SECURITIES SERVICES EVOLUTION 2022

Disruption and transformation in financial market infrastructures

Securities Services

Foreword

2021 saw the publication of Citi's inaugural report on the state of market infrastructures and securities services. The detailed findings of that report were only possible thanks to the valued participation of financial market infrastructures (FMIs) and market participants in the 100+ markets around the globe in which Citi has a presence. For this year's report we have again benefited from their time and expertise in making this research as comprehensive as possible and we would like to extend our thanks to them all.

Last year, many of the trends we observed in automation and digitalization[1] were strongly driven by the pandemic. This year, however, the pandemic was barely mentioned, and there was a greater sense of momentum and purpose in all developments across the industry. In addition to the transition to T+1 in certain major global markets, FMIs and others are engaging in an increasing number of development projects, pilots, innovations and collaborations, which will facilitate future improvements to the settlement process.

Delivering these changes is no small task in view of the sheer complexity and diversity of global securities markets. Nevertheless, simplifying processes to maximize the quality, scale and global consistency of the client experience remains core to the Citi Securities Services offering. The changes necessary to achieving this are numerous and multidimensional, but in due course offer the prospect of very substantial cost savings and efficiencies.

We hope you find this paper insightful and informative.

Okan Pekin
Global Head of Securities Services, Citi

Executive Summary

Last year's Citi Securities Services Evolution 2021 whitepaper (Citi whitepaper)[2] saw global securities markets on the brink of transformation. This year, this transformation appears already underway, as witnessed by important settlement cycle reductions in major markets, plus a host of initiatives in related processes and technologies. There also now seems to be a greater sense of purpose among both financial market infrastructures (FMIs) and market participants. A significant proportion of FMIs are involved in trials and projects that will facilitate settlement reduction, as well as future market efficiencies on a pre-emptive basis, rather than being purely driven by market participant demand. At the same time, market participants are also becoming more proactive in areas such as digital assets.

The market volatility of spring 2020 and remote working caused by the pandemic were frequently cited by FMIs last year as catalysts for change, but this year they were barely mentioned. This might suggest that while they may still have a tail effect, they have been largely supplanted by a longer term acceptance of the need for change so that all involved can reduce costs and improve efficiency.

Settlement compression

Settlement compression has again been a high profile theme this year, with the US and its most closely-linked markets moving to T+1, plus the decision by India to embark upon the same journey. This has also been accompanied by a greater sense of purpose among FMIs, with several engaging in compression or digitalization projects for specific asset types, such as commercial paper or bonds. In addition, several traditional FMIs are working on pilots or proofs of concept in support of future compression, while several non-traditional FMIs are already capable of T+0 settlement.

At the same time, market participants increasingly believe that shorter settlement cycles are the forthcoming reality, with 51% (versus 44% last year) now thinking T+1 will be the prevailing equity settlement cycle by 2026. There was an identical percentage point rise (to 85%) since last year in those expecting settlement to be at T+1, T+0 or atomic over the same timeframe.

Reduction in margin requirements and risk were again seen by FMIs as the major benefits of shorter settlement cycles, though these were slightly lower ranked by market participants, who instead saw greater efficiency in investment and trading processes as the main benefit.

Although a larger proportion of market participants this year feel real time immediate atomic settlement would be the prevailing settlement timeframe by 2026, FMIs were again far more circumspect. While some feel that atomic settlement could be feasible for certain situations — e.g. primary issuance of instruments such as commercial paper — the overwhelming view is that it is not practical for equity markets in view of loss of netting benefits and the major cash/securities pre-positioning burden it would impose.

Last year, FMIs and market participants had very different views on the impact of technology on shortening settlement cycles. This year however, there were clear signs of greater convergence between the two groups. While FMIs did not see technology as much of a barrier, upgrading or re-platforming legacy technology was the standout factor (46%) for market participants in enabling a T+1 or T+0 environment. This year, FMIs views on this are much the same, but there was a radical change in market participants' views, with only 18% seeing upgrading or re-platforming legacy technology as the main factor and the majority (25%) now favoring improving and simplifying operational processes instead.

Digitalization

Digital assets have continued to grow rapidly in importance since last year, as witnessed by a recent executive order [3] to establish a national policy for them. Elsewhere, various polls [4,5,6] have underlined how seriously professional asset managers are now taking them as an asset class. This trend corresponds with the high levels of digital asset activity among market participants polled this year and the number of FMIs already live with (or working on) digital asset initiatives, tokenization and fractionalization.

