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In February 2021, the Depository Trust & Clearing Corporation (DTCC) challenged the financial services industry with migrating the Standard Settlement Cycle from T+2 to T+1 by 2023. Settlement cycle compressions have been successfully implemented several times over the past 25-plus years, each requiring an enormous, well-coordinated effort between all industry participants that was approached with great care.

The recent spike in trading volumes and the impact the "meme stock" volatility had on several member firm's intraday clearinghouse deposit requirements served as an inflection point. On March 12, 2021, a record 363 million equity trades were processed by DTCC, eclipsing the prior single day record set in October 2008 by 15%.²

It was a bit surreal to watch information (and misinformation) regarding the settlement and clearing process go viral on Twitter, Redditt and CNBC. The

rhetoric and "sound bites" that swirled in the wake of this situation with the discussions actively taking place among industry groups was the impetus for this paper. This is all part of a much bigger picture and sparked a conversation that needs to be had.

Why not bypass T+1 all together? Wouldn't moving to real-time or T+0 settlement serve clients and market participants best? The short answer is no, or more specifically, not right now for the reasons outlined in the following pages.

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The task of reducing the standard settlement cycle to 24 hours comes at a time when trading volumes have never been higher, technology has never been more intertwined and complex, and the topic has never been more on display. The stakes are high, but so are the opportunities. Working groups have been assembled throughout the industry to plan for a transition to T+1 and pave the way for future progress.

THE T+1 vs. T+0 CONVERSATION

On March 4, 2021, Paxos Settlement Service announced they had settled transactions in U.S. listed equity securities between Credit Suisse and Nomura Instinet in the span of 90 minutes. The T+0 settlement itself was not really the news story. It may be surprising to learn that nearly 1 million transactions are submitted for T+0 clearance and settlement each day. The accelerated settlement cycle is agreed to at the time of trade by the buyer and seller. The process is quite manual in nature and both sides of the trade must be submitted to NSCC by 11:30 a.m. ET.

What made this newsworthy is that these were the first trades cleared and settled via Paxos' Blockchain platform independent of NSCC under an SEC noaction letter.³ The SEC's letter permits the pilot to run for 24 months, limited to seven participant firms and restricted to a defined list of securities and daily notional trading limits. Societe Generale became the third participant in the fall of 2020 and Bloomberg announced in mid-May that Bank of America has joined as the fourth participant in the pilot.⁴

In their request letter to the SEC, Paxos outlined the need for further relief from many fundamental post-trade processes such as the payment of dividends or voluntary reorg elections via their platform, relief from Regulation SHO, and an exemption from account-level margin calculations under Regulation T in lieu of a program-level aggregate calculation.

It is important to note that these limitations are not pointed out as a criticism of their efforts. Quite the opposite.

> Change is hard. Transformation is something else entirely.

However, these relief exemptions underscore many of the points within this paper. Much of this discussion focuses on the clearance and settlement of trades, but that is just the beginning.

We are an industry made up of competitors, but at the same time we are all connected via counterparty relationships and our commitment to a fair and efficient market. The processes, procedures, and rules involved in the custody of securities requires us to work together on projects with street-wide impacts, such as transitioning to a standard T+1 settlement cycle, while at the same time navigating the way to widespread adoption and preparation for evolving technologies. After all, there is another side to every trade.

HOW DOES SHORTENING THE SETTLEMENT CYCLE IMPACT CLEARING?

Securities clearing comprises all of the activities that occur between trade date and settlement date, including confirmation of trade details between the buyer and seller, facilitation of payment, and updating the buyer's and seller's accounts to reflect the transfer of money

Central Clearing Organization by Security Type	
Equities	NSCC*
Municipal Bonds	NSCC*
Corporate Bonds	NSCC*
Mutual Funds	NSCC*
Government Bonds	FICC-GSD*
Mortgage-Backed Bonds	FICC-MBSD*
Options	осс
Money Market Instruments	Banks

^{*}NSCC and FICC are subsidiaries of DTCC

T+1 Settlement will leave the Central Clearinghouse Settlement Guarantee intact, providing certainty for investors. T+0, as structured today, removes this assurance.

If a T+0 scenario is implemented outside framework the central clearing. sellers and buyers would face each other directly—essentially taking a leap of faith that the other side would their meet settlement obligation. In a volatile market, it is easy to see how this scenario does not serve the end investor.

and/or securities. This process can occur via two primary methods: central clearing and bilateral clearing.

