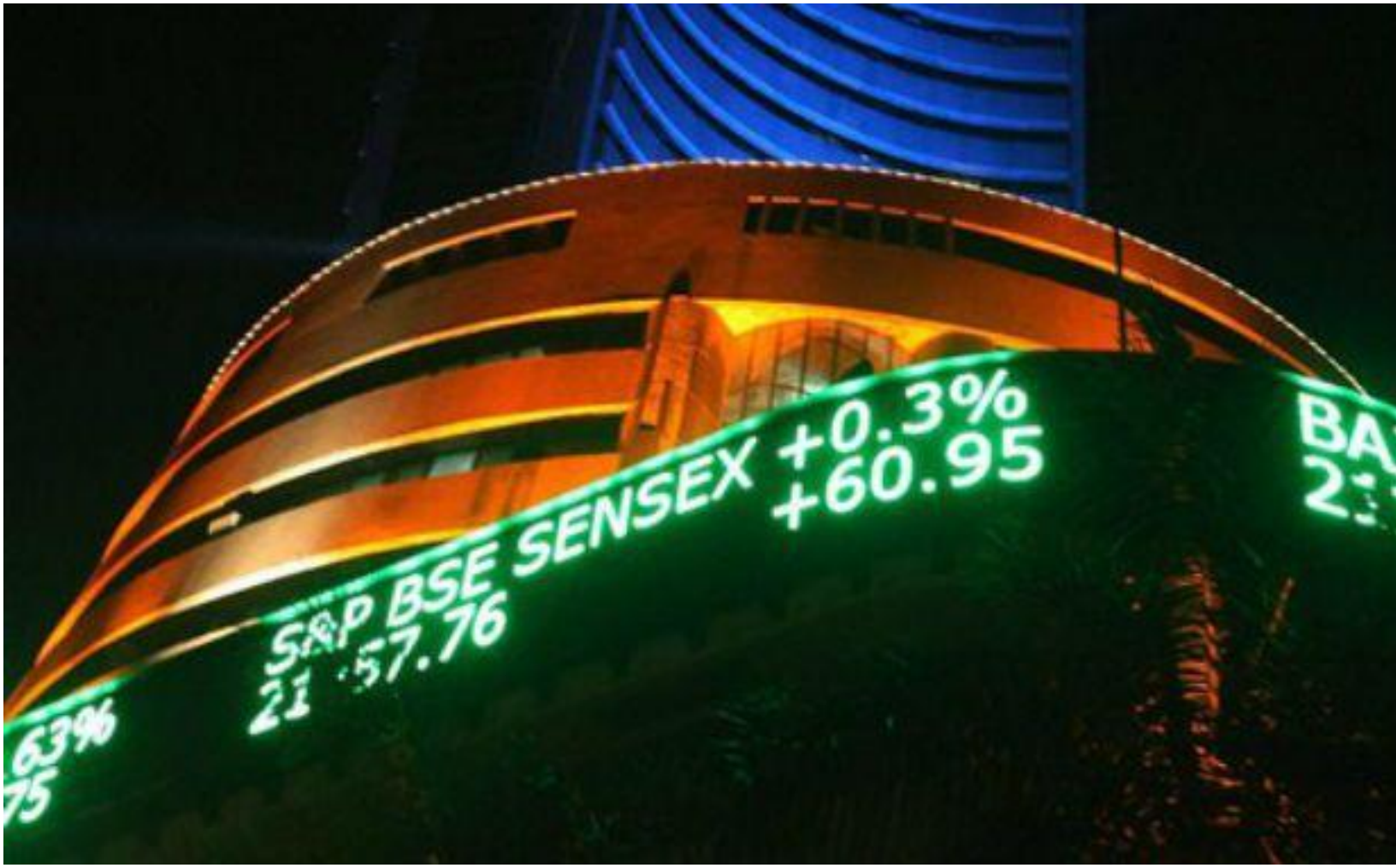
JUNE 2023

Revolutionizing Settlements: Platform for Custodian Of Securities

Beyond Time And Borders : Blockchain Empowering T+0 Settlements

A Whitepaper to the industry



CONTENTS

Executive Summary

The existing securities custodian system in India lacks an efficient and secure mechanism to enable T0 (T-zero) transactions and integrate DMAT (Dematerialized) accounts with Central Bank Digital Currency (CBDC). The current process of buying and selling securities involves multiple intermediaries, delays, and potential for fraud, leading to inefficiencies and increased costs for investors. Therefore, there is a need to develop a platform that leverages Hyperledger Fabric blockchain technology to transform securities into tokens, facilitating seamless ownership transfer while ensuring the integrity and transparency of transactions.

KEY CHALLENGES

[1]The industry believes that moving to a T+1 settlement cycle will increase the overall efficiency of the securities markets, mitigate risk, create better use of capital, and promote financial stability, provided that the appropriate balance is achieved between increasing efficiencies and mitigating risk. These benefits will be realized through direct and indirect means by both industry participants and investors as much of the settlement infrastructure will require reengineering given the compressed timeframes.

Below is a summary of the primary benefits anticipated by adopting T+1 settlement:

- **Reduction of risk, particularly during periods of high volume and volatility:** As the volume of unsettled trades over a single trading day and the time between trade and settlement is reduced, there will be a reduction in systemic, counterparty, and operational risk across the settlement ecosystem, particularly in periods of market volatility. Furthermore, T+1 settlement preserves the benefits of settlement netting at NSCC and, thereby, significantly reduces the volume of securities and currency required to be moved across markets on any given trading day.

- **Reduction in liquidity requirements:** With firms' market and counterparty exposure over the settlement period reduced, there is a reduction in margin requirements posted to NSCC by its members. This reduction will allow broker-dealers to better manage their capital and liquidity risks and better utilize their available capital. For investment funds, T+1 will align the

[1] Reference: DTCC Accelerating the U.S. securities settlement cycle to T+1 Published December 1, 2021 | SIFMA | Deloitte

settlement cycle of U.S. mutual fund shares with the portfolio securities settlement cycle, thus improving cash and liquidity management.

• **Capital and operational efficiencies:** Capital and operational efficiencies can be grouped into three categories: infrastructure modernization, standardization of industry processes and reduction in costs.

[2]Each category is explained further below:

• **Infrastructure modernization:** Through technology adoption, the automation of manual processes will significantly reduce operational risk, increase productivity, and reduce friction for market participants. The migration to T+1 provides opportunities to:

▪ Accelerate industry adoption of Straight-Through Processing (STP) and reengineer certain processes. For example, enabling match-to-instruct capabilities for trade affirmation and confirmation, will eliminate redundant processes, save time and expenses, and reduce manual errors

▪ Optimize margin calculations and reduce margin requirements among customers, brokers, and clearinghouses (due to the recommended changes in the allocation11 and affirmation timelines)

• **Standardization of industry processes:** By adopting the recommended best practices in this report and implementing behavioral changes across the industry, market participants have an opportunity to standardize and synchronize processes in order to facilitate greater transparency and real-time / near-time access to critical data across the financial ecosystem. Specifically, the migration to T+1 settlement may require standardization for certain industry processes in order to meet updated timelines, including to:

▪ Coordinate processing timelines and formalize and adopt industry best practices to facilitate optimized information sharing and data transfers between counterparties, particularly for critical reports or deadlines (e.g., sharing intraday trade allocation data between counterparties)

▪ Formalize SLAs between counterparties for as soon as possible allocation submissions to facilitate more timely allocations from block trades

▪ Standardize processes for prime broker customer onboarding to enable automated capabilities for recurring, time-sensitive processes (e.g., Form 1 Schedule A)