On the matter of tokenization, both market participants and FMIs view it as likely to assist in adding market liquidity, though FMIs mostly see this relating mainly to illiquid asset classes, such as real estate. They were also somewhat skeptical about the value of digitizing existing assets, other than as an intermediate step towards native digital assets, in order to avoid having to run parallel systems and reconcile between them.

This was linked to FMIs' concerns (also raised last year) that there needed to be robust regulation and legal infrastructure to support the evolution of native digital assets. Sentiment from the FMIs is that there is room for improvement, with most digital assets still being created by tokenizing existing physical assets. Additionally, FMIs also felt that greater international collaboration was therefore needed to support natively digital assets and also to reduce the risk of digital islands being created that would cause legal and standards inconsistency across jurisdictions.

Technology and digital transformation

The pace of technology development and adoption in support of the settlement process continues to accelerate. The past year has seen a slew of announcements, including the creation of a regulatory sandbox [7] for distributed ledger technology (DLT)-based trading/settlement, several FMIs taking stakes in DLT fintechs and numerous DLT industry trials and pilots.

Nevertheless, there remains a dichotomy between market participants and FMIs on the subject of DLT. More than a fifth of the former see it as core to a successful transition to T+1/T+0 and a quarter of them expect a DLT based market infrastructure to cut post-trade processing costs by 31-50% or more. By contrast, traditional FMIs are more cautious. Despite their high levels of DLT activity, most are still dubious about its suitability for mainstream securities settlement and none felt that cost savings were more than conjectural at this stage.

As to the benefits of other technologies, FMIs are more convinced. For example, there was a common sentiment that cloud computing is now sufficiently proven for production use and most see artificial intelligence and machine learning (AI/ML) as useful, though not necessarily for shortening settlement cycles.

On the subject of digital money, most FMIs regard it as an inevitable evolution, but not necessarily one that would support securities settlement by 2026. Market participants differed, with only 27% not seeing digital money being used for this purpose over the same time frame. However, the positions were reversed on the importance of central bank digital currencies (CBDCs), with FMIs more convinced of their merits for securities settlement than market participants.

Overall, it is apparent that technological advances remain integral to enhancing settlement processes and that this trend has only become more entrenched since last year. Taken in conjunction with progress in various markets on shortening settlement cycles and greater digitalization, the impression is of an industry moving collectively in the same direction.

Introduction

Last year's Citi whitepaper [8] placed the securities industry on the brink of transformational change. This year, we can see that change is clearly underway, with the adoption of new technologies and processes that will deliver important efficiencies and opportunities in the near future. However, there is also evidence that financial market infrastructures (FMIs) are developing and testing new technologies/processes in anticipation of change, rather than due to immediate demand.

All this effort and investment is being heavily influenced by the same three trends identified last year as being transformational forces for change in the post-trade environment:

Settlement compression

While T+2 has been the established standard in recent years, the transitions to T+1 in the US and other markets (such as India), have further increased already elevated levels of interest in settlement compression.

Digitalization

Digital asset demand and innovation have continued their rapid growth trajectory, but so also has the effort to optimize the settlement of trades for both digital and traditional assets.

Technology and digital transformation

Technology and digital transformation have further underlined their critical importance to the smooth and efficient operation of securities markets.

Methodology

This paper is based upon data gathered from both FMIs and other market participants across Asia-Pacific, Europe, North America and Latin America. The geographic breadth and broad spectrum of firms that participated has helped generate quantitative and qualitative insights into ongoing developments across the securities markets ecosystem.

- **Market participants:** In order to gauge the sentiment of market participants across the industry, Citi Securities Services collaborated with ValueExchange to survey almost 300 individuals around the globe via an online poll that ran between May and July of this year. These included, among others, a broad mix of custodians, banks, broker dealers, asset managers and institutional investors (see Figure 1).
- **FMIs interviewed:** A total of 12 leading FMIs (9 traditional,[9] 3 non-traditional) participated in one-on-one in depth interviews which took place between May and July 2022. Traditional FMIs interviewed included exchanges, centralized securities depositories and clearing houses. Non-traditional FMIs interviewed included digital exchanges and a fintech.