Central clearing is the method used when both parties to a transaction are member firms of a central counterparty clearinghouse. Their services may only be directly used by their member firms who own a stake in the clearinghouse. Central clearing creates efficiency and reduces settlement risk for member firms and investors through trade comparison, trade netting, and clearing counterparty guaranty of settlement.

Bilateral clearing is the method used when one or both parties to a transaction is not a member of a central clearing party.

Bilateral trades clear and settle using one of three processes:

- If neither the buyer nor seller are central clearing members, each side of the trade settles bilaterally.
- If both the buyer and seller are central clearing members, each leg is netted and centrally cleared.
- If only one of the parties to the trade is a central clearing member, one leg of the trade is centrally cleared and settled, and the other side is bilaterally cleared and settled.

For the purposes of our discussion, we will focus primarily on the central clearing process. However, it is important to note that the bilateral clearing process is commonly used for dealer-to-customer trade settlement. The process is manual in nature, capital intensive and will need to be significantly streamlined, even in a T+1 environment.

A 2018 white paper published by the Treasury Market

Practices Group (TMPG), outlining the challenges of the manual, cumbersome, and error-prone processes used to settle customer-side U.S. Treasuries, which already settle on a T+1 basis, reads like a cautionary tale. While many of these trades are executed electronically or via ATS platforms, it is estimated that up to 30% of dealer-to-customer trades are traded via voice and entered manually for clearance. Without the benefits of central clearing, these trade practices can be disrupted by manual errors, system disruptions or unforeseen, external events.

In addition, while trades are typically compared on trade date and institutions affirm the customer side of these trades on trade date, nearly 85% of institutional clients affirm their trades before T+1, which essentially lets the DVP settlement process begin. Clearly, this practice will not be sustainable in a shortened settlement cycle.



NSCC TRADE NETTING

NSCC clears and settles nearly all equity, corporate and municipal bond, UIT and mutual fund trades in the U.S. Through its Continuous Net Settlement (CNS) system, NSCC records and pairs off, or "nets," each member firm's trades to an aggregate long (buy) or an aggregate short (sell) position due. This amount is adjusted by the number of shares from miscellaneous activities, such as incoming or outgoing customer account transfers, dividend or reorg activities, and open positions from the previous day to determine the total number of shares that need to be credited or debited in the member firm's account at DTC.

Benefits of CNS Netting that will continue in a T+1 Settlement Cycle:

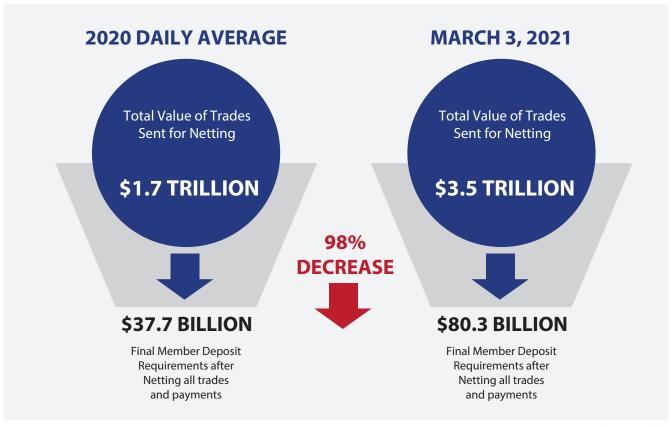
- Reduces costs and settlement risk to investors
- Reduces capital commitments required by member firms by trillions of dollars each year
- Creates efficiency that allows member firms to process increasing trade volumes
- Decreases number of trades failing to settle

On an average day in 2020, DTCC netted down \$1.77 trillion dollars in total trade activity to a final settlement value of just under \$38 Billion. By comparison, on March 3, 2021, total trade activity nearly doubled overnight compared to the 2020 average to \$3.5 trillion. After netting, the final daily settlement amount requiring processing was \$80.3 billion. While there was much discussion around the sharp increase in the collateral deposits experienced by some member firms related to the trading volume in certain securities, it is incredibly important to recognize that the clearance

CNS Netting results in a 98-99% reduction in the number of trades and payments that are exchanged at DTC daily to settle. Much of the efficiency would be lost by moving to T+0 prior to putting a similar process in place between market participants. The benefits of CNS Netting would not be sacrificed in a T+1 settlement cycle.

and settlement netting process worked as designed without disruption.