---

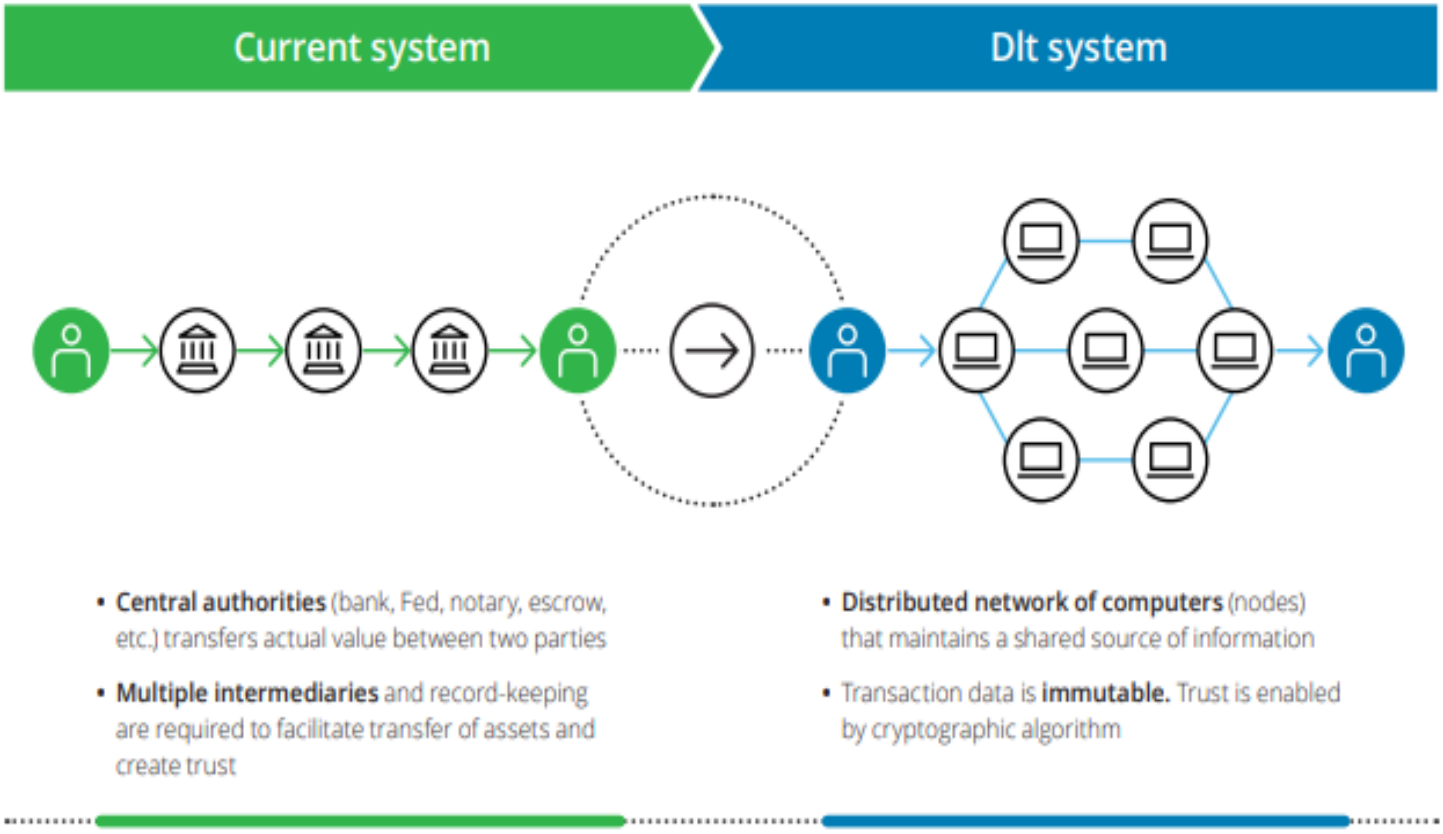
[2] Reference: DTCC Accelerating the U.S. securities settlement cycle to T+1 Published December 1, 2021 | SIFMA | Deloitte

▪ Develop an automated and standardized straight-through settlement processing path for unaffirmed institutional transactions and disaffirmed trades

• **Reduction in costs:** While there may be increased buy-ins, earlier up-front close outs, and up-front implementation costs to transition the industry to T+1, the industry foresees long-term cost reduction for market participants, and by extension, costs borne by end investors, given the benefits of moving to T+1 settlement

[3]While there is skepticism about the merits of introducing a T+1 settlement cycle without impacting the value chain, market practitioners are also open to the concept of T+0, otherwise known as instantaneous or atomic settlement. Again, the benefits of shorter settlement cycles (e.g. less counterparty risk, capital and liquidity savings) ring true for T+0 just as they do for T+1. It is also clear that many of the barriers inhibiting T+1 will likely be the same obstacles hampering the future adoption of T+0. “New technologies could help the industry overcome these underlying problems,” suggests Clarke. “Rather than accelerating the settlement cycle to T+1 using existing technology and processes, forward-thinking post-trade providers believe that the industry should leverage innovative technologies such as DLT (distributed ledger technology) and smart contracts to achieve T+1 or directly to T+0.”

[4]Below image represents the transition current system operation to a DLT system operation



[3] Reference: Accelerated Settlements : The move towards T+0 | Deutsche Bank
[4] Reference: Are Token Assets The Securities Of Tommorow | Deloitte

KEY BENEFITS

- **Lack of T0 Transactions**: [5]The absence of T0 transactions, which allow instantaneous settlement of securities, results in delays and exposes investors to market risks. A robust platform is required to facilitate near-instantaneous transfers of securities ownership upon trade execution.

- **Integration of DMAT Accounts:** The integration of DMAT accounts, which hold securities in electronic form, with the proposed platform is crucial. The system should seamlessly interface with DMAT accounts to tokenize the securities and enable their transfer using blockchain technology.

- **Adoption of CBDC:** The platform should integrate with the Central Bank Digital Currency (CBDC) infrastructure to enable the transfer of funds in real-time during securities transactions. This integration is necessary to streamline the payment and settlement processes, eliminating the need for traditional banking intermediaries.

- **Security and Privacy:** Maintaining the highest level of security and privacy is paramount in the custodian platform. The blockchain infrastructure must employ robust encryption techniques, access controls, and identity management protocols to ensure secure ownership transfer and protect sensitive investor information.

- **Regulatory Compliance:** The platform should adhere to the regulatory requirements set forth by the Securities and Exchange Board of India (SEBI) and other relevant authorities. Compliance with regulations such as Know Your Customer (KYC), Anti-Money Laundering (AML), and Securities Settlement System guidelines is critical to ensure the legality and trustworthiness of the platform.

- **User Experience:** The platform should provide a user-friendly interface for investors, brokers, and other market participants. Intuitive features, easy navigation, and comprehensive reporting capabilities should be incorporated to enhance user experience and encourage adoption among a wide range of stakeholders.