1a Market participants classification breakdown

16%	47%	10%	12%	15%
Asset Managers	Banks	Broker-dealers	Custodians	Insitutional investors

1b Market participants geographical breakdown

25%	33%	15%	27%
APAC	Europe	LATAM	North America

Settlement compression

There have been a number of important developments related to the shortening of settlement cycles in the last twelve months. Apart from the US's transition to T+1 launched last year, two further major markets – Canada and India – have since embarked on a similar journey. Furthermore, in the course of our research we identified at least nine other markets globally (in addition to the US, Canada and India) now have plans for, or are discussing, shortening their settlement cycles. Of these, one FMI in Vietnam has already recently achieved a half day reduction in its existing T+2 settlement cycle.[10]

This high level of activity is also accompanied by a greater sense of purpose regarding settlement compression amongst the FMIs interviewed this year, when compared to last. Several are engaged in (or have recently completed) important compression or digitalization projects for specific asset types, such as commercial paper (Marketnode) and certain bonds (Santiago Stock Exchange).

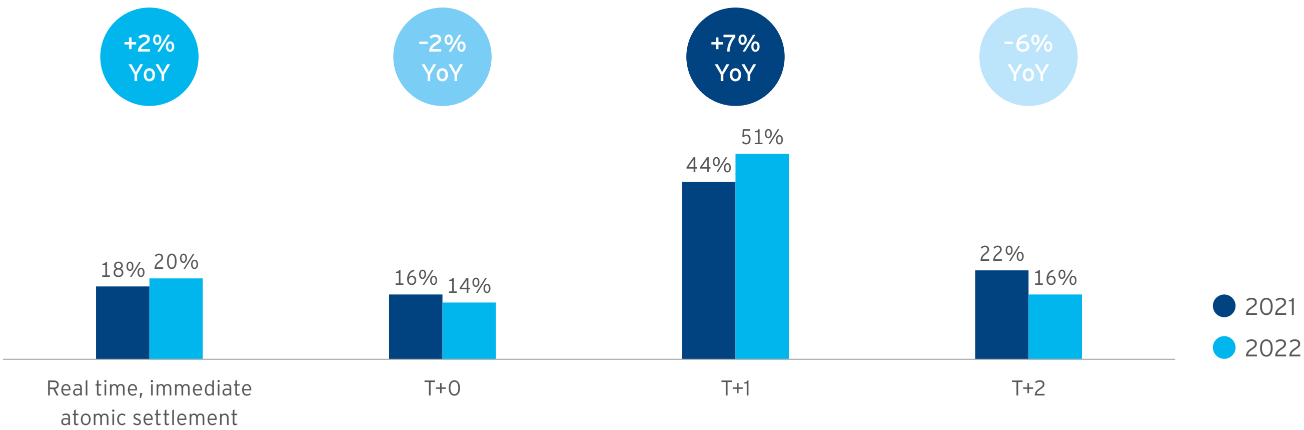
Elsewhere, traditional FMIs are also working on proofs of concept or pilots that will facilitate further future compression. For instance, Euroclear has successfully tested real time settlement using central bank digital currency (CBDC) for French government bonds on a test blockchain.[11] These compression initiatives among traditional FMIs are also taking place against a backdrop where their non-traditional peers, such as BondEvalue, Archax, SIX Digital Exchange (SDX) and Paxos already have technology capable of supporting T+0 settlement.

This increase in tempo among FMIs is mirrored in a significant shift in market participants' views, with 51% surveyed believing T+1 would be the prevailing settlement timeframe for equities by 2026 (see Figure 2). This is a seven point rise increase on last year's Citi whitepaper. There was a similar general shift across settlement cycles, with 85% expecting settlement to be at T+1, T+0 or atomic over the same timeframe, versus 78% last year. There was also a notable increase in those regarding immediate atomic settlement as the likely 2026 settlement timeframe, from 18% to 20%.

Nevertheless, despite these expectations, FMIs already capable of clearing faster than the current settlement cycle do not feel under pressure to do so. For example, while Euroclear is already able to settle at T+0, it is not as yet experiencing market demand for this. Furthermore, while some other FMIs mentioned similar lack of demand from market participants for faster settlement, a noticeable change from last year is that none of them saw this as reason to adopt a 'wait and see' approach.

2 What is the expectation?

85% believe change is imminent as T+1 becomes the norm



Question: By 2026, what do you expect to be the prevailing settlement timeframe for equities?