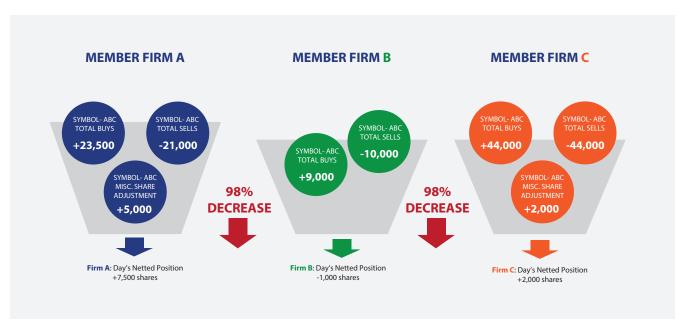
To draw a parallel, imagine without warning or an ability to prepare, airlines DOUBLED the number of flights tomorrow? It is easy to see that the result would be quite different. The existing infrastructure would not be able to accommodate the extra capacity and safety would likely be compromised. This efficiency, flexibility and scale are the cornerstones of the confidence investors have in the U.S. markets.



Source: HilltopSecurities

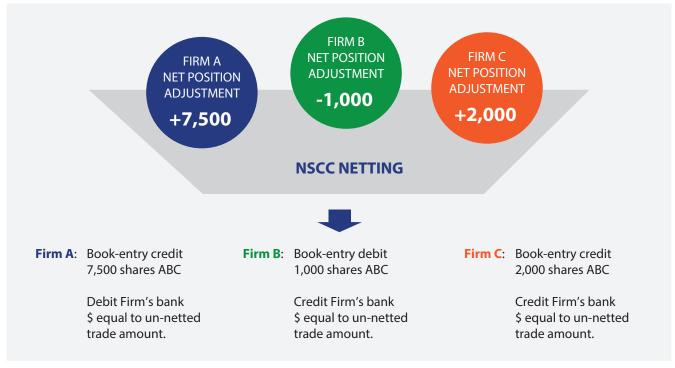
TRADE NETTING

CNS nets 98-99% of trades daily by firm & symbol:



Source: HilltopSecurities

NSCC sends one net cash or position to the member firm's DTC account:



Source: HilltopSecurities

FIXED INCOME, INSTITUTIONAL, PHYSICAL CERTIFICATES AND OTHER SETTLEMENT CONSIDERATIONS

Trade matching systems, such as real-time trade management (RTTM), give nearly instantaneous confirmation and comparison of fixed income trade details that are legal and binding between street-side (dealer) counterparties. While RTTM has had a significant impact on reducing errors and enables real-time monitoring of regulatory reporting status to TRACE or the MSRB, the process has not eliminated settlement risk or created efficiency for some customer-side trades.

Discussions around consolidating the trade confirmation and trade affirmation processes are underway to determine the best path to facilitate a shortened settlement cycle and reduce the capital commitments for member firms related to institutional trades.

As discussed in the bilateral clearing section, dealer-tocustomer DVP trades that settle vs. a custodian bank clear and settle bilaterally, or trade-for-trade, as banks are not obligated to CNS. To successfully transition to T+1, the customer side will need to transition to automated standing settlement instructions (SSI), central matching for trade processing, and the use of the SWIFT network of banks to expedite settlement notification.

When a stock or bond, for instance, is bought or sold, a transfer of title occurs between the seller and buyer because there is a transfer of ownership of the asset that takes place.

Dematerialization of physical certificates will need to be addressed as we move toward a shortened settlement cycle. Physical certificates, while less than 1% of DTCC's inventory, represent \$780 billion of client assets clearing firms and custodians must store in their vaults. The time, expense, and risk associated with these assets will not be manageable in a T+1 environment. Member firms that have been resistant in the past will need to reconsider dematerialization and low-touch processing efforts.

WHAT ARE COLLATERAL DEPOSITS & HOW WILL THEY BE IMPACTED BY T+1 VS T+0?

Under SEC Rule 15c3-1, net capital requirements are defined for all brokers and dealers and are applied moment-to-moment, i.e. intraday. As mentioned earlier in the clearing discussion, member firms have a financial responsibility for all transactions they submit to clearinghouses until settlement. This responsibility is met in the form of collateral deposits, which are a mechanism used by clearinghouses to manage the risks assumed inherent to the settlement guaranty extended to member firms.