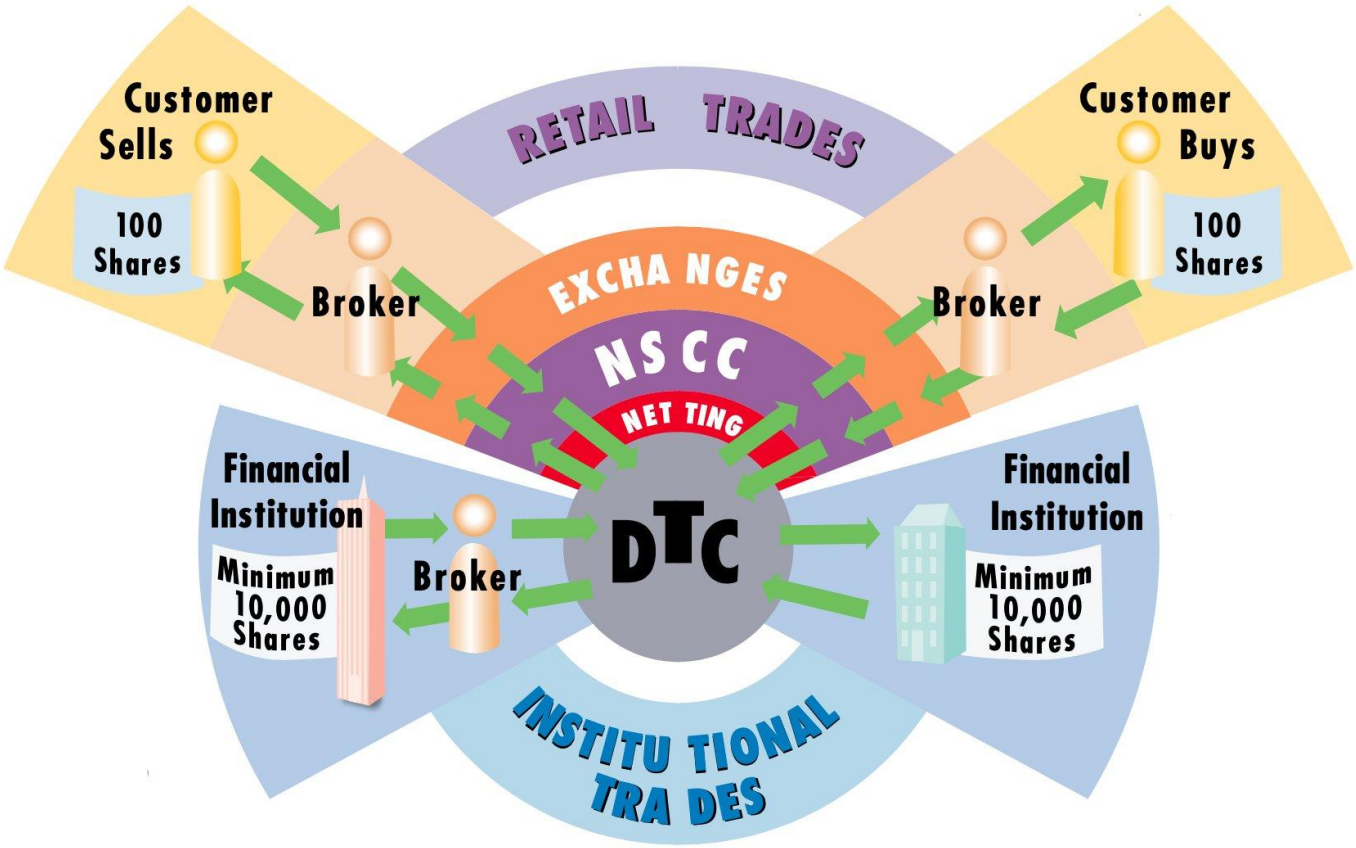
Overall, the development of a custodian platform utilizing Hyperledger Fabric blockchain technology, with seamless integration of DMAT accounts, CBDC, and tokenization of securities, will address the aforementioned challenges. Such a platform will revolutionize the stock market in India by enabling T+0 transactions, reducing settlement times, enhancing security, and streamlining the overall securities trading process for the benefit of all market participants.

[5] Reference: Accelerated Settlements : The move towards T+0 | Deutsche Bank

Magnitude Of The Problem

It is important to note that while NSCC and DTC are prominent entities in the U.S. market, the indian market has its own clearing and depository organizations with similar functions and services such as National Securities Clearing Corporation Limited (NSCCL) which is the clearing and settlement subsidiary of the National Stock Exchange of India (NSE) and the Central Depository Services Limited (CDSL) and National Securities Depository Limited (NSDL) and two major depository participants in India which facilitate electronic holding, settlement and transfer of securities, similar to the services provided by DTC.

[6]NSCC and DTC clear and settle T+1 and same-day (T+0) every business day across multiple counterparties and markets.
[7]

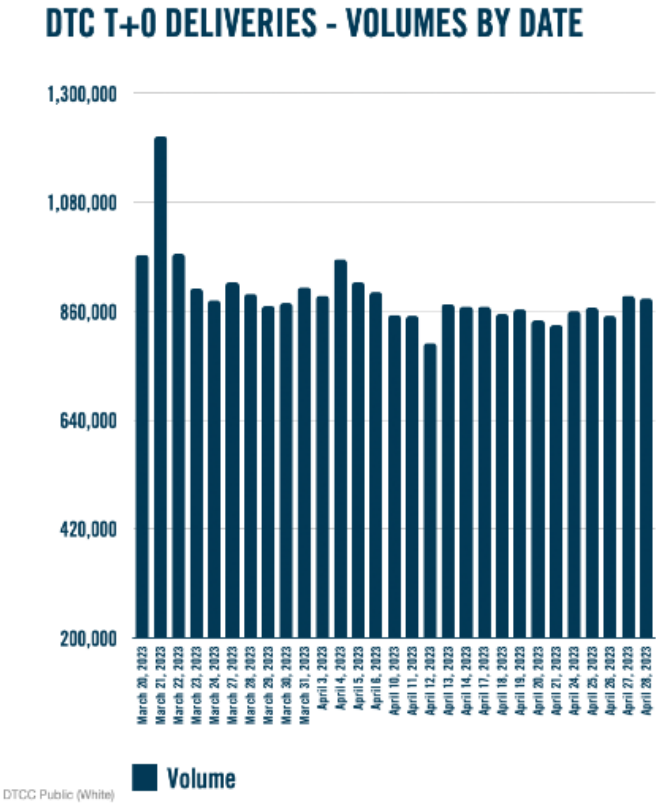


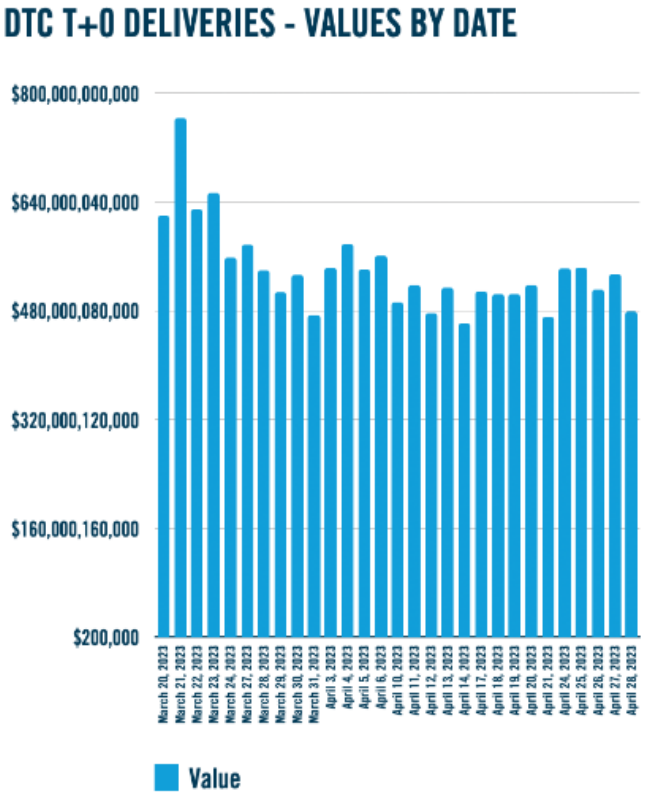
[6] Reference: DTCC Whitepaper Settlement By The Numbers | Shortening The U.S. Equities Settlement Cycle
[7] Reference: image explanation Jesse Daugherty twitter thread

[8]Time to settlement equals counterparty risk, and margin requirements, which are designed to mitigate those risks, represent cost to members. The most logical way to reduce the risks that drive margin requirements is to shorten the settlement cycle. In fact, risk model simulations have shown that the Volatility component of NSCC's margin could potentially be reduced by 41% by moving to T+1, assuming current processing and without any other changes in client behavior.

DTC: The values and volumes captured in the T+0 charts exclude DTC deliveries processed with Reason Code 77, as well as CNS and CNS ACATS transactions.

NSCC: Using UTC data, data is filtered by: trade date; CNS or non-CNS netting; settlement type of same day (T+0) and next day (T+1); and trades are broken down by dollars and volumes.



