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# Discussion

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“Embedded supervision: How to build regulation into blockchain finance” by Raphael Auer

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VIEWS EXPRESSED DO NOT NECESSARILY REFLECT THOSE OF THE  
BANK OF CANADA





*Chairman William Weatherall Wilkins with ledger for Fidelity Fiduciary Bank's shares aka the Villain in Mary Poppins Returns. © Walt Disney*

# Summary

A case for (a) regulators directly monitoring financial market's ledgers using (b) a distributed ledger model (with proof-of-stake-like protocol) where (c) transactions are considered final if it is financially unprofitable to alter transactions.

## Main benefit:

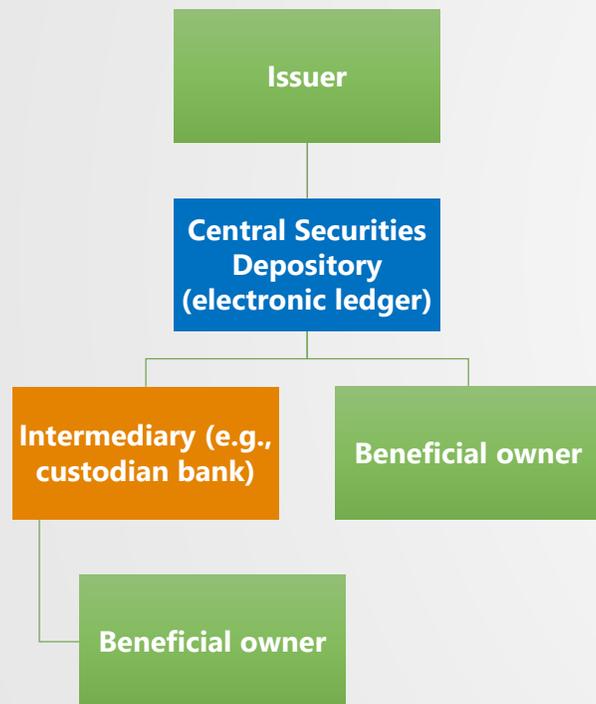
- Reduce regulatory costs
- Levelling playing field large and small firms by reducing fixed costs

## Other benefits:

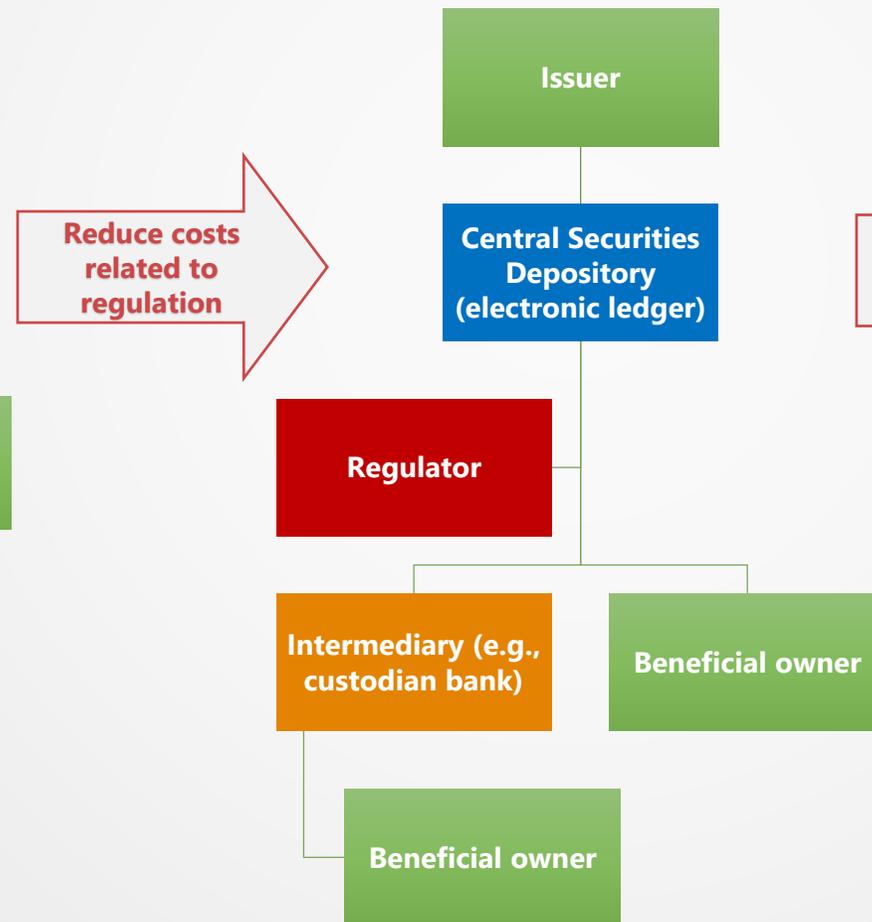
- Reducing cost by official sources delivering data for smart contracts
- Better governance structure for disputes regarding smart contracts