Collateral deposit amounts fluctuate daily and are calculated based on several factors such as:

- Trading volume
- The volatility and risk of the security (known as a VaR charge)

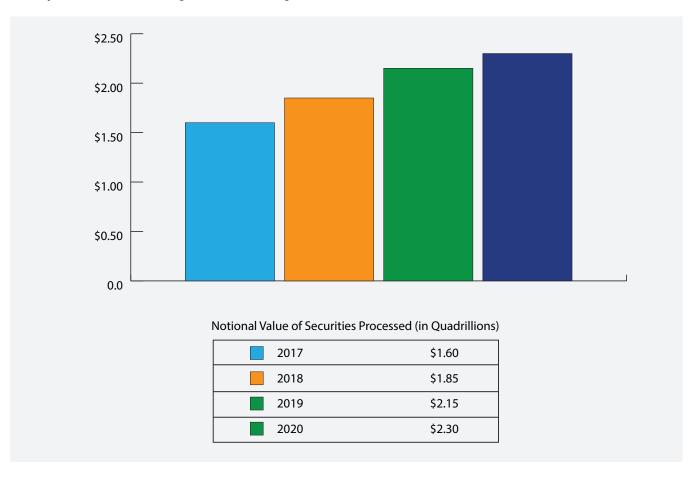
- The security's concentrated position at a limited number of member firms
- A significant discrepancy between the day's notional value of a firm's buy vs. sell transactions
- The financial condition of the member firm

Since trading volumes, open settlement obligations, and VaR charges change daily (sometimes, exponentially as we saw in March 2021), NSCC provides tools that provide an indicative collateral requirement intraday. However, exact daily requirements are not known until the end of the day. Any additional funds must be deposited the following business day.

It is estimated that a move to T+1 will result in a 41% reduction in the capital committed for NSCC VaR alone.⁶ This does not factor in the collateral deposit commitments that would be reduced by effectively cutting in half the time between trade and settlement date. This significant reduction in risk and expense not only will benefit member firms, but would likely provide an opportunity to extend better pricing to cost of funds and processing rates to investors as well.

When the settlement cycle was reduced from T+3 to T+2 in 2017, collateral deposits were reduced by 25% that year, saving the industry \$1.36 billion in collateral deposit requirements.⁷

In the 4 years since the industry transitioned to T+2 Settlement, the notional value of trades processed through DTCC has risen by over 30%—from \$1.6 quadrillion to \$2.3 quadrillion in 2020.8



"The material increase in intraday margin calls during these periods of volatility can greatly impact firms, and liquidity can be strained as members draw down credit lines and increase liquidity buffers. Time to settlement equals counterparty risk, and margin requirements, which are designed to mitigate those risks, represent cost to members. We believe the most logical way to reduce the risks that drive margin requirements is to shorten the settlement cycle. Shortening the settlement cycle would help strike a balance between risk-based margining and reducing procyclical impacts. In fact, our 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."

Murray Pozmanter, DTCC Managing Director and Head of Clearing Agency Services and Global Operations

TECHNOLOGY: T+1 AND BEYOND

Those of us who have spent decades in the clearing or back-office operations space are keenly aware of the ever-evolving technological advances at our disposal. It could be argued that all securities firms are "fintech" firms. In many cases, client, trader, and advisor portals are typically connected via APIs of FIX connections to more seasoned infrastructure, allowing for a modern, mobile, and nimble end-user experience. These front ends are often built on top of legacy processing and order routing systems that are many decades old in some cases. The good news? These systems are tested, reliable, and audited. However, they can create a logjam during volatile or high-volume trading sessions.

Almost all firms have some element of batch processing, which happens overnight. Can some level of batch processing still exist in a T+1 environment? Yes. Will it need to be more efficient, multi-threaded, and compressed? Absolutely.

Transformation

It would be short-sighted not to recognize that the adoption of distributed ledger technology (DLT) will continue to be a part of the conversation, and it will be transformational. So, what is it and how does it work?

DLT, simply stated, is a database spread across multiple locations, regions, or participants. There is no need for a central party to process, validate or authenticate transactions or other types of data exchanges. In contrast to the databases much of the industry uses today that are housed in a fixed location and are vulnerable to a single point of failure, DLT only stores records in the ledger when the consensus has been reached by the parties involved.

Is DLT Blockchain? No, it is a type of Blockchain (a la Coca-Cola is a type of soda). DLT does not require encrypted data 'blocks' that are dependent on a logical relationship to the proceeding 'blocks' in a chain.