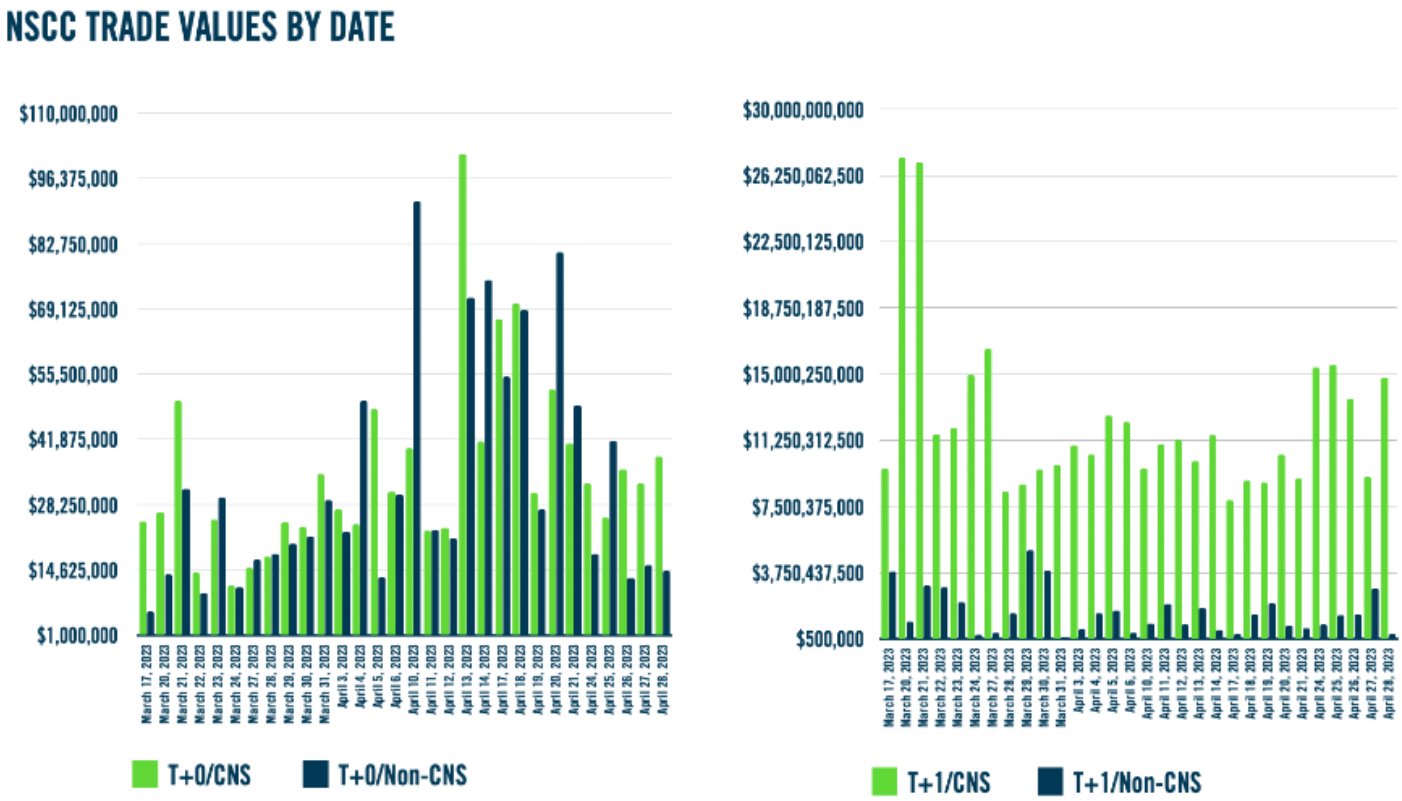


- **Increased Trade Volume:** T+0 settlements eliminate the traditional settlement period, allowing investors to buy and sell securities on the same day. This shortened settlement cycle encourages more frequent trading activity as investors can quickly capitalize on market opportunities and react to news and events. The elimination of the settlement delay removes a barrier to executing trades, leading to a potential increase in trade volume.

[8] Reference: DTCC Whitepaper Settlement By The Numbers | Shortening The U.S. Equities Settlement Cycle

▪ **Intraday Trading:** T+0 settlements facilitate intraday trading strategies, where investors open and close positions within a single trading day. With the ability to settle trades instantly, investors can engage in more active and short-term trading, taking advantage of intraday price fluctuations. Intraday trading strategies tend to involve higher trade volume as positions are opened and closed multiple times during the day, contributing to increased trading activity.

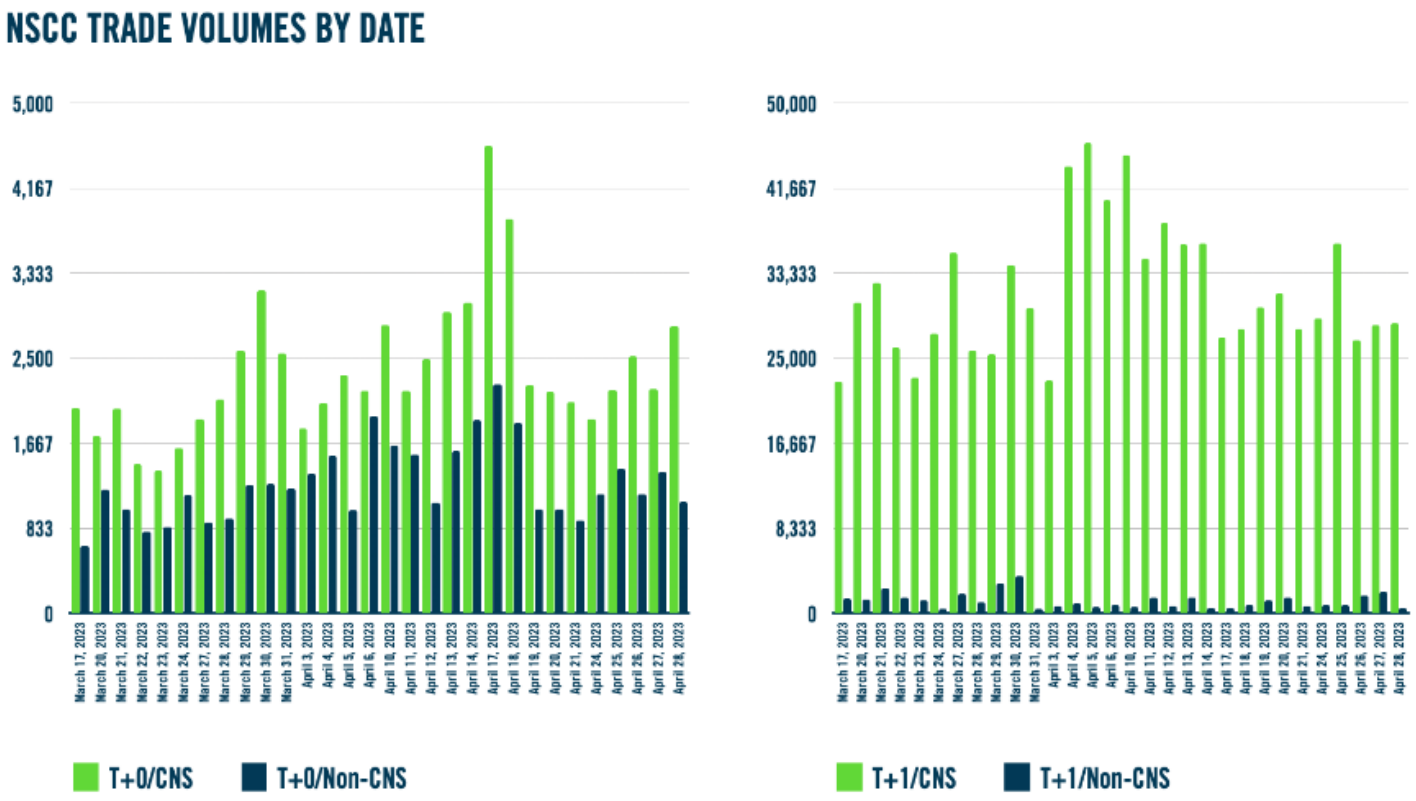
▪ **Scalping and Arbitrage Opportunities:** T+0 settlements enable traders to seize scalping and arbitrage opportunities. Scalping involves capturing small price differentials by executing multiple trades within a short period, aiming to profit from minor price movements. Arbitrage strategies capitalize on price discrepancies between different markets or trading venues. T+0 settlements facilitate the execution of such strategies in a more efficient and timely manner, potentially leading to higher trade volumes.
9



