Introduction
aux Crypto-actifs, Crypto-monnaies et Monnaies Numériques de Banque Centrale

24 juin 2021

Benoît Sureau, Associé Financial Institutions, Risk & Blockchain
benoit.sureau@pwc.com

Klara Sok, Senior Manager Blockchain Lab
klara.sok@pwc.com
5 global crypto trends
Supports digital assets development

Central Bank Digital Currencies
Entry of Corporate and Institutional Players
Regulatory Clarity and Enforcement
Rise of Decentralised Finance
Scaling-up of the crypto ecosystem

Global Crypto Trends
Crypto-assets use Blockchain as the main technology
*Serves as a secure and distributed registry*

**Distributed Ledger**
Every network member has access to the information at the same time

**Cryptography**
Information integrity and security anchored in a blockchain is based on cryptographic functions

**Consensus**
Network members mutually verify and confirm transactions on a peer-to-peer basis, without the need of intermediation

**Smart contracts**
Automated business logic allows counterparties to agree on future payment terms through the transfer of assets registered on a blockchain

---

**How does it effectively work?**

- **Real time** information access and **transparency** that may eliminate the need for reconciliation
- **Protects from malicious intrusions** into the network by unauthorized entities
- **Facilitates** updates and information validation by network members to ensure the data validity and integrity registered on the blockchain
- **Facilitates conditional agreements** design and enforcement in an automated way
Tokenization shall bring high value to the financial industry

*Namely by enhancing value chain efficiencies and audit trails*

<table>
<thead>
<tr>
<th>EFFICIENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Disintermediation - potentially faster, cheaper and frictionless transactions</td>
</tr>
<tr>
<td>• Smart contracts may reduce the cost of issuing and administering securities</td>
</tr>
<tr>
<td>• Possibility to hold fractional ownership of assets</td>
</tr>
<tr>
<td>• May facilitate corporate actions and collateral management</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AUTOMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Smart contract ability to automate multi-party conditional executions in a programmed and automated way should facilitate complex event and flow management.</td>
</tr>
<tr>
<td>• Native consensus blockchain characteristics highly diminishes the need of reconciliation (e.g. atomic DvP)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATA TRANSPARENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Transparency regarding transactional data and information around the issuer and the asset characteristics, through enhanced information recording and sharing</td>
</tr>
<tr>
<td>• High number of standardized data made available by blockchains facilitates the production of aggregated analytical outputs and modelization.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRACEABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Chained data structure highly facilitates the management of historical data</td>
</tr>
<tr>
<td>• Smart contract may ease the traceability of events on the tokenized asset</td>
</tr>
</tbody>
</table>

Tokenization represents a real opportunity for increased transparency, real time management and issuance efficiency
Which assets are concerned?

*Potentially, all of them*

---

### Traditional financial assets

- Stocks, bonds, and other traditional equities can be represented as tokens.
- This could reduce costs through disintermediation and increase returns through easier collateralization like stocks, bonds, and other traditional equities can be represented as tokens.

### Non-traditional financial assets

- Include assets that have historically been difficult to trade, like shares or revenue rights to VC funds.
- This could increase the investors pool and increase the liquidity of traditionally illiquid assets.

### Non-traditional assets

- Real estate or art, which are illiquid and often prohibitively expensive to own entire units and transfer ownership rights. Fractional shares in token form make these much easier to buy and trade.
- This could lead to the “securitization” of currently non-financial assets.

### Cash

- Private stablecoins
- Central Bank Digital Currencies
- Retail / wholesale applications

### Rights and schemes

- They can include revenue share agreements, royalties, voting rights, and synthetic derivatives.