Risk and margin reduction: releasing capital

FMIs overwhelmingly continue to view risk mitigation and the consequent reduction in margin requirements as the major benefits of shorter settlement cycles. A briefer period of risk exposure would result in lower margin requirements, thus improving participants' cash liquidity positions (last year, FMIs' estimates for the saving in margin created by shifting from T+2 to T+1 ranged from 41% to ~60%[12]).

However, some FMIs were aware that market participants might have different priorities.

"I think most exchanges and depositories will see reducing risk and increasing cash liquidity as the main drivers/benefits. However, this view seems less prevalent among conventional banks and even less so among some brokers. Those with significant cross border business, might feel those benefits are outweighed by current longer settlement cycles that give them more time to fund trades across time zones."

Anshuman Asthana, Head of Post Trade, Marketnode

This certainly tallies to some extent with the poll results from market participants, who only ranked better cash management/increasing liquidity second and reducing settlement fails and risks third when asked what they saw as the greatest benefit of a shorter settlement cycle for their organization. By contrast, the top ranked benefit among market participants was greater efficiency in investment and trading processes (see Figure 3). This efficiency gain was also mentioned by FMIs but was mostly seen as secondary to the risk and margin reduction benefits.

Interconnection and expectation

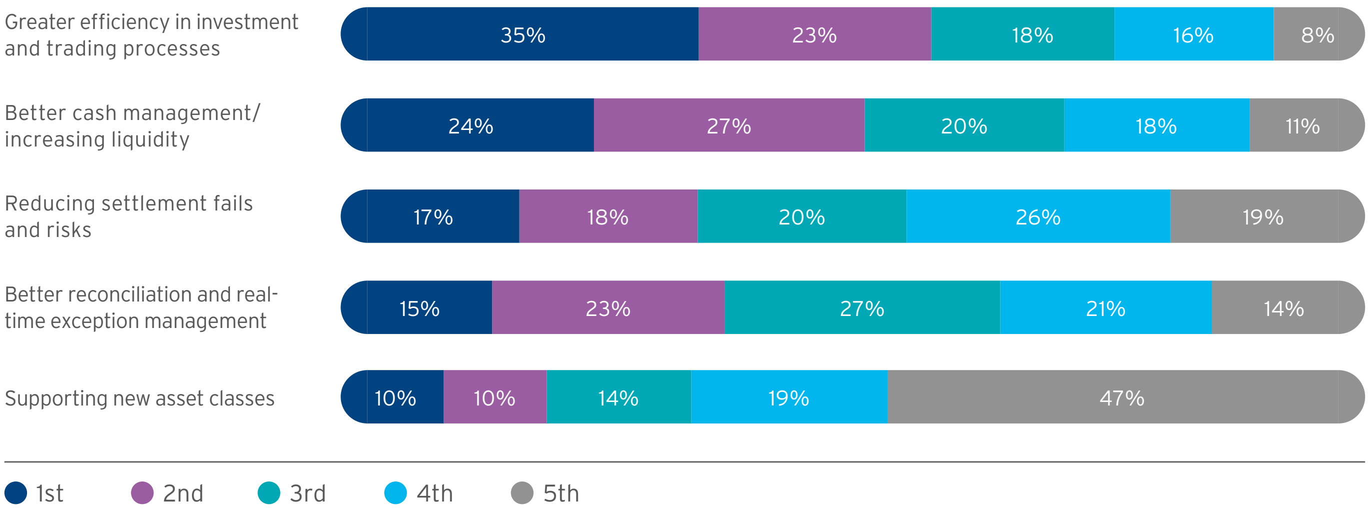
As last year, there was a reminder of how the interconnected nature of certain regional markets can also act as a driver for accelerating settlement. In 2021, S.D. Indeval (Mexico) remarked that it was likely to follow the US in moving to T+1 because of its close linkage with US markets. This year, the Canadian Depository for Securities (CDS) made a similar observation.

"Our primary reason for moving to T+1 settlements is the highly interconnected cross-border linkages between the U.S. and Canadian markets. In order to ensure that market participants on both sides of the border avoid incurring additional risk, increased costs, and added work that would otherwise be unnecessary we need to migrate in synch."