DLT, simply stated, is a database that is spread across multiple locations, regions, or participants, or nodes, in a public or private peer-to-peer network who can view only transactions that are relevant to them. Distributed ledgers are considered highly secure and tamper-evident networks, as they are inherently decentralized and provide a high amount of transparency. Every record in the distributed ledger has a timestamp and unique cryptographic signature making the ledger an auditable, immutable history of all transactions in the network.

In contrast to the databases much of the industry uses today that are housed in a fixed location and are vulnerable to a single point of failure, a distributed ledger acts as a single source of truth by recording the chronological order of transactions with all nodes agreeing to the validity of transactions' details using a chosen consensus model. All the confirmed and validated transaction details, or blocks, are linked and chained from the oldest to the most current, hence the name blockchain. Ledger entries cannot be altered or reversed, unless the change is agreed to by all relevant members in the network in a subsequent transaction.

The opportunity to eliminate much of the duplication of efforts related to some security clearance and settlement processes through use of blockchain is evident and it is exciting.

Other modernization efforts are also taking place throughout the industry, such as DTCC's Night Cycle Reengineering efforts. Implemented in early 2020, they are already improving processing efficiencies by up to 15%. This was followed by "Project Ion," which is an exploration of the use of DLT, and "Project Whitney" to study the asset tokenization and digital infrastructure to support private market securities from issuance through secondary markets. 10

REGULATORY READINESS FOR T+1 WITH AN EYE ON T+0

When the industry has transitioned to shortened settlement cycles in the past, lengthy studies by independent auditors have been commissioned by industry groups to help firms plan, test, and prepare for the implementation. These "playbooks" provide a roadmap and define the scope of work needed to ensure readiness. Updates to rules and regulations are typically required.

While this is in no way a complete list, it provides a glimpse into the scope of work required by the industry's various regulatory bodies to transition to T+1. These efforts should be approached with a T+0 reality in mind.

- A review and remediation of FINRA's uniform practice codes (UPC) will need to be performed.
- A review and remediation of each member firm's processes around possession & control and collateral management including stress tests and simulations will need to be performed.
- A move toward full novation will be needed related to balance orders and step outs for bilateral clearing.
- The definitions related to certain corporate actions will need to be clarified and redefined. How is "ex-

- date" defined in a T+1 settlement cycle?
- "Access equals delivery" and electronic delivery will need to be discussed in order to comply with current delivery requirements of trade confirmations and prospectuses.
- Securities lending processes will need to be addressed to set a new timeline for stock loan recall.
- Central clearinghouses and member firms
 will need to evaluate the impacts with foreign
 exchanges, currency exchange systems, and foreign
 clients.

INSTITUTIONAL AND RETAIL INVESTOR IMPACT & EDUCATION

Meeting a 2023 "T+1 Go Live" date will take a significant and coordinated effort on the part of banks, central clearinghouses, and fintech/third party systems, as well as the broker-dealer and RIA community—including financial professionals and their clients.

Historically, clearing and settlement has been an esoteric and somewhat invisible part of the industry. Clearinghouses and clearing member firms were like the electric company. Just flip a switch and as long as the light comes on, no one thinks much more about it. While the fundamental role of a clearing and custody partner will not change as the settlement cycle compresses, the function will increasingly become a part of the "end-product" delivered to investors.

Criticisms have been that a move to T+1 is the bare minimum the industry can do, but as mentioned at the beginning of this paper, it is important to step back and look at the bigger picture. Clearing and settling trades is only the beginning of the process. Liquidity, integrity in the marketplace, and planning for and meeting collateral obligations is foundational. Clearing and custody firms will need to ensure we can continue to meet our regulatory obligations and service commitments to our clients. Member firms, together with industry groups and our regulatory bodies, will need to work together to educate and communicate the impacts of a shortened settlement cycle to the investing public.

Currently, we are navigating a dramatic intergenerational transfer of wealth. As a result, brokerdealers, RIAs and their custodians are tasked with meeting the needs of investors who span a broad range of comfort levels related to technology and automation. On one end of this spectrum are investors who require speed and automation. Self-directed platforms and mobile tools are viewed as table stakes. On the other end are investors who are accustomed to relying on the U.S. Postal Service for delivery of client documents and who send or recieve checks for deposits or disbursements. They will need to adapt and plan for the impacts of a compressed settlement timeline.



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- FINRA Clearing Firm Committee Member
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- ASA Affiliate Member Program Sponsor
- Hilltop Holdings Women's Forum Executive Committee

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