---

5
Digital Assets overview
A wide range of developments by various types of stakeholders

Cryptocurrencies
Native digital tokens stored in a blockchain and transferable on a peer-to-peer basis

Security tokens
Crypto-assets representing a security providing financial rights (and potentially other types of rights such as voting rights)

Non-fungible tokens
Digital objects on a blockchain

Stablecoins
Tokens offering price stability vs. fiat currency or referenced assets
- Backed on fiat currency or on other assets (cryptocurrencies, commodities, fiat currency)
- Issued by a decentralised or a centralised actor (in this case private or public)
- Large span of applications: payment, settlement (DvP)

Application tokens
- Utility tokens: crypto-asset providing digital access to a good or service
- Governance tokens (DeFi): crypto-asset representing voting power on a blockchain project
Decentralized Finance ("DeFi")
Covers a wide range of applications and offers high innovation potential in financial services digitization

- Stablecoins
  Digital assets whose price is pegged to the value of the underlying reserve assets to offer a cryptocurrency with little volatility in the price of the coin itself (DAI, sUSD)

- Decentralised exchanges
  Exchanges that enable users to trade their digital assets peer-to-peer without any centralised intermediaries (Uniswap, SushiSwap,Balancer, iDEX, Loopring, Bancor)

- Lending and borrowing
  One of the key functions in today’s current financial system. With blockchain technology, users are now able to carry out such activities without intermediaries (MakerDAO Compound)

- Insurance
  Allows users to get coverage for certain risks (mainly against smart contract failures and the risks related to their deposited crypto assets) without any centralised insurance intermediary (Nexus Mutual)

- Derivatives (Synthetic assets)
  Contracts whose value is derived from the performance of underlying assets. Cryptocurrency-based synthetics allow users to trade the values of various assets on the blockchain network without having the

DeFi provides an open access to peer-to-peer (disintermediated) financial applications
A growing interest for CBDC
More than 86% of central banks experiment

Projects current status
- Research phase
- Pilot phase
- Live

1Source: BIS. Please note that project dates are based on the first publication date of the related report, as provided by BIS. When there is an ongoing or completed pilot, a is marked on the right side of the country flag by a star. Flags without stars indicate that Central Banks are on the stage of research studies. More information concerning the determination of pilot could be found in ‘Rise of the central bank digital currencies: drivers, approaches and technologies’, BIS working paper, No 880, August by Auer, R, G Cornelli and J Frost (2020).
Retail CBDC shows different models with their own peculiarities and characteristics that establish the role and functions of the actors participating in the system:

### 1. Direct issuance
- **Central Bank**
- **API platform/infrastructure**

The Central Bank would build a tech platform with CBDC functionality which allows private sector firms to connect and provide customer-facing services.

### 2. Indirect issuance
- **Central Bank**
- **Stablecoin issuers**

CBDC issued by issued (e.g., non bank FinTechs) – similar to narrow banking (no lending, 100% liabilities covered by reserves at central bank and focused on facilitating payments).

### 3. Hybrid approach
- **Central Bank**
- **Regulated intermediaries**

CBDC issued to regulated intermediary who then distribute to the public. The counterparty risk remains towards the Central Bank that issues the CBDC.

<table>
<thead>
<tr>
<th>Claim</th>
<th>Distribution</th>
<th>Operations</th>
<th>Balance Sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Claim against Central Bank</td>
<td>Central Bank issues CBDC to the public</td>
<td>Central Bank onboard (KYC) and handles retail payments</td>
<td>Central Bank records retail balance</td>
</tr>
<tr>
<td>Claim against Stablecoin Issuers</td>
<td>Stablecoin Issuers issue CBDC to the public</td>
<td>Stablecoin Issuers onboard (KYC) and handles retail payments</td>
<td>Stablecoin Issuers record retail balance</td>
</tr>
<tr>
<td>Claim against Central Bank</td>
<td>Central Bank issues CBDC and Intermediaries distribute to the public</td>
<td>Intermediaries onboard (KYC) and handles retail payments</td>
<td>Both Central Bank and Intermediaries record retail balance</td>
</tr>
</tbody>
</table>
Wholesale CBDC

CBDCs can expand the functionalities of existing currency, making several payments use cases more efficient. There can be several CBDC implementation models. A first driver is the choice of the perimeter: Wholesale or Retail.

1. National

- Central Bank
- Regulated intermediaries

Used for domestic payments. Allows to improve on existing RTGS systems.