Johann Lochner, Managing Director, CDS Operations, TMX Group

3 Why do we need to shorten our settlement cycles?

Accelerated settlements are needed to drive efficiency and realize treasury benefits



Question: What would be the greatest benefit of a shortened settlements cycle for your organization?

An interesting additional driver mentioned by some FMIs was meeting the expectations of specific customer segments. While most global institutional investors were accustomed to extended securities settlement cycles, retail investors were not — especially those that had experienced real time settlement when trading crypto currencies. Therefore, retail customer expectations at the end of the chain could in some cases be a driver for further shortening settlement cycles.

Market liquidity and other advantages

As last year, most FMIs thought it a reasonable assumption that the cash freed up by lower margin requirements as a result of faster settlement could be recycled into more trading activity, thereby improving overall market liquidity and so potentially also enhancing market efficiency and price discovery. This was seen as particularly pertinent for markets with a large retail component, such as India.

"Faster release of funds is likely to grow market liquidity, as the retail & institutional participants can use the funds efficiently. This is a step to strengthen the market structure in India and will give more confidence to investors to participate in our markets."

Hari K, Head — Business, National Stock Exchange of India Ltd (NSE)

However, in some markets, regulatory restrictions applied to certain investors might cap this benefit depending on the settlement cycle. For example, offshore investors in certain jurisdiction are not allowed to day trade, so any additional cash liquidity they gain can only be recycled into additional T+1 trading.

While FMIs see risk reduction and lower margin requirements as the main benefits of a faster settlement cycle, they again mentioned that the investment needed to support this would also deliver process efficiencies and higher straight through processing (STP) rates. (As already mentioned above, this was again the top ranked benefit for market participants.)

In addition to the cost savings/capital efficiencies brought about by reduced margin requirements for exchange trades, FMIs again mentioned more general cost savings as a potential benefit of shorter settlement cycles. Depending on the individual entity and the amount of process improvement (such as removing manual activity) achieved as part of handling faster settlement cycles, these savings could be substantial.

Netting: the limiting factor?

Netting is obviously a huge advantage for markets in terms of capital efficiency, with several FMIs alluding to netting rates in the 98-99% range. For this reason, they were (as last year) highly circumspect about the prospects of immediate atomic settlement for markets such as equities.

"If as an industry we chose to implement real-time gross settlement or, in the case of digital assets, atomic settlement to accomplish the simultaneous movement of securities versus cash, I think we could accomplish it. However, given the exceptionally high netting benefits we would be forgoing and the associated additional costs and significant changes that would be required to processes and systems, I believe the overwhelming feeling within the industry at the moment would be that real-time gross settlement and atomic settlement are not the right way to go. I think a netted end-of-day settlement option — which retains the benefits of netting — is likely where the industry might be focused in the future."

Michele Hillery, General Manager of Equity Clearing and DTC Settlement Service, The Depository Trust & Clearing Corporation

Hillery also points to the fact that the National Securities Clearing Corporation (NSCC) handles 200-300 million transactions per day, potentially peaking at ~50,000 transactions per second. The pre-positioning of cash and securities for that level of activity for settlement on an atomic basis would clearly be an enormous burden for all participants, in addition to any netting loss.

Market participants have remained particularly focused on the cash leg as a barrier not just to atomic settlement but to any further reductions in the global settlement cycle, with a similar percentage of market participants to last year seeing cash, funding and liquidity management as the greatest obstacle for the market as a whole. 19% also saw this as the major challenge for their own organization internally (see Figure 4).

While other FMIs took the same view as NSCC regarding the atomic settlement of equities, several also mentioned the alternative of T+0 intraday settlement windows that would preserve some of the netting benefits. Some pointed to the precedent for this in the FX market with CLS Bank, which uses batch intraday settlement (continuous linked settlement).

FMIs were also careful to make the distinction between equities and other markets, where atomic settlement could be feasible. One example cited was commercial paper, where a corporate treasurer might have access to a small selection of asset managers, all able to trade and settle immediately. In those circumstances, atomic settlement of primary issuance might be entirely possible.

Shorter settlement cycles: needs and obstacles

When it came to the key factors enabling a T+1/T+0 environment, there was a major shift in the priorities of market participants in comparison with last year. Where previously responses were very distinct, this year they were far closer in percentage terms. For example, in 2021, 46% of respondents saw upgrading or re-platforming legacy technology as the primary factor, far ahead of the second placed factor (buy in from regulators and market infrastructures on 16%). By contrast, the legacy technology factor was sharply down to just 18% this year – with improving and simplifying operational processes replacing it as the top priority (25%) and the other factors also much more closely grouped in terms of percentage. Much of this change was driven by the sell side.