▪ **Market Liquidity:** T+0 settlements can enhance market liquidity, which refers to the ease of buying and selling securities without significant price impact. With the shorter settlement cycle, traders and investors have quicker access to funds from settled trades, enabling them

9 Reference: DTCC Whitepaper Settlement By The Numbers | Shortening The U.S. Equities Settlement Cycle

to participate in subsequent trades promptly. This increased liquidity encourages more market participants to engage in trading, contributing to higher trade volumes.
[10]



- **Impact on Trade Value:** T+0 settlements may also impact the value of trades in the market. The elimination of the settlement period allows investors to quickly realize gains or losses from their trades. As a result, the frequency of trade execution and profit realization can impact the overall value of trades conducted in the market. Increased trading activity associated with T+0 settlements can lead to higher trade values as more transactions occur within a given time period.

- **Market Efficiency:** T+0 settlements promote market efficiency by reducing the time gap between trade execution and settlement. With near-instantaneous settlements, market participants can quickly allocate capital, respond to market developments, and adjust investment strategies. The improved efficiency can attract more participants to the market, potentially increasing both trade volume and value.

[10] Reference: DTCC Whitepaper Settlement By The Numbers | Shortening The U.S. Equities Settlement Cycle

T+0 SETTLEMENT IMPACT ON THE MARKET

- **Quicker Settlements:** Higher trading volumes indicate a more active market with increased liquidity. This means there is a larger pool of buyers and sellers available, making it easier to match trades and settle them promptly. With improved liquidity, T+0 settlements can be executed swiftly, reducing the time required for transaction settlement.

- **Reduced Price Impact:** Higher trading volumes contribute to a deeper market, which means there is a greater number of orders available at various price levels. This depth in the market reduces the price impact of individual trades. When executing T+0 settlements, reduced price impact is advantageous as it minimizes the risk of unfavorable price movements during the settlement process.

- **Lower Transaction Costs:** Enhanced liquidity resulting from higher trading volumes often leads to lower transaction costs. With a larger number of participants and increased trading activity, bid-ask spreads tend to narrow. This means investors can buy and sell securities at prices closer to the prevailing market rates. Lower transaction costs are beneficial for T+0 settlements as they reduce the overall expenses associated with executing trades and settling transactions.

- **Improved Price Discovery:** Higher trading volumes contribute to more accurate and efficient price discovery. When there is increased liquidity, the market reflects a wider range of participants' opinions and expectations. This results in better-informed pricing of securities. Improved price discovery benefits T+0 settlements as it ensures that trades are settled at prices that are more closely aligned with the fair market value at the time of the transaction.

- **Mitigated Counterparty Risk:** Higher liquidity reduces counterparty risk in T+0 settlements. With more active participants and increased trading volumes, there is a higher probability of finding a counterparty to match and settle a trade. This helps mitigate the risk of failed trades and enhances the overall reliability of T+0 settlement processes.

- **Enhanced Flexibility:** Improved liquidity provides investors with greater flexibility in executing T+0 settlements. Investors can quickly enter or exit positions, adjust their portfolios, and take advantage of short-term trading opportunities. The ability to swiftly execute trades and settle them on the same day allows for more agile portfolio management and efficient capital allocation.

- **Market Stability:** Higher trading volumes and improved liquidity contribute to market stability. A liquid market is less prone to sudden price swings and market disruptions. This stability is crucial for T+0 settlements, as it ensures that the settlement process can proceed smoothly without significant disruptions or unexpected price movements.

The Scale Of Business Opportunity

“Another driver behind the potential adoption of T+0 is the growing appetite for digital assets such as tokenized securities” - Mike Clarke Global Head of Securities Services Product Management at Deutsche Bank

[11]Whereas DLT provides a real-time, single source of truth, smart contracts can be utilized to facilitate securities and cash settlement in what would create an ecosystem supporting atomic settlement, namely the simultaneous transfer of cash and securities. This could help market users procure massive operational and cost savings, especially as instantaneous settlement would remove the need for CCPs. Similarly, the emergence of central bank digital currencies (CBDCs) could play a role in bringing about T+0. CBDCs – namely digital iterations of fiat currencies issued by central banks,7 which are stored on a DLT – engineer efficiencies in securities settlement by using central bank money. As investment into these technologies increases, the possibility of delivering on T+0 will grow.

Another driver behind the potential adoption of T+0 is the growing appetite for native digital assets or forms of tokenized securities, continues Clarke.8 While there are reservations about the virtues of tokenizing existing assets such as equities and bonds – mainly because it could result in a splitting up of the underlying liquidity – Clarke says there is a compelling case for potentially tokenizing illiquid instruments such as real estate. Through tokenization, once illiquid instruments could become more accessible as collateral, which in turn will help generate much-needed liquidity.
“The priority for the securities industry should be on identifying ways in which these new digitally native assets can be transacted and settled on a T+0 basis from the outset” explains Clarke. In fact, the settlement of digital assets is something in which regulators – such as the European Commission – are taking an interest. Among one of the objectives of the EU’s proposed Markets in Crypto-assets Regulation (MICA)9 is the establishment of a sandbox for market infrastructures to support trading and settlement of regulated digital assets using DLT. This could pave the way for new technologies to be integrated into the trade settlement process − in what could precipitate an eventual roll-out of T+0.

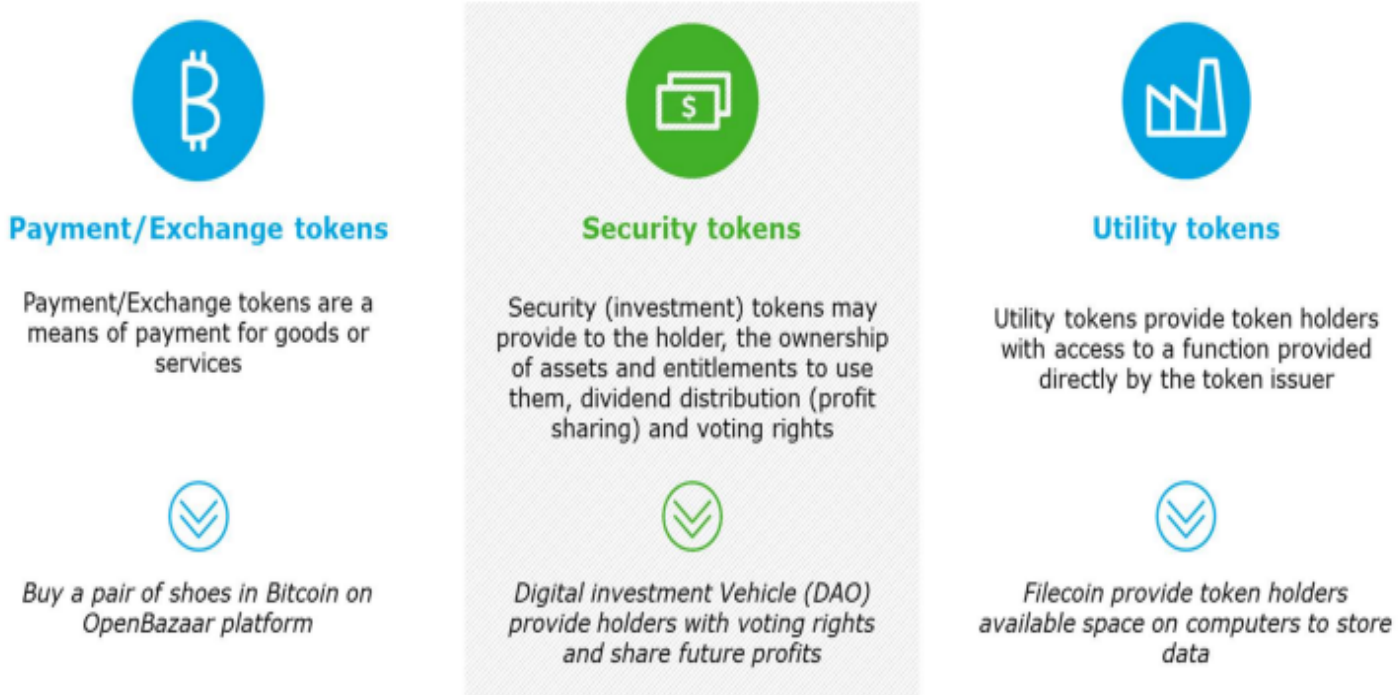
However, there are stumbling blocks which need addressing. Today, technologies such as DLT, digital assets and smart contracts are not subject to uniform industry standards or common regulation. Without some degree of basic harmonization, the ability for market participants to interoperate with each other in post-trade processes such as trade settlement risks being undermined. More fundamentally, T+0 will never be achievable unless other activities in the investment value chain become real-time or instant as well. For example, if