2. Cross border

- Central Bank
- Operator Node
- Bank Node
- Bank Node
- Central Bank
- Regulated intermediaries

Used for cross-border transactions between national wholesale CBDC systems. A corridor network is created with an operator node run jointly by both central banks that issues depositary receipts used for the cross-border settlement between the bank nodes of the participating banks.
CBDC accessibility

Despite of the specific model, a CBDC design could take in consideration two different specific accessibility approaches:

**Account based – Ownership is linked to an identity**

Using an identity, counterparties can verify the owner of the account and its balance. A transaction is an update of payer and payee balance.

- **Payer**
- **Transaction**
- **Payee**

Verify User Identity and balance

Financial Operator

Reconciliation

Financial Operator

This type of accessibility resembles the systems we use today for sending digital payments. Main benefits of this approach: **simplify institutions backoffice operations** via standardization.

**Token based – Ownership is linked to a proof**

Using Public Key Cryptography, it is possible to verify digital signatures to execute and verify transfer. A transaction is a change of ownership (keypair) of a specific unit of account.

- **Payer**
- **Transaction**
- **Payee**

Verify User Identity and balance

Via the use of PKI and encryption, it is possible to verify that a digital signature is correct.

This type of accessibility resembles very much the possession of cash. Main benefits of this approach: **financial inclusion** (unbankable users) and **cash handling costs reduction**.
CBDC as new monetary instrument

There is no one best CBDC model out of all, but it should depend on the socio-economic context of the reference country. The model should guarantee flexibility to adapt effectively to several monetary policies and it must take into account the risks associated with different financial scenarios.

CBDC as a tool of monetary sovereignty and a response to crypto-currencies, private coins and foreign CBDCs.

Retail CBDC
- Can contribute to modernize the current monetary system and increase financial security
- Can contribute to bridge the gap with the unbanked
- May brings higher assurance on tax collection

Wholesale CBDC
- Can facilitate interbank payments.
- Can facilitate the use of central bank money within market infrastructures for financial instrument settlement.

Retail CBDC may transform financial intermediation chains and impact financial system, depending on organizational design choices and access globally.

Retail CBDC would attract deposits away from the banking system potentially impacting liquidity.

Foreign use could lead to substitution of the local currency and political instability.

Competition with E-Money if CBDC becomes more convenient.

Fiduciary money value chain to be disrupted if retail CBDC gains traction over coins and bills.

Associated risks that Central Bank and financial institutions have to challenge depending on the CBDC purpose.

Effectiveness

Store of value
CBDC is attractive to hold as a saving vehicles

Mean of payment
CBDC is attractive to use as mean of payment.

Risk

CBDC

Retail CBDC
- CBDC would attract deposits away from the banking system potentially impacting liquidity.
- Foreign use could lead to substitution of the local currency and political instability
- Competition with E-Money if CBDC becomes more convenient
- Fiduciary money value chain to be disrupted if retail CBDC gains traction over coins and bills.
CBDC development could impact banks’ liquidity

Euro area deposits estimated to be potentially reduced by 7-8 % by Morgan Stanley

Scenario 1

All euro area citizens above the age of 15 will want to hold €3,000 in digital euros

Scenario 2

More realistic and homogeneous scenario : ~10% of households’ deposits are converted into digital euros

Euro-area total deposit reduced by 8%

- Increase the loan-to-deposit ratio (LDR) from 97% to 105% (banks in smaller countries could be more impacted than the average)

Euro-area total deposit reduced by 7%

Differences between the countries in both scenarios explained by €3,000 which represent 30% to 50% of total household deposits in small countries compared to 12% in average Euro-zone

Source: Morgan Stanley, « Digital Euro: Rationale and Implications », June 7th 2021
Pour aller plus loin...

Focus sur les développements blockchain en France

- Enjeux et opportunités que représente la blockchain pour l’écosystème français
- Résultats d’une enquête complète auprès d’entreprises du secteur (« pure players ») et d’entreprises « traditionnelles »
- Analyses croisées de la part d’experts du domaine (AMF, ACPR, Banque de France, ADAN, Caisse des Dépôts et des Consignations, pure players et grandes entreprises)

Monnaies Numériques de Banque Centrale

- Analyse des grandes tendances à suivre sur le développement des monnaies numériques de banque centrale
- Baromètre de maturité des différents territoires sur le sujet
- Description des dix projets les plus avancés dans les applications de détail et interbancaires
Merci !