



## ORIGINAL PAPER

# Transforming Capital Markets by means of Financial Digital Assets

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### Abstract:

Digital technologies are deeply embedded into the daily activity of every capital markets professional. They have transformed the sales and trading business over time and will continue to improve it.

The Digital Asset ecosystem has developed significantly since the advent of Bitcoin over a decade ago. Beyond cryptocurrencies, blockchain technology is going to have a revolutionizing impact on financial services, including Capital Markets. The Global Capital Markets including equities and bonds was valued at \$177.5 Trillion at the end of 2019 according to research by SIFMA.

These markets, in essence, represent data, and the benefits of transferring data on a blockchain include accessibility, liquidity, and transparency. The attributes of financial digital assets and how they will transform capital markets will be addressed in paper, focusing on how Blockchain and Distributed Ledger Technology (DLT) can fundamentally change the way financial institutions are exchanging value and building market infrastructure.

**Keywords:** *Capital Markets; Digital Assets; Securities; FinTech; Blockchain.*

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## **Transforming Capital Markets by means of Financial Digital Assets**

### **Introduction**

The macro financial and technological trends are key drivers that are contributing to the exponential growth in Decentralized Finance (DeFi). We have seen the DeFi progression that spread with a speed rarely seen in any other sectors, across financial industry sectors from payments, to banking, lending, investing, and insurance. There is also transformation within financial institutions as they structure data through digitization and standards, share that data and workflow on blockchains, move small elements of business logic into tokens, and eventually transition all supporting software into programmable financial instruments. We are seeing a very intense and emerging ecosystem powered by financial incumbents, FinTechs and Artificial Intelligence (AI) companies that focus their research on decentralized autonomous digital financial assets.

While it's true that FinTech organizations are disruptive, there's more to this equation. When they choose to combine forces, banks and FinTechs can create new financial products and channels that better serve existing clients and help expand outreach. Banks and Institutional Investors are, and remain, the key to the next phase of digital assets market evolution.

FinTechs recognize that staying competitive and delivering what customers want, will require a set of digital assets services underpinned by secure custody.

We often think of "cryptoassets" as only bitcoin or other cryptocurrencies, but is actually a much broader term covering security tokens and new disruptive models for the security value chain from issuance to custody and settlement (Deloitte, 2020).

The creation of a new global capital market powered by digital assets or blockchain-based tokens is one of the most exciting and ambitious vision of blockchain technology and DLT.

Capital Markets function slowly by nature, as companies issuing stocks and bonds have to go through rigorous regulation and auditing, and as an investor, you are locking your funds up with the intention of long-term gains. In terms of accessibility, capital markets are generally only available to those with large amounts of funds and access to private markets.

In the case of accessibility, blockchain technology allows anyone with internet access to interact with these markets from anywhere on the globe, at any time. In some sectors, assets within capital markets suffer from low liquidity. Liquifying your assets is a whole entire process that frequently requires more than just the buyer and a seller and involves a broker or a middle man. Digital assets, alternatively, have a much shorter settlement time. The power of blockchain technology, in some cases, allow funds to be transferred in a matter of seconds from one party directly to another. Also, digital assets offer more transparency than traditional assets as the information sent over a distributed ledger can be tracked with 100% certainty because every single transaction is uniquely recorded on the blockchain. The blockchain industry is going through a maturing phase, but one key fact is that it is still largely undefined. Regulated capital markets will not simply switch to a fully digital ecosystem until there is tighter regulation and more successful case studies.

New market players are starting to emerge by raising capital through the issuance of debt and equity on a blockchain-enabled market. Specifically, stablecoins and digital securities are going to dominate the digital asset landscape for quite some time.

### Digital Architecture

The banking system represents a fundamental pillar of the economic growth and macroeconomic stability, especially in the context of globalization. However, the evolution of the banking sector in each country is affected by continuous changing dynamics of the international banking architecture and financial environment (Spulbar and Birau, 2019).

Most of the DLT platforms being developed for usage in the banking system and financial services use significant variations & evolutions from the original Bitcoin blockchain tech and are “permissioned”, both in terms of who can access the network and who can update it. Access to the network is restricted to a list of known and approved parties, for example, banks who already trade with each other. The use of permissioned platforms might be preferable in some cases because financial institutions handle sensitive data and need to know who they are dealing with on the platform. There are also practical benefits to permissioned networks: if only known and trusted users are admitted to the network, the consensus mechanism used can be significantly faster and more energy and cost efficient than in a permissionless system. This means that permissioned platforms avoid much of the negative environmental impact of permissionless systems.