Interestingly this shift means that market participants are now more closely aligned with the view expressed by many FMIs last year (and repeated this year) – namely that technology upgrades were not necessarily a major part of shortening settlement cycles. They acknowledge that technology can be an enabler in this respect, with technologies such as cloud and DLT enabling the acceleration of data and the breaking down of data silos to improve data integrity.

However, while this could streamline processes from front to back to compress settlement cycles, FMIs (as last year) see the demographic and process practicalities of transition to faster settlement as a bigger issue.

"When we look at the reason why we have T+2, it is not because of technology. It is a market convention that we have agreed upon, because many processes and many participants simply can't go faster. Fundamentally, the challenge is therefore to coordinate the different participants so that trade processing, liquidity, treasury etc. is aligned to the delivery of the right settlement cycle."

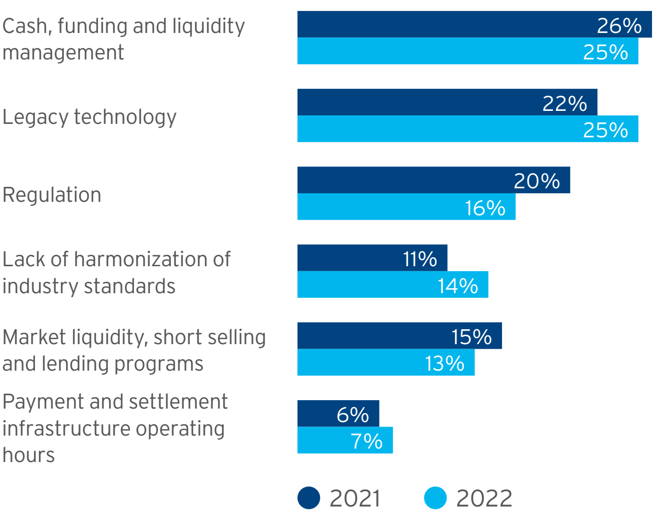
Pierre Davoust, Chairman, Euronext Securities

Achieving an adequate degree of coordination to accomplish a successful transition is obviously not a trivial task, but can be made even more demanding by the mix of market participants. As several FMIs pointed out, the more diverse the mix, the greater the challenge. So a market with both domestic and offshore investors has one layer of complexity, but that is then rendered even more complex by

4 What is getting in the way of accelerated settlement?

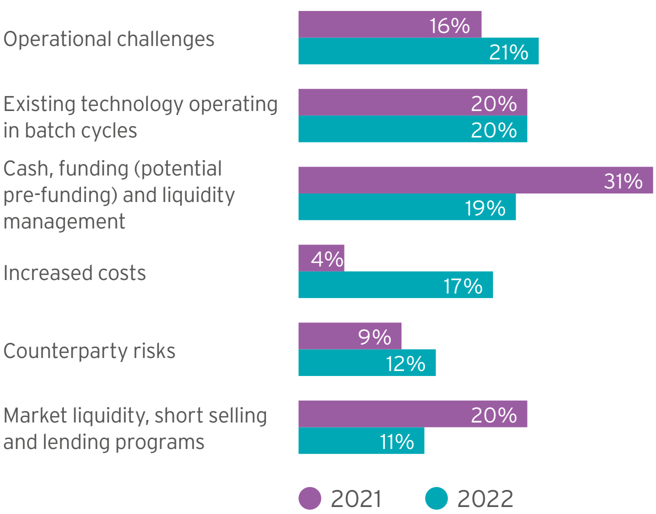
Gross funding requirements are seen as a major market issue with technological readiness a market-wide challenge

Market level obstacles



Question: At a market level, which of the following is the greatest obstacle to achieving further reductions in the global settlement cycle?

Internal obstacles



Question: Within your organization, what would be the main challenge of supporting a shortened settlement cycle?

the diversity of those investors across retail, institutional, alternative and high frequency etc. A related consideration is how manual some processes can be in particular markets. In situations involving cross border clients, where neither the exchange nor the broker may actually know at the time of order placement who the end client is, the process for adding this information post trade may be 100% manual. Therefore a lot of work on both the process and the technology will be required to automate this.