# Dissecting the proposed model

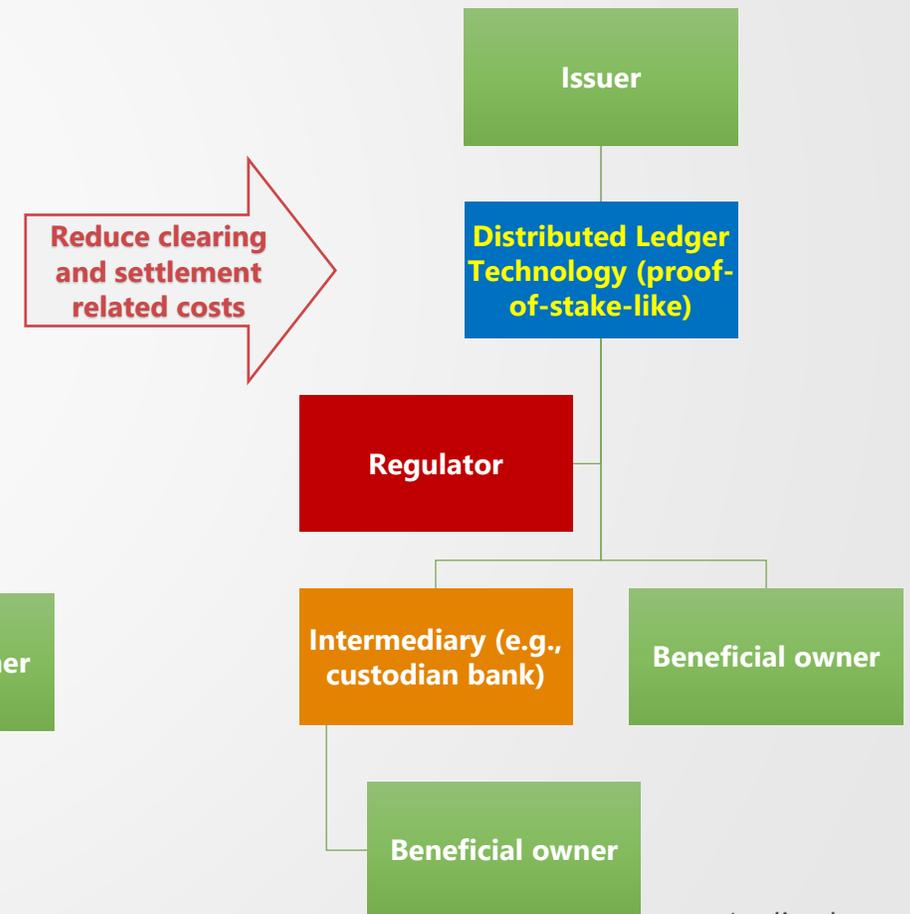
**(a) CSD model without regulatory access to ledger**



**(b) CSD model with instant regulatory access to ledger**



**(c) DLT (proof-of-stake) model with regulatory access to ledger**



*(stylized examples)*

# What reduced *regulatory cost* requires in either model

**Regardless of how clearing and settlement occurs, ledger-based monitoring requires:**

## **1) Ability to identify actors on the ledger**

- Initiative by FSB: Global Legal Entity Identifier (LEI) for Financial Markets
  - Call for tool to improve ability to quickly assess market participants' exposure
    - Improved risk management within firms
    - Better assessment of micro and macroprudential risks
    - Facilitation of orderly resolution
    - Containing market abuse and curbing financial fraud
    - Enabling higher quality and accuracy of financial data overall
- Global Legal Entity Identifier Foundation (GLEIF) established in 2014
- On-demand regulatory access to the ledger (e.g., data feed)
  - ✓ In model **(b)**, CSDs could provide regulators with LEI-to-ISIN data ("who owns what?")