[11] Reference: Accelerated Settlements : The move towards T+0 | Deutsche Bank

payment settlement systems and FX processing continues to rely on antiquated or legacy technologies, then T+0 will be harder to achieve. Only unless there is meaningful digitalisation across the entire transactional life-cycle will T+0 become a reality.

[12]We often equate cryptoassets with bitcoin or other cryptocurrencies. But "crypto-asset" is actually a much broader term covering security tokens and new disruptive models for the security value chain from issuance to custody & settlement.

Security token Tokens issued via an ICO may have an investment dimension; these tokens are more similar to financial instruments than they are to cash. They should bethought of as assets providing rights such as ownership, payment of a specific sum of money (dividend) or entitlement to a share in future profits or cash flows. Security tokens may qualify as transferable securities or financial instruments under the EU's Markets in Financial Instruments Directive (MiFID II). Just as depository receipts are certificates representing securities, security tokens are the digital representation of existing securities such as equities, debt instruments, funds, etc. Some tokens may fall into several categories (e.g., investment and payment tokens). These are what we refer to as "hybrid tokens".



Combining Central Bank Digital Currency (CBDC) with Dematerialized (Demat) accounts through the use of Distributed Ledger Technology (DLT) to enable T+0 settlements presents a significant business opportunity with a wide range of potential benefits. Here's an overview of the scale of the business opportunity:

[12] Reference: Are token assets the securities of tomorrow? | Deloitte

- **Increased Trading Activity:** T+0 settlements eliminate the need to wait for the traditional settlement period, allowing investors to buy and sell securities on the same day. This increased trading activity presents a substantial business opportunity for stock exchanges, brokerages, and financial institutions. Higher trading volumes generate transaction fees, commission revenues, and increased market activity, leading to potential growth in their businesses.

- **Liquidity Provider Services:** With T+0 settlements, there is a higher demand for liquidity, as trades need to be settled immediately. This creates an opportunity for financial institutions and liquidity providers to offer intraday financing solutions, such as margin lending or intraday loans. These services can generate revenue through interest charges and fees associated with providing intraday liquidity support.

- **Technology Infrastructure Development**: The integration of CBDC, Demat accounts, and DLT for T+0 settlements requires the development and implementation of advanced technology infrastructure. This presents an opportunity for technology companies to offer solutions, including blockchain platforms, smart contract development, DLT integration services, cybersecurity measures, and real-time transaction monitoring tools.

- **Financial Product Innovation**: T+0 settlements open up avenues for financial product innovation. Financial institutions can develop new investment products tailored to the shorter settlement cycle, such as intraday investment funds or real-time trading strategies. These innovative products can attract investors seeking faster and more flexible investment opportunities, potentially leading to increased assets under management and revenue for asset management firms.

- **Market Data and Analytics:** T+0 settlements generate a vast amount of real-time trading data, which presents opportunities for market data providers and analytics firms. These companies can offer data feeds, trading analytics, and real-time market insights to help market participants make informed trading decisions. The availability of accurate and timely data is crucial for successful T+0 settlements and can be monetized through subscription models or licensing agreements.

- **Regulatory and Compliance Solutions:** As T+0 settlements introduce new complexities and challenges, there is a business opportunity for regulatory and compliance firms. These companies can provide solutions for regulatory reporting, risk management, monitoring of intraday trades, and compliance with anti-money laundering (AML) and know-your-customer (KYC) regulations. They can offer services and tools to ensure that market participants adhere to the regulatory requirements associated with T+0 settlements.

- **Market Expansion and Global Reach:** The integration of CBDC, Demat accounts, and DLT for T+0 settlements can attract international investors and expand the market reach of financial institutions and exchanges.

Product Design: Introduction

SECURITY TOKENS

Tokens issued via an ICO may have an investment dimension; these tokens are more similar to financial instruments than they are to cash. They should be thought of as assets providing rights such as ownership, payment of a specific sum of money (dividend) or entitlement to a share in future profits or cash flows. Security tokens may qualify as transferable securities or financial instruments under the EU's Markets in Financial Instruments Directive (MiFID II). Just as depository receipts are certificates representing securities, security tokens are the digital representation of existing securities such as equities, debt instruments, funds, etc. Some tokens may fall into several categories (e.g., investment and payment tokens). These are what we refer to as "hybrid tokens"

HOW SHOULD TOKEN SECURITIES OFFERINGS BE CONDUCTED?

[13]Issuers can also design tokens in a way that ensures that they qualify as securities by meeting the three main criteria: transferability, negotiability, and standardization.

- **Transferability:** Transferability means that units can be assigned to any other person, irrespective of whether certificates exist that record or document the existence of the units. Certificates are not used to prove the existence of tokens, but tokens can generally be sold on secondary markets. Therefore, they are typically transferable.

- **Negotiability**: While "transferability" refers to the mere fact of passing on ownership in securities, the term "negotiability" refers to how easy it is to do so. Securities are classed as negotiable if they can be traded on a regulated market, multilateral trading facility (MTF) or organized trading facility (OTF). Tokens clearly meet this criterion for classification as transferable securities

- **Standardization:** MiFID defines transferable securities as "classes of securities" that share certain qualities. This implies that the issued units must share a number of characteristics so that they can be considered a class. Most importantly, the claims represented by the units must not be individually negotiated with investors. Units must be defined by common characteristics so that it is sufficient to refer to the type and number of units to trade them.

[13] Reference: Are token assets the securities of tomorrow? | Deloitte

Is the STO the security issuance process of the future?

The STO represents an innovative new opportunity for issuers and investors involved in the primary market

A Security Token Offering (STO) is the process whereby a financial security (or a digital representation of a financial security) is issued in the form of a digital asset; typically the digital asset represents ownership rights in an underlying company and/or its assets. This is entirely different to the ICO discussed above, which are "utility tokens"—i.e., digital tokens that provide access to a future product/service but do not entitle the holder to ownership of an asset or equity.[14] The STO represents an innovative new opportunity for issuers and investors involved in the primary market. STO can be more organized in a more standardized and efficient way. Here are just a handful of the advantages offered by STO:

• The terms and conditions/prospectus are embedded in the security itself (called smart contract)

• Documentation and compliance processes (AML/KYC) are less onerous, it is easier to exchange information with regulators transparently, and all users are identified instantaneously

• An admission to trading (listing) process is emerging that is more automated (and therefore fail-proof and standardized or semi-standardized) than the listing process for regulated markets Overall, this is likely to reduce the time and cost required to launch new security offerings on the primary market and enhance the compliance process.

STO also provide benefits for investors thanks to a superior asset universe, enhanced liquidity (trade/post-trade) and fractional ownership opportunities.

Another benefit of tokenization is that it allows assets to be divided into smaller units so that investors can access big-ticket items by acquiring a number of units of the assets. In practice, for certain securities with a high value per unit, tokenization may allow investors to buy a tenth or a hundredth of the underlying asset and ensure its immediate replication/ reconciliation with the original.

Secondary trading of tokens via a "regulated platform" will also boost the liquidity of assets and mitigate against risk by allowing investors to "take money off the table" through

[14] Reference: Node Blockchain, Securities Token Offerings, "The evolution of capital formation", November 2018

secondary market selling. This has the additional benefit of qualifying as a recognized and instantaneous property exchange.

[15]While the STO process mainly involves creating new security tokens in the context of primary issuance, DLT can also be used to "tokenize" existing assets. Tokenization occurs when existing assets are recorded on a DLT platform. As we have seen above, there are

[15] Reference: Are token assets the securities of tomorrow? | Deloitte

several advantages to using tokens to represent assets. Specifically, doing so improves the issuance (STO), trading (secondary market), clearing, and settlement processes. From a regulatory perspective, the status of an asset should not be affected by the tokenization processes provided that there are no changes in the regulatory and legal status of the underlying assets. If an asset is currently regulated, using a token to represent that asset will not change its status.

Nevertheless, the nature and structure of the DLT ecosystem in which the security token exists may alter the extent to which regulations are applicable. Practical example: At present, investors in private equity, real estate and alternative investment funds (AIF) may find it hard to sell/transfer their holdings owing to a lack of liquidity or of organized markets. If such fund holdings are converted into digital tokens via DLT then these can be exchanged more easily and transactions can be confirmed or validated in real time (or nearly real time).

An additional benefit for investors is that it will be easier to move shares from one account to another because this will happen via DLT. This will also create an opportunity for custodians to be the agents that transform the physical shares into digital assets. In theory at least, this process could be used on any asset.

SETTLEMENT CYCLES

[16]The settlement cycle refers to the time between the trade date, when an order is executed in the market, and the settlement date, when participants exchange cash for securities and a trade is considered final.

WHY IS THE LENGTH OF THE SETTLEMENT CYCLE IMPORTANT

The length of the settlement cycle is important because there is risk that a counterparty to a trade may not fulfill its obligations between the time a trade is executed and when the securities settle in a client's account. The longer this period of time, the greater the risk. This risk becomes elevated during times of high volatility and stressed market conditions, as unpredictable market events, such as the risk of a firm default, can potentially impact the transfer of cash or ownership of securities. Under the current T+2 settlement cycle, risk is

[16] Reference: A shorter settlement cycle: T+1 will benefit investors and market participant firms

spread over two full business days. Therefore, by reducing the settlement cycle to T+1, we would take a full day of risk out of the market.

The National Securities Clearing Corporation (NSCC) mitigates this risk for centrally cleared activity by guaranteeing settlement of all cleared trades, however, the length of a settlement cycle also has an impact on margin requirements. Because a longer settlement cycle equates to increased risk, market participants face higher margin requirements with a two-day settlement cycle to manage those risks.

WHAT ARE THE BENEFITS OF ACCELERATING THE SETTLEMENT CYCLE

[17]Reducing the settlement cycle will create *greater efficiencies in the market and further protect investors.* Accelerating the settlement cycle will help ***reduce systemic risk, operational risk, liquidity needs, buy-side counterparty exposure, broker-to-broker counterparty risk, and, by reducing these risks, would also reduce margin requirements and collateral requirements for broker-dealers.*** It will also allow investors quicker access to their funds following trade execution and settlement. Additionally, shortening the settlement cycle will mitigate systemic risk by reducing exposure between the counterparties to a trade, between the counterparties to the clearinghouse, and for the clearinghouse itself.

WHAT NEEDS TO CHANGE TO REDUCE THE SETTLEMENT CYCLE

The settlement cycle involves complex processes and shortening it will require extensive due diligence around identifying operational and business impacts. As a result, we are currently working to identify and analyze the key products, markets, and processes that will need to be modified to move to T+1, including foreign exchange and securities lending, the potential impact on institutional trade processing, financing and segregation requirements, as well as processes such as post-trade affirmation and broker processing. We are committed to pursuing this work vigorously and have identified a series of goals to advance this effort, including:

- **mitigating risks to investors and industry participants;**
- **analyzing and improving current business and operational processes;**
- **minimizing the disruption of important industry services;**
- **ensuring new risks are not introduced; and**
- **conducting a comprehensive cost-benefit analysis.**

---

[17] Reference: A shorter settlement cycle: T+1 will benefit investors and market participant firms

WHY INDUSTRY IS FOCUSED ON T+! AND NOT T+0

Moving to a T+1 settlement cycle is a complex undertaking and will require significant planning, execution, and testing and it would fundamentally change market structure. While DTCC can support some T+0 settlement today using existing clearing and settlement technology, an industry-wide move to T+0 is not feasible at this time.

A T+0 settlement cycle couldn't be leveraged by all existing industry participants due in part to legacy business and operational processes which would not be able to support current trading volumes or existing business structures and may introduce additional risk into the system.

Unlike a T+0 scenario, T+1 would allow the industry to retain the risk-mitigating benefits of netting, which frees up billions of dollars in margin that would otherwise be moving through the markets at any given moment. T+1 would also give brokers enough time to arrange for the financing that allows people to buy securities on margin, which is a loan from the broker to the investor.

Nevertheless, we will discuss how to advance to a T+0 settlement cycle, as we create additional operational efficiencies and further modernize the process across the industry.

HOW T+1 AND T+2 SETTLEMENT OF BUYING AND OWNING AN ASSET NOT A SIMULTANEOUS PROCESS

In financial markets, the settlement process refers to the finalization of a trade where the buyer pays for the purchased asset, and the seller delivers the asset to the buyer. The time it takes for settlement to occur can vary depending on the type of asset and the market in which the trade takes place.

Typically, in the context of T+1 and T+2 settlements, "T" refers to the trade date, and the "+1" or "+2" indicates the number of business days it takes for the settlement to be completed after the trade date. For example, in a T+1 settlement, the buyer is required to make payment for the asset one business day after the trade, and the seller is required to deliver the asset on that same day.

The reason buying and owning an asset is not a simultaneous process in T+1 and T+2 settlements is primarily due to the need for various administrative and logistical procedures to

be completed before the transfer of ownership can occur. These procedures include verifying the trade details, confirming the availability of funds, conducting necessary regulatory checks, and facilitating the physical or electronic transfer of the asset.

During the settlement period, the buyer may not have complete ownership rights over the asset, but they have an enforceable contractual obligation from the seller to deliver the asset on the settlement date. Until the settlement is completed, the seller retains legal ownership of the asset, and the buyer bears the risk of any adverse price movements.

Product Design: Security Transfer Process

DIGITAL CONVERGENCE: UNLEASHING THE POWER OF CBDC, DEMAT ACCOUNTS OVER DLT

In the process of clearing and settlement, when Party A transfers the ownership of an asset to Party B through a purchase made using their Demat account connected to CBDC, the back-end depository data is captured and processed. Here's a description of how this process works at the depository level on a Distributed Ledger Technology (DLT) platform to enable T+0 settlement of assets:

TRADE TRANSACTION INITIATION AND EXECUTION

- **Trade Execution**: When Party A initiates a purchase transaction through their Demat account connected to CBDC, the trade details are electronically captured and sent to the exchange or trading platform. This includes information such as the asset being traded, the quantity, the price, and the identities of the parties involved (Party A and Party B).

- **Trade Matching:** The exchange or trading platform matches the buy order from Party A with a corresponding sell order from Party B. Once the trade is matched, the platform generates a trade confirmation, which includes the details of the trade and the settlement instructions.

- **Settlement Instructions:** The trade confirmation is then sent to the relevant depository, which maintains the ownership records of the assets. The settlement instructions specify the transfer of ownership from Party A to Party B, along with the necessary details to execute the transfer on the DLT platform.