The issue of coordination is also linked to the capabilities of individual participants in handling and processing data sufficiently quickly, which can effectively result in progress being limited to the pace of the slowest. Ultimately, markets are complex and integrated ecosystems where all participants need to work towards shortened cycles if systemic failure is to be avoided. In Europe, there is also the matter of CSDR penalties to consider.

"I would say that one of the most important obstacles to reducing the settlement cycle is whether all participants are able to reconcile and process all data efficiently enough within one day. Today we can see that two days is sufficient, but even then not in all cases. So there is a risk that reducing the settlement cycle further without resolving this point would simply leave some participants having to finance more penalties."

Francisco Béjar Nuñez, Managing Director, Iberclear, BME

Modern technology and new processes could be used to reduce this obstacle and possibly also another mentioned by FMIs, namely organizational inertia. Participants may simply be contented enough with the existing settlement cycle (for all its limitations) and are reluctant to invest the effort and funds to shift to a shorter one. That is seen as a key challenge for buy-side firms.

"The buy-side needs to work to change their processes in order to cope with a shorter settlement cycle. And that is actually the biggest hurdle, because there's nothing in it for the buy-side. They don't put up margin, so they don't gain anything in terms of cost saving. So there's no benefit for them despite having to do a lot of work."

Greg Lee, Managing Director, Securities Business Development, Paxos

Apart from modern technology and new processes, an additional remedy here could be external service providers. These firms could help insulate the buy-side from the effort and complexity of change, particularly for those already amenable to outsourcing middle and back office processes.

The ease with which reductions in settlement cycles can be achieved, with the required changes to established processes and technology, will largely be dependent on the degree of maturity, sophistication and complexity of the market itself. All other things being equal, younger capital markets could have an advantage here.

"I believe a key consideration for changing settlement cycles is the history of each market's technology and regulatory frameworks," says Kangjun Yang, Director of the Clearing and Settlement Management Department at China Securities Depository and Clearing Corporation (CSDC). "For example, in China our capital markets began relatively late, so we have a cleaner slate to work with. However, for markets with a long history, changing their settlement cycles involves higher costs, as well as needing the cooperation of market participants, each with their own legacy processes and technology."

Operating hours and overseas investors

Any discussion of operating hours in the context of reducing settlement cycles almost inevitably involves a discussion of overseas investors. Some FMIs feel that while T+1 might still be feasible for these investors, T+0 would probably be a bridge too far and might deter their participation. Others feel that investors and service providers will need to adopt 'follow the sun' operational models in order to enable settlement compression in cross regional markets, such as APAC investors investing into the Americas and vice versa.

10% of market participants (versus 8% last year) also thought that extending operating hours for settlement infrastructure was a key factor in enabling a T+1/T+0 environment. Nevertheless, even reducing to T+1 could present challenges in the view of some other FMIs.

"T+1 poses a challenge in an industry that has prided itself on being very global, simply because of the physical time zone differences. The impact it has on Funding needs to be taken into consideration, in certain circumstances requiring the ability to trade and fund almost around the clock."

Samuel Riley, Head of Clearstream Securities Services and CEO, Clearstream Holding AG

One FMI reported pushback on the idea of increasing operating hours from domestic as well as overseas investors. However, this was specific to multiple settlement sessions in a market that also had high levels of day trading activity. The later settlement sessions would be considered for next day settlement, which would result in appreciably higher overnight margin requirements than day trading margin, thereby potentially deterring day trading activity.

Some FMIs are already at the technological stage that they have sufficient processing/resilience headroom to continue squeezing the gap between closing one day and starting the next.

"At present we can manage several hundred thousand transactions in a few minutes and have the technological capability to exceed that. That gives us further scope to extend hours and accommodate overseas investors as needed."

Philippe Laurensy, Head of Group Strategy, Product Management and Innovation, Euroclear

For some, the elephant in the room is not so much the question of extending hours but the fact that the industry runs on batch processing, which is not compatible with a 24x7 operating environment and has proved problematic in some markets. A potentially even bigger issue is that payment system hours may not necessarily accommodate longer operating hours. This is understandable given that cash and security settlement systems are entirely distinct and separate from each other and are owned by different participants in each domestic market. More generally, cash, funding and liquidity management were seen as the largest market level (as opposed to internal) obstacle to achieving further reductions in the global settlement cycle by market participants.