## **2) Ability to observe beneficial owner**

- Need to be able to look-through custodians
- Possible when beneficial owner is recorded on the ledger (as of now not in all countries)

# Settlement in CSD versus DLT (with proof-of-stake-like protocol)

When profitable for coalition of record keeper and shady party to erase historical transaction?

- Answer: When the joint benefit to the record keeper(s) and the shady party exceeds their joint cost
- DLT with proof-of-stake-like protocol in model **(c)**:

Money lost on past transaction > Capital staked by record keeper(s)

- Central securities depository in models **(a)** and **(b)**:

Money lost on past transaction > Reduction in net worth of CSD

-/- money recovered through legal proceedings      + financial penalties  
+ jail time for fraud

# Clearing and settlement costs in CSD system

## Report gives no estimate of clearing and settlement related costs in CSD system

- Back-of-the-envelope based on annual report of Canadian Depository for Securities



### 2018

Revenue: CAD 90 million

Operating cost: CAD 58 million

Number of transactions settled: 519 million

"Revenue per transaction"  $\approx$  CAD 0.17 (EUR 0.12)\*

"Cost per transaction"  $\approx$  CAD 0.11 (EUR 0.08)\*

(\* ) Those numbers do not take into account, among others,

- Other activities by securities depository

- (e.g., processing CAD 3.73 trillion related to money markets, dividends and interest)

- Liquidity cost savings provided to market participants due to settling payments at the end-of-day using an extensive collateral system

- How do these costs compare to the costs that would be incurred in a DLT-based model where different verifiers pledge sufficient capital to make it unprofitable to reverse trades?

# Clearing and settlement costs in DLT system

**Report gives no estimate of benefits in terms of clearing and settlement related costs in the DLT system with the proof-of-stake-like protocol that it advocates**

- Paper derives equation for costs with broad parameters on when economic finality is achieved.
- Paper stops there. No attempt to truly use these parameters to estimate what the costs would be of using DLT with proof-of-stake-like protocol to process the actual volume of transactions.
  - Some practical difficulties with the assumptions:

## **Potential losses on many transactions are theoretically unbounded**

- One parameter is the maximum possible loss that can occur with hindsight on a transaction
  - May work for some transactions, unrealistic for others:
    - Buy-side of stock can lose at most the transaction price
    - Sell-side of stock can, with hindsight, lose out an infinitely large amount
  - Also unrealistic in context of, for example, options, currencies and total return swaps.
- Why important? Verifiers need to pledge a stake that exceeds the maximum possible loss
  - No finite amount is sufficient to achieve economic finality.
  - Verifiers pledging the security?
    - But that may also require a record of the verifier buying the security? Chicken and egg problem.

# Clearing and settlement costs in DLT system (continued)

- Some practical difficulties with the assumptions (continued)

## **Anything recorded on the ledger is vulnerable to attacks**

- Model assumes that record of transactions lose relevance over time
  - Important, because it limits verification capital necessary achieve economic finality
  - Idea: offsetting transactions occur, so history becomes less relevant
    - But should offsetting transactions not also be recorded on the ledger?
  - If recorded on the distributed ledger, then they must be vulnerable and verification capital is necessary for those transactions as well.
  - If ultimate proof of offsetting transactions is not on the distributed ledger, how is then the accuracy of the record of those transactions ensured?
    - On a ledger in a CSD?
- Assumption may be ok for some securities that expire automatically
  - Options, futures
  - Some contracts expire really slowly (e.g., swaps, long-term bonds)
  - Does not work for all securities (e.g., stocks, preferred stocks, typically don't expire)

# Concluding remarks

- Thought-provoking, well-written, pleasure to read
- Stronger case in the area of achieving regulatory cost savings when regulators directly access the market's ledger... (...progress in this area is already underway without a DLT based on proof-of-stake-like protocol)
- Weaker case regarding cost reductions in the areas of clearing and settlement due to the adoption of a DLT based on proof-of-stake
- Could change by providing a cost comparison between the CSD and DLT
  - › Requires a credible calibration of the model with DLT based on proof-of-stake
  - › Open question whether this can be done for many different securities
- Having data delivered by official sources can also be achieved in the CSD model
  - › In fact, derivatives clearing for e.g. equity options relies on data feeds of exchanges.
- Recommend to read

Thank you

Vielen Dank