DEPOSITORY DATA IN A BLOCKCHAIN DIGITAL LEDGER

- **DLT-based Settlement:** The depository processes the settlement instructions on the DLT platform. The DLT ensures transparency, immutability, and secure recording of the ownership transfer. The transfer of ownership is executed through smart contracts, which automatically update the ownership records on the DLT, reflecting Party B as the new owner of the asset.

- **Smart Contracts:** Smart contracts are self-executing agreements with predefined rules and conditions encoded within the DLT. In the context of T+0 settlement, smart contracts play a crucial role in automating the transfer of ownership. The smart contract contains the logic to validate and execute the settlement instructions, updating the ownership records accordingly.

- **Tokenization of Assets:** Assets can be represented as digital tokens on the DLT, enabling their seamless transfer and tracking. When Party A initiates a purchase transaction, the asset being traded is tokenized, creating a digital representation of the asset on the DLT. This token represents the ownership rights and can be transferred to Party B upon settlement.

- **Ownership Transfer:** When the trade is matched and settlement instructions are provided, the ownership transfer is executed on the DLT. The smart contract verifies the availability of the asset in Party A's account and ensures Party B has the necessary funds or digital currency in their CBDC wallet. Once the conditions are met, the ownership record is updated on the DLT, transferring the tokenized asset from Party A to Party B.

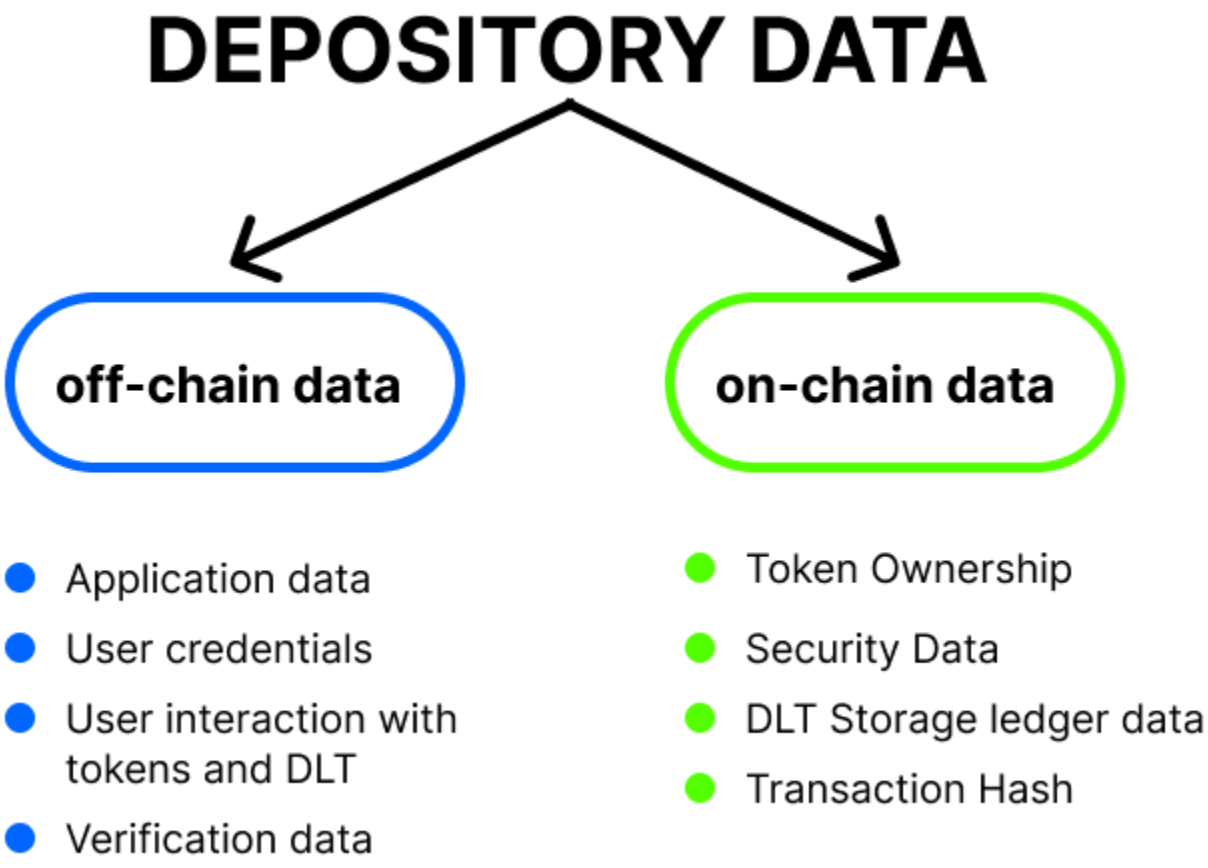
- **Immutable Ledger:** The DLT maintains an immutable ledger that records all ownership transfers and changes in the asset ownership records. This provides transparency and allows any authorized participant to verify the ownership history of the assets. The immutability of the DLT ensures that once an ownership transfer is recorded, it cannot be altered or tampered with.

- **Real-Time Settlement:** The integration of CBDC with the DLT platform enables real-time settlement. As the ownership transfer occurs on the DLT, the corresponding value of the asset is simultaneously transferred from Party B's CBDC wallet to Party A's CBDC wallet. This immediate settlement ensures that funds are available to the seller (Party A) without the need for traditional intermediaries or delays.

- **Auditing and Reporting:** The DLT provides a comprehensive audit trail of all ownership transfers and settlement transactions. This enables efficient auditing and reporting processes, ensuring regulatory compliance and transparency in the settlement process. The parties involved can access transaction details and

settlement records for verification and reporting purposes.

The DLT-based settlement process for T+0 settlement combines the benefits of blockchain technology, smart contracts, and CBDC integration to streamline and expedite asset transfers. It ensures secure, transparent, and real-time settlement while maintaining an immutable record of ownership transfers on the DLT. By removing intermediaries and automating the settlement process, DLT-based settlement offers efficiency, reduced counterparty risk, and enhanced liquidity for market participants.



EXCHANGE OF OWNERSHIP OF AN ASSET AS AN ATOMIC SETTLEMENT

- **CBDC Integration**: In a CBDC-enabled system, the settlement process involves the transfer of digital currency from Party B's CBDC wallet to Party A's CBDC wallet, corresponding to the value of the asset being purchased. This transfer occurs simultaneously with the ownership transfer on the DLT. The integration between the DLT platform and CBDC ensures real-time settlement and immediate availability of funds to the seller (Party A).

▪ **Confirmation and Reporting:** Once the settlement is successfully executed, the depository generates confirmation statements for Party A and Party B, reflecting the updated ownership records and the completed settlement. These statements serve as proof of ownership and settlement for the parties involved.

India Trumpets T+1 and road to T+0

[18]Once T+1 is implemented, many industry experts believe the transition to T+0 or even atomic (i.e. instant) settlement is the next logical step. T+0 is theoretically possible today as we have the technology to make it happen. The only issue is that investors do not want to operate on T+0 as it precludes them from obtaining netting benefits and would require firms to pre-fund trades.

[19]Through disruptive technologies such as distributed ledger technology (DLT), smart contracts and central bank digital currencies (CBDCs), Krishnan believes atomic settlement could become a reality in the next five to 10 years across India and many other markets. Finance Minister Nirmala Sitharaman announced in February that the Reserve Bank of India (RBI) would introduce a digital rupee during the financial year to 31 March 2023. The Ministry of Electronics and Information Technology's dedicated Centre of Excellence (CoE) in Blockchain Technology is evidence of the government's support for blockchain. The emergence of blockchain technology holds promise for the government to foster trust and greater transparency about certain data activities and provide frictionless transactions with the citizens. Settling trades would be no exception.

As policymakers in India demonstrate their commitment to innovation, further changes to the settlement cycle beyond T+1 are highly likely.

[18] Reference: economictimes india Reuters
[19] Reference: India Trumpets towards T+1 settlements Flow DB Sriram Krsihnan Co-Head and managing director of securities and global transaction banking at Deutsche Bank