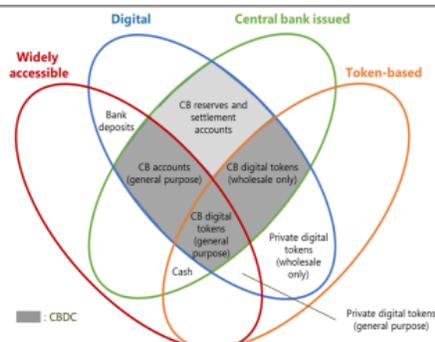
To begin with, it is important to understand that CBDCs are not new, and Central Banks have been issuing CBDCs since the first RTGS systems were around. These are the commercial banks' reserves held in the RTGS systems. Even though this form of CBDC is not blockchain based, it is important to mention that the CBDC concept is not a novelty.

CBDC debate invigorated with new understandings of money definition

Alternative CBDC forms:

- **Reserves.** An electronic form of money used by commercial banks
- **Central Bank Crypto-Currency.** A peer-to-peer retail currency or alternatively for commercial banks' use
- **Central Bank Deposit Accounts.**

The money flower: a taxonomy of money Source: BIS



That being said, the central banks need to have a clear motivation to issue a CBDC. These motivations will be different and therefore the CBDCs will be different in their design, benefits and concerns.

One way of categorizing CBDCs is by their access: general purpose, or retail, and wholesale. For retail use, the motivations in emerging economies are mainly to reduce cash in circulation, or promote electronic payments, foster financial inclusion, and reduce informality and tax evasion. On the other hand, the motivations for wholesale use are mainly efficiency and security.

We could also mention cross-border payments as a motivation for either of the two categories as well.

There might be different motivations to issue a CBDC, and therefore different designs, benefits and concerns

General purpose/CBCC

- Low use of cash
- In emerging economies:
 - Reduce cash in circulation or promote electronic payments
 - Foster financial inclusion
 - Reduce informality and tax evasion

Reserves/wholesale

- Efficiency and security

In terms of the benefits, I can mention the following:

- Some research indicates that DLT may enhance market efficiency. DLT registers based on real user identities can improve competition, price transparency and liquidity.
- Crisis management around the Zero Lower Bound. In a world of low real interest rates, the impact of unconventional monetary policies, such as QE, nominal GDP targeting and forward guidance, appears to be limited (Blanchard, Dell’Ariccia and Mauro, 2013, Gagnon and Sack, 2018). Fixing negative nominal interest rates in a flexible way could improve the Central Banks’ toolkit (Rogoff, 2019). However, there

are some drawbacks. The general public could interpret negative interest rates as a new tax and probably legislators would restrict it (Rogoff, 2019). Also, price and wage rigidity can persist, due to habit-consumption, market power, organizational inertia, information frictions.

A wholesale CBDC may have several benefits

- DLT may enhance market efficiency: DLT records based on true user identities can improve competition, price transparency and liquidity
- **Crisis management around the ELB/ZLB*** – In a world of low real interest rates, the impact of unconventional monetary policies (such as QE, nominal GDP targeting and forward guidance) appears to be limited
- Fixing negative nominal interest rates in a flexible way could improve central banks' toolkit
 - However, the wide public may interpret negative interest rates as a new tax and probably legislators will restrict it (Kenneth Rogoff suggests zero-cost deposit accounts up to a certain amount to overcome such resistance). Also, price and wage rigidity can persist, due to habit-consumption, market power, organizational inertia, information frictions

* ELB (effective lower bound), ZLB (zero lower bound).

Continuing with the benefits:

- In a world with a widely used CBDC, commercial banks could be smaller/less systemic. CBDCs can give central banks more intervention tools and reduce the risk of runs (Kumhof and Noone, 2018).
- Transparent balance sheets can make it easier to unwind troublesome financial institutions and divest their assets.
- Monetary policy channels in a world with CBDCs may be faster and more powerful. Today monetary policy works by affecting the balance sheets of banks and some financial intermediaries, which do not pass on all the rate changes to final users due to market power and other frictions. If central banks can reach out to more and more agents (businesses, households), then their role will become ever more central and effective.

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Lastly, use of CBDCs could be explored as a more efficient alternative for remittances.

In Chile, immigration has had a sharp increase in few years. As in other parts of the world, they face high costs for their remittances when using traditional methods based on a structure of correspondent entities. An alternative option that is being used, although because of its nature is not possible to have detailed information, are remittances based on cryptoassets. While these remittances may be faster and even cheaper, they are outside of the regulatory perimeter and thus their customers are exposed to several risks (counterparty, liquidity, operational).

The cross-border use of CBDC would reap the benefits of crypto-based methods, without their risks. Certainly, this would require coordination between the central banks involved.

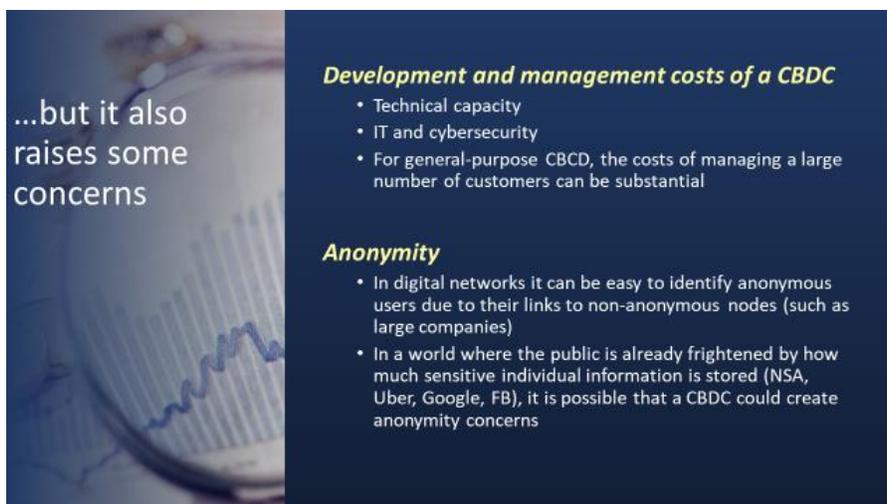


A wholesale CBDC may have several benefits

- Cross-border use of a CBDC may be explored as a more efficient alternative for remittances
- Remittances using a structure of correspondent institutions are expensive and usually take time to settle. On the other hand, crypto-based alternative may be more efficient, but they are unregulated and have risks.
- The cross-border use of CBDC would reap the benefits of crypto-based methods, without their risks. It certainly would require coordination between the central banks involved.

On the other hand, some concerns have still not been fully addressed:

- a. Development and management costs of a CBDC, specially a retail CBDC that is available for a large number of people, can be substantial. Technical capacity is still not mature enough, and risks of cyberattacks are exacerbated.
- b. The level of anonymity that the CBDC should have is still a matter of discussion. In digital networks it can be easy to identify anonymous users due to their links to non-anonymous nodes, such as large companies. The public is already frightened by how much sensitive individual information is stored (NSA, Uber, Google, Facebook...), it is possible that a CBDC could create anonymity concerns.



...but it also raises some concerns

Development and management costs of a CBDC

- Technical capacity
- IT and cybersecurity
- For general-purpose CBDC, the costs of managing a large number of customers can be substantial

Anonymity

- In digital networks it can be easy to identify anonymous users due to their links to non-anonymous nodes (such as large companies)
- In a world where the public is already frightened by how much sensitive individual information is stored (NSA, Uber, Google, FB), it is possible that a CBDC could create anonymity concerns

- c. Some of these concerns end up in a discussion about which is the optimum design features: anonymous or pseudo-anonymous? Interest bearing? Guaranteed convertibility of bank deposits into CBDCs?
- d. Finally, there are some additional risks to take into account: Reputational risk if CBDC is not widely adopted by the public, or if privately issued currencies gain more traction; Financial exclusion of the “non-tech” persons?



...but it also raises some concerns

Which is the optimum design?

- Anonymous or pseudo-anonymous?
- Interest bearing?
- Guaranteed convertibility of bank deposits into CBDC?

Additional risks

- Reputational risk if CBDC is not widely adopted by the public (or if privately issued currencies gain more traction)
- Financial exclusion of the “non-tech” persons?

Even though many CBDC experiences are from developed economies such as Canada and Sweden, there are also some experiments in developing economies such as China, Colombia and Uruguay. For emerging economies, where persons tend to be financially underserved, is CBDC the most efficient way to solve this problem? Other alternatives, such as fast payments solutions, can be evaluated.



...but it also raises some concerns

Which is the optimum design?

- Anonymous or pseudo-anonymous?
- Interest bearing?
- Guaranteed convertibility of bank deposits into CBDC?

Additional risks

- Reputational risk if CBDC is not widely adopted by the public (or if privately issued currencies gain more traction)
- Financial exclusion of the “non-tech” persons?

In conclusion:

- a. Blockchain technology implies opportunities and concerns that should be carefully addressed: Which is the goal of technology adoption?
- b. This is especially important in the case of CBDC: financial inclusion, response to new forms of e-money, facilitate wholesale payments, faster payments, cross-border payments?
- c. CBDC does not necessarily need blockchain.

Our understanding is that DLT or Blockchain technologies are more useful when several participants of a given system need to have access to a ledger of information and/or when participants do not necessarily trust each other (and therefore proof of work requirements make the register almost immutable).

However, when a Central Bank issues its currency -- either in physical or digital format -- trust should be a given. Also is far from obvious that all market participants should have access to sensitive information such as all transactions in which the CBDC was used. In fact, the pilot program of Uruguay (“e-Peso”) was not blockchain-based.

- d. There are different policies being explored and there is no “one size fits all” answer.
- e. Nevertheless, countries could largely benefit from sharing their experiences.



Key takeaways

- Blockchain technology implies opportunities and concerns that should be carefully addressed: *This is the goal of technology adoption!*
- This is specially important in the case of CDIBC: financial inclusion, response to new forms of e-money, facilitate wholesale payments, faster payments, cross border payments?
- CDIBC does not necessarily need Blockchain
- There are different policies being explored and there is no “one size fits all” answer
- Nevertheless, countries could largely benefit from sharing different experiences