In the US, DTCC is expecting to extend operating hours as part of its move to T+1 and stands ready to do so again, if needed, in the event of further settlement compression or extension of exchange opening hours. From a buy-side perspective, the biggest impact of these changes is likely to be after market close and before what the DTCC refers to as its night cycle.

"DTCC's night cycle is going to be extended to accommodate processing more activity between 4pm and 10pm ET," says Michele Hillery at DTCC "This will impact both the buy side and sell side."

While FMIs were relatively evenly split on the matter of intending/expecting to increase their operating hours, it was apparent that they had all devoted considerable thought to the matter and/or had been involved in discussions on the topic with market participants and regulators. By contrast, market participants surveyed seemed rather less engaged on the subject, with only 7% (see Figure 4) seeing payment and settlement infrastructure operating hours as the greatest obstacle to achieving further reductions in the global settlement cycle.

Cash settlement systems

FMIs are unsurprisingly keenly aware of the integral role that cash settlement systems play in any shortening of settlement cycles. Therefore, close interaction with those systems is the default for all FMIs interviewed. This was especially true for those such as Marketnode that have a geographically widely distributed market participant base, and so is building a network for cash across multiple banks and branches (and even non-banks in some geographies). The key objective is to provide access for market participants to the maximum number of cash settlement and statement hours, plus the easiest possible cash management processes.

In view of their use of dedicated cash accounts at the central bank, European FMIs did not see cash settlement as much of an issue for EUR-denominated securities. However, FMIs such as Euronext also operate in markets where they hold numerous (more than five million) retail accounts directly on the books of the CSD. They therefore have to maintain very close connections with retail cash payment systems in order to make dividend payments etc. Any further reductions in the settlement cycle would also require accelerating the processing of corporate actions, which would also drive a need to streamline the way in which Euronext interacts with those external retail cash payment systems.

For US markets, some FMIs see major Fedwire enhancements (such as the 2023 FedNow launch[13]) or a digital dollar (in the form of a CBDC) as key to further reductions in the settlement cycle. With either/both of those in place, the market would have the necessary access to USD that could move freely 24x7.

Regulation: an important consideration

Market participants surveyed did not view regulation as a major factor in terms of achieving further reductions in the global settlement cycle. As last year, FMIs' views on regulation with regards to transitioning to T+0 were

India Settlement Cycle Journey

2001
India moves from weekly rolling settlement to T+5 settlement

2003
India transitions to T+2

2013
The Securities and Exchange Board of India (SEBI), contemplating a further compression of settlement cycle to T+1, publishes a discussion paper and invites comments from stakeholders including CCPs, CDPs and exchanges.[14]

2021
In September 2021, SEBI enables stock exchanges to offer T+1 settlement on an optional basis.[15]

2022
To avoid splitting the settlement of individual securities across T+1 and T+2, the exchanges decide to go live with T+1 in a gradual manner, starting with the 100 lowest market cap stocks on 25th February 2022.[16]

Present
Since then, on the last Friday of each month ~500 stocks move to T+1, with the final batch of the highest market cap stocks due to move in January 2023.[17]

sharply divergent. At their best, regulators were seen as strong enablers, supportive of innovation (such as by enabling sandboxes for testing) and collaborative in approach (e.g. by running user groups involving industry participants). In India, the regulator SEBI has epitomized this collaborative style and has been key to the rapid deployment of T+1.

A point raised by several FMIs last year with regard to the regulation of digital assets was the importance of collaboration among regulators to maximize consistency where possible across jurisdictions. This point was raised again by FMIs this year, but more generally to include non-digital assets as well. Apart from reducing costs and workloads for market participants this could (through broader scrutiny and collaboration) also minimize the chances of unintended negative consequences arising from new regulation. Some saw the need for more regulatory consistency as pressing.

While the majority of FMIs were generally positive about the prospective influence of regulation on faster settlement, they did not see a role for regulation regarding the technology that might support this. Some regulators were also seen as being cautious on technology such that they would not allow FMIs to use a particular technology, unless it had already been deployed successfully in another regulatory jurisdiction.

Other FMIs however felt that regulation could act as a strong technology enabler. "In Switzerland, we have favorable regulatory and legislative environments," says Marco Kessler, Head of Business Design at SIX Digital Exchange. "That has definitely given us a