The United Kingdom Cryptoassets Taskforce (2018) that the Chancellor of the Exchequer launched, consisting of HM Treasury, the Financial Conduct Authority and the Bank of England, considers three broad types of crypto assets:

- **Exchange tokens** – which are often referred to as “cryptocurrencies” such as Bitcoin, Litecoin and equivalents. They utilize a DLT platform and are not issued or backed by a central bank or other central entity. They do not provide the types of rights or access provided by security or utility tokens, but are used as a mean of exchange or for investment purposes;
- **Security tokens** – which refer to a “specified investment” as set out in the Financial Services and Markets Act (2016) (Regulated Activities) Order (RAO). These may provide rights such as ownership, repayment of a specific sum of money, or entitlement to a share in future profits. They may also be transferable securities or financial instruments under the EU’s Markets in Financial Instruments Directive II;
- **Utility tokens** – which can be redeemed for access to a specific product or service that is typically provided using a DLT platform.

Crypto assets are typically used:

- **As mean of exchange**, functioning as a decentralized tool to enable the buying and selling of goods and services, or to facilitate regulated payment services;
- **For investment**, with firms and consumers gaining direct exposure by holding and trading crypto assets, or indirect exposure by holding and trading financial instruments that reference crypto assets;
- **To support capital raising** and/or the creation of decentralized networks through Initial Coin Offerings (ICOs) or Security Token Offerings (STOs).

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The Bank of England recognized the resilience benefits of DLT systems in one of its proofs of concept in June 2016. This involved building a multi-node distributed ledger environment on the Ethereum protocol to enable the transfer of ownership of a fictional asset among several participants, including a central authority that could establish the supply of the asset and permissions to access and use the ledger. The proof of concept demonstrated that participants in the network could continue to trade the fictional asset without the central authority, removing the single point of failure of the system and considerably increasing its resilience. This work also highlighted a number of potential limitations, which were not explored in this proof of concept, but which engaged further investigation, including scalability, security, privacy, interoperability and sustainability.

### **Stablecoins**

A stable coin is simply a cryptocurrency pegged to the price of an asset. Some examples of popular stablecoins include Tether, Paxos, and USDC, which are pegged to the US Dollar (USD). These coins are being used today, and on a relatively large scale. While stablecoins still lack decentralization and require auditing for backed funds, there is no doubt they are instrumental for mass adoption.

Stablecoins have many of the features of cryptoassets but seek to stabilize the price of the “coin” by linking its value to that of a real asset or a pool of assets. Therefore, stablecoins might be more capable of serving as a means of payment and store of value, and they could potentially contribute to the development of global payment arrangements that are faster, cheaper and more inclusive than present arrangements (BIS, 2019).

Stablecoins, regardless of size, pose legal, regulatory and oversight challenges and risks related to:

- Legal certainty;
- Sound governance, including the investment rules of the stability mechanism;
- Money laundering, terrorist financing and other forms of illicit finance;
- Safety, efficiency and integrity of payment systems;
- Cyber security and operational resilience;
- Market integrity;
- Data privacy, protection and portability;
- Consumer/Investor protection;
- Tax compliance.

Moreover, stablecoins that reach global scale could pose challenges and risks to:

- Monetary policy;
- Financial stability;
- The International Monetary System;
- Fair competition.

Berentsen A. and Schär F (2019) presented a paper on stablecoins and they concluded that for price stability, the requirement collateral should be of 100%.

On-chain collateral has many benefits over off-chain collateral. With on-chain collateral, transparency is automatically given as demonstrated by the DAI stablecoin. Every user can verify that the collateral is effectively there. Furthermore, off-chain collateral is a single point of attack and the threat of a sudden closure by an outside

entity is clearly present. When the collateral is on-chain, as for the DAI stablecoin (2017), this threat is non-existent.

The performance of a stablecoin during worst-case-scenario market circumstances is one of the most important components of its ecosystem (Shipman J., Samman G., 2018).

Preparation for a black swan event is a must and this can be achieved by managing the peg and providing stability during times of extreme stress. Any pricing model must be robust enough to withstand a black swan event where all token holders sell at the same time. The reserve must have enough money to payback all holders in this unlikely scenario.

### **Digital Securities**

This digital transformation results from what economists who study scientific progress and technical change call a general-purpose technology—that is, one that has the power to continually transform itself, progressively branching out and boosting productivity across all sectors and industries (Mühleisen M., 2020).

Digital securities, or Asset-backed tokens, are digital assets that represent the value of an underlying asset. Similar to buying a stock in a company, and therefore owning a small percentage of it, digital assets offer the ability to fractionize ownership of any type of asset. This includes, for example, the tokenization of real estate, energy, fine art or any other type of alternative investments you can imagine. Many analysts believe that the digital asset market will dominate the blockchain industry in the near future. By means of tokenization, digital assets provide more accessibility, liquidity, and transparency. Having the security, speed, and decentralization that blockchain offers will only help grow many industries, that can benefit from digital securities.

In the financial services space, tokens can represent the value of an asset that is ultimately held elsewhere, such as a Central Securities Depository (CSD) or in a commodity warehouse.

The first distinction between book-entry and tokenised securities is how transfers are authorised. For book-entry securities, transfer authorisation ultimately depends on the CSD verifying the identity of the account holder. In contrast, for digital tokens authorisation depends on "validation" of the token (Bech M. L. et al., 2020).

If they gain enough traction with issuers and investors, tokens hold the potential to create new opportunities for capital formation, liquidity and more efficient asset management in a huge range of markets. When traded on integrated enterprise blockchain platforms, these tokens unlock liquidity in previously illiquid markets, creating entirely new tradable assets and enabling a more standardized form of trading for currently illiquid assets, such as corporate bonds.

### **Security Token Offerings (STOs)**

STOs are a new form of capital raising, and part of the broader emerging trend of digital securities and tokenization. Because of the relative low cost of STO issuance, businesses that have been too small to tap traditional equity capital markets through IPOs can access equity investors through STOs, allowing diversity of capital and reducing cost of capital.

With the advent of security tokens, the race for tokenization has accelerated to another level. Proposed with a prospect to reduce friction in asset issuance and trading,

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securitize intellectual property rights, and to enable issuers to tap into hard-to-access liquidity around the world, STOs aim to bring the much-needed regulated environment.

One of the most interesting, impactful, and truly innovative changes that STOs offer is encapsulated by the term accessibility, sometimes referred to as financial democratization. At present, traditional stock exchanges are closed more hours a week than open. With digital securities exchanges, this will not be the case as they will be open 24 hours a day, seven days a week, 365 days a year. In fact, securities that sit on these new generation of exchanges will have just one opening bell to signal the start of trading into perpetuity.

As this technology matures, geographic barriers to capital market access will be eliminated due to the decentralized nature of the blockchain. In a fully matured landscape for Security Token Offerings, investors worldwide with funds and an internet connection can participate in opportunities throughout the world.

True transparency will fundamentally transform capital markets and provide a basis on which to grow new asset classes, as well as to clarify existing ones. Every trading operation, issuance application, dividend payout and smart contract execution is transparently recorded on the blockchain to improve the overall securities ecosystem experience. This is an immensely powerful tool which seeks to prevent fraud and theft and will be massively important for payment companies such as PayPal as they navigate and adapt to the new blockchain-based monetary landscape (Nasdaq, 2019).

Another fundamental impact of the STOs is liquidity. The introduction of digitized securities into capital markets promises to increase dramatically the pace and quantity of capital transactions.

Two of the factors that interact in this ecosystem for the generation of liquidity are fractional ownership and asset fungibility. Fractional ownership refers to the property of digital securities that allows them to be divided and sold as a part of the whole. Fungibility of asset classes is a novel concept within the DLT spectrum, the probability of liquidity events increases dramatically if distinct asset classes, when digitized and securitized, are able to be traded interchangeably.

Many view fungibility to be the essential revolutionary element in the development of digital securities. No longer will investors need to partially divest from the stock exchange in order to diversify into other asset classes such as bonds and real estate. Access to digitized investments of all shapes and sizes, from more dependable long-term funds and bonds to quick day-trading equities, will be available to a much larger percentage of the world, thereby driving a veritable explosion of liquidity events.

### **Market Benefits and Translations**

The European Central Bank (Chimienti et al., 2019) has been analyzing the digital asset phenomenon with a view to identifying and monitoring potential implications for monetary policy and the risks crypto-assets may pose to the smooth functioning of market infrastructures and payments, as well as for the stability of the financial system. The financial system may be subject to risks from crypto assets to the extent that both are interconnected; spillover effects may also be transmitted to the real economy. In particular, crypto assets may have implications for financial stability and interfere with the functioning of payments and market infrastructures, as well as implications for monetary policy.

The European Central Bank (ECB) analysis shows that, while these risks are currently contained and/or manageable within the existing regulatory and oversight

frameworks, links with the regulated financial sector may develop and increase over time and have future implications.

Accordingly, the analysis concludes that the ECB should continue monitoring crypto assets, raise awareness of their risks and develop preparedness for any future adverse scenario.

A new “token economy” offers the potential for a more efficient and fairer financial world by greatly reducing the friction involved in the creation, buying and selling of securities (Lauren, P., Chollet, T., Burke, M., Seers, T., 2020).

The article published by Pinna A. and Ruttenberg W., entitled “Distributed ledger technologies in securities post-trading” puts focus on the innovative approach of blockchain and distributed ledger with regards to the securities markets and not only. The paper analyses the main features of DLTs that could influence their adoption by financial institutions and discusses how the usage of these technologies could affect the European post-trade market for securities.

The appeal and benefits of raising capital by issuing debt and equity on a blockchain-enabled marketplace has caught attention throughout the institutional financial services world, and traction is now building among some of the biggest names in finance, including SWIFT, SIX, CLS, DTCC, along with the majority of central banks. This momentum is being fueled by innovation in areas such as custody, settlement and post-trade – which remain critical functions in regulated financial markets – with providers developing an ecosystem of services that replicate these functions for digital assets traded in a blockchain environment.

With certain cryptos, settlement can occur within seconds and value can be moved fluidly. Meanwhile, completing the two-step process of settling a stock through a broker then moving funds to a bank account using the Automated Clearing House (ACH) can take several days.

Tokenized assets may flourish as a complement to “traditional” assets in the financial world by allowing smaller companies to access capital market financing. A Security Token Offering (STO) is an evolution of fundraising (Stefanoski D., 2020). Financing through a STO has structural differences compared with traditional fundraising methods like venture capital or Initial Public Offering (IPO), however it offers various advantages:

- the global reach of digital distribution of tokens;
- more transparency;
- liquidity improvement;
- efficiency and scalability.

### **Custodians**

The increasing interest in digital assets from both retail and institutional investors has given rise to the growth of custody options. As the market evolves, various types of custody options have emerged and new providers are seeking to establish the structures and controls that work best in their markets and for their propositions.

With changing definitions and evolving structures, it is uncertain whether the current regulatory frameworks are applicable to custodians and whether additional controls should be added to existing frameworks.

To define custodianship, it is worth looking at it within the context of traditional capital markets. Generally speaking, custodians are institutions that provide customers

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with an array of financial services including the likes of trade settlement, exchange, clearing, and corporate action execution.

However, one of their most notable roles is in the safekeeping of investors' assets. Custodians are like "vaults", holding investors' assets in both electronic and physical form, charging investors a fee in exchange for maintaining them securely. They enter into agreements with investors, whereby the asset remains temporarily in the custodian's safekeeping, subsequently being returned to the investor upon request. Custodians harness their market expertise to minimize the risk of fraud, theft or loss to those assets.

In the digital asset space, custodians operate in a similar fashion to traditional financial markets in that their primary role remains their responsibility for, and the safekeeping of customer's digital assets. This is achieved through safe key management, which allows the assets to be cryptographically secured. However, unlike for traditional assets, an entity has custody of a digital asset simply by holding the private key on behalf of the asset holder, ensuring that it cannot be accessed by any other party (Smith P., Srivastava N., 2020)

### **Use Cases**

#### ***Depository Receipt***

An early example of this interplay between new technology and established institutions is R3's collaboration with Bank of Canada in 2017 under the name Project Jasper. The project leveraged the depository receipt model, where a token called CAD-COIN represented collateral held by the central bank (in this case, represented by Bank of Canada). Project Jasper demonstrated the potential for an on-chain token that is a digital representation of a type of asset or some form of value held elsewhere by a custodian. The token moves from owner to owner on the ledger based upon the appropriate rule set, while the underlying asset remains with the regulated custodian.

The project demonstrates the potential of blockchain in uniting different services. It allowed for integration of the Canadian TMX equity settlement system with the Payments Canada interbank cash payment settlement system. Tokenization of both cash and equities on a shared ledger resulted in new types of asset interactions during settlement relative to the currently existing clearing and depository services system and large value transfer system (LVTS). Settlement was able to occur without a large increase in the number of LVTS transactions. This was achieved without a rebuild or tight integration of the current systems. It was also accomplished while maintaining each system's separate governance and without compromising the control of either authority over its system or assets.

#### ***Real Estate***

Perhaps one of the most exclusive real-world use cases for asset-backed tokens is real-estate, especially with reports of multi-million-dollar condo developments and high-end resorts seeking funding via blockchain.

Currently, a piece of property is a very illiquid asset as selling it is not a straightforward or standardized process, and there are costs associated with the sale, with no guarantee of buyers. The only liquidity in today's property market is generated by real-estate investment funds (REITs), which can be both publicly traded or non-traded, and special purpose entity (SPE) equity investments that have a much longer holding period.



Tokenization provides benefits when a property is divided up into multiple stakes, as each token represents digital ownership in the underlying asset. These tokens can then be freely and easily traded with anyone around the world on a digital exchange. To the end investor, purchasing a real-estate token reflects the process of a traditional real estate investment, however it would rely on a blockchain based system, rather than a third-party custodian, to establish ownership and safe transfer of the asset. For a property developer, this opens up a major new channel for gaining funding. As in any market, the key to liquidity is instantaneous access to buyers and a simplified transaction process.

### ***Corporate Bonds***

Projects focusing on the corporate bond market have been able to model the entire lifecycle of the bond within a blockchain platform. For example, coupon payments can be made directly to bondholders through pre-arranged contracts. Similarly, corporate bonds can be traded on the secondary market that exist within the same blockchain network.

Representing a corporate bond directly on a blockchain platform reduces the time involved in both discovery and settlement of a particular bond. For example, an investor looking for automotive sector debt no more than five years from maturity could simply enter these criteria into the blockchain-based registry and find all the relevant bonds currently in circulation. Additionally, bonds traditionally settle T+2, with additional delays for payments, but if all aspects of the bond live on the ledger, all information can be updated and seen by relevant parties in real time.

Corporate Bonds have attracted particular focus from firms experimenting with asset-backed tokenization because of their illiquidity challenges. Since the financial crisis there has been a huge shift towards more electronic trading in the less liquid parts of the bond markets, but despite this, the corporate bond markets remain extremely low-tech compared to most other asset classes.

HSBC (2020) has played a key role in a groundbreaking deal demonstrating how digital technology could help businesses issue bonds securely, efficiently and quicker than ever.

The bank has been working with the Singapore Exchange (SGX) and investors Temasek Holdings since 2019 to explore the use of distributed ledger technology (DLT) in the country's bond market.

The partnership has just successfully simulated a fully digitalized bond issuance on SGX's DLT-enabled platform.

### **Conclusions**

Today there are over 130 global securities exchanges that are trading equities, options, exchange-traded funds (ETFs), futures, swaps, and derivatives for cash, energy, and commodities. All are operating in an industry being reshaped by business challenges, strategic choices, and the possibilities that emerging technologies offer (Myers D., Walley R., 2020).

Blockchain technology is driving an unprecedented period of innovation across capital markets and other industries.

The digital asset landscape has matured significantly since the early days of Bitcoin, with asset-backed tokens and native tokens emerging as the clear forerunners for capital markets use cases. The real potential of digital assets, however, is to open up financial services to a vast retail customer base.

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This interplay of a regulated custodian linked with an on-chain digital representation is critical to enabling digital assets to unlock new ways for markets and marketplaces to transact and expand. It also offers a way for enterprises to begin to iterate and implement enterprise-friendly digital assets, as the model builds out from an accepted regulatory base, with the assets held at a regulated custodian.

Tokenization would ultimately increase the potential investor base, which would help promote further growth in liquidity in corporate bonds. A tokenized bond is by its nature more accessible across borders and different investor classes, breaking down the barriers that have traditionally prevented certain types of market participants from trading with each other and making true all-to-all trading a reality in this market.

Blockchain would also add resiliency to a currently fragmented corporate bond market. Tens of thousands of corporate bonds are in circulation at any given time, with hundreds of dealers providing prices across multiple different electronic platforms. To a trader, the end result is millions of data points per day that just require attention, most of which are of questionable quality. In order to trade certain corporate bonds, a portfolio manager must go to a primary issuer or know who is trading them in the limited secondary market. This task can be so challenging that some corporate bonds are rarely traded.

Tokenization would allow corporate bonds to be fully standardized and listed on a digital asset registry with fully transparent pricing.

The benefits of tokenizing assets are manifold. From higher cost efficiency to leaner trade financing options, there are various opportunities. At the same time, it's important to acknowledge and address certain challenges.

Asset tokenization is not the future, it's the present. This deeply transformative innovation offers promising possibilities for financial markets and despite an exponentially increasing interest in tokenized assets, conventional financial institutions and competent authorities are still cautious in their approach to asset tokenization.

With great benefits and features of this innovating technology, come also new risks. In the case of stablecoins, their global adoption could have significant adverse effects, both domestically and internationally, on the transmission of monetary policy, as well as financial stability, in addition to cross-jurisdictional efforts to combat money laundering and terrorist financing. They could also have implications for the international monetary system more generally, including currency substitution, and could therefore pose challenges to monetary sovereignty.

Stablecoins may combine novel and untested technology and new entrants to financial services, and could pose risks that fall outside existing frameworks. This may also create new risks, which should be addressed by requiring compliance with the highest regulatory standards, potentially revising existing standards or creating new standards and regulations where needed.

Digital assets have several characteristics that make them unique from a taxation perspective. They are worthy of consideration, as existing tax rules have not typically been developed with digital assets in mind, and in many cases have not kept up with developments in this space. PwC released its Annual Global Crypto Tax Report 2020, which aims to evaluate and review the existing digital assets tax guidance globally and identifies areas where there are gaps or where guidance may need to be refined and added. The report discusses survey participants' views of the development of tax guidance internationally to date and sets forth a tax jurisdiction by jurisdiction view on

digital assets as a means of exchange and an investment class, trading and exchanges, lending, mining and issuance, and tax reporting.

#### References:

- Bank of England, (2016). Fintech Accelerator proof of concept'. Retrieved from <https://www.bankofengland.co.uk/research/fintech/-media/boe/files/fintech/pwc.pdf>.
- Bech, M. L., Hancock J., Rice T., Wadsworth A., (2020). Bank for International Settlements (BIS) - On the future of securities settlement. Retrieved from: [https://www.bis.org/publ/qtrpdf/r\\_qt2003i.htm](https://www.bis.org/publ/qtrpdf/r_qt2003i.htm).
- Berentsen, A., Schär, F., (2019). Stablecoins: The quest for a low-volatility cryptocurrency.
- BIS, (2019). Bank of International Settlements - G7 Working Group Stablecoins - Investigating the impact of global stablecoins. Retrieved from: <https://www.bis.org/cpmi/publ/d187.pdf>.
- Calle, G., Singh-Jarrold, B., McDonald, T., Nicol, D. (2019). R3 – Digital Assets: Transforming Capital Markets. Retrieved from <https://www.r3.com/wp-content/uploads/2019/06/DigitalAssets.Transforming.CapitalMarkets.R3.May-2019-copy.pdf>.
- Chapman, J., Garratt, R., Hendry, S., McCormack, A., McMahon W. (2017). Bank of Canada - Project Jasper: Are Distributed Wholesale Payment Systems Feasible Yet? Retrieved from: <https://www.bankofcanada.ca/wp-content/uploads/2017/05/fsr-june-2017-chapman.pdf>.
- Chimienti, T., Kochanska, U., Pinna, A. (2019). European Central Bank - Understanding the crypto-asset phenomenon, its risks and measurement issues. ECB Economic Bulletin, Issue 5/2019. Retrieved from: [https://www.ecb.europa.eu/pub/economic-bulletin/articles/2019/html/ecb.ebart201905\\_03~c83aeaa44c.en.html#toc1](https://www.ecb.europa.eu/pub/economic-bulletin/articles/2019/html/ecb.ebart201905_03~c83aeaa44c.en.html#toc1).
- DAI, (2017). MakerDAO - The Dai Stablecoin System. Retrieved from: <https://makerdao.com/whitepaper/DaiDec17WP.pdf>
- Deloitte, (2020). Are token assets the securities of tomorrow?. Retrieved from: <https://www2.deloitte.com/lu/en/pages/technology/articles/are-token-assets-securities-tomorrow.html#>.
- HSBC (2020). How blockchain could revolutionise bonds. Retrieved from: <https://www.hsbc.com/who-we-are/hsbc-news/how-blockchain-could-revolutionise-bonds>.
- Lauren, P., Chollet, T., Burke, M., Seers, T. (2020). Deloitte – The tokenization of assets is disrupting the financial industry. Are we ready?. Retrieved from: <https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/financial-services/lu-tokenization-of-assets-disrupting-financial-industry.pdf>.
- Mühleisen, M., (2018). The Long and Short of The Digital Revolution. International Monetary Fund - FINANCE & DEVELOPMENT, JUNE 2018, VOL. 55, NO. 2. Retrieved from: <https://www.imf.org/external/pubs/ft/fandd/2018/06/impact-of-digital-technology-on-economic-growth/muhleisen.htm>.
- Myers, D., Walley, R., (2020). Deloitte - Bank of 2030: The digital future of securities exchange operations. Retrieved from: <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Financial-Services/gx-digital-future-of-securities-exchange-operations.pdf>,

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- Nasdaq, (2019). 3 Ways Blockchain Will Transform Capital Markets. Retrieved from: <https://www.nasdaq.com/articles/3-ways-blockchain-will-transform-capital-markets-2019-04-09>.
- Pinna, A., Ruttenberg, W. (2016). Distributed ledger technologies in securities post-trading. Revolution or evolution? European Central Bank. Occasional Paper Series. No 172.
- PwC, (2020). PricewaterhouseCoopers Hong Kong – PwC Annual Global Crypto Tax Report 2020. Retrieved from: <https://www.pwchk.com/en/research-and-insights/fintech/pwc-annual-global-crypto-tax-report-2020.pdf>.
- Regulated Activities Order - Specified investment', FCA, (2016). Retrieved from: <https://www.handbook.fca.org.uk/handbook/glossary/G1117.html?date=2016-03-21>
- Shipman, J., Samman, G., (2018). PwC – Stable Coin evolution and market trends: Key Observations. Retrieved from: <https://www.pwc.com.au/pdf/stable-coin-evolution-and-market-trends.pdf>.
- SIFMA, (2020). Capital Markets Fact Book, 2020. Retrieved from: <https://www.sifma.org/resources/research/fact-book/>
- Smith P., Strivastava N., (2020). Deloitte – A market overview of custody for Digital Assets – Digital Custodian Whitepaper. Retrieved from: [https://www2.deloitte.com/content/dam/Deloitte/xs/Documents/finance/me\\_Digital-Custodian-Whitepaper.pdf](https://www2.deloitte.com/content/dam/Deloitte/xs/Documents/finance/me_Digital-Custodian-Whitepaper.pdf).
- Spulbar, C., Birau, R. (2019). "Financial Technology and Disruptive Innovation in ASEAN", Chapter 7 "The effects of cybercrime on the banking sector in ASEAN", Publisher: IGI Global, USA, ISBN13: 9781522591832, ISBN10: 1522591834, EISBN13: 9781522591856, DOI: 10.4018/978-1-5225-9183-2, Retrieved from: <https://www.igi-global.com/book/financial-technology-disruptive-innovation-asean/219369>.
- Stefanosky, D. (2020). EY - How can companies drive the tokenization of assets? Retrieved from: [https://www.ey.com/en\\_ch/blockchain/how-can-companies-drive-asset-tokenization](https://www.ey.com/en_ch/blockchain/how-can-companies-drive-asset-tokenization).
- Taskforce, C, (2018). Cryptoassets Taskforce: Final Report. HM Treasury, Financial Conduct Authority and Bank of England. Retrieved from: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/752070/cryptoassets\\_taskforce\\_final\\_report\\_final\\_web.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/752070/cryptoassets_taskforce_final_report_final_web.pdf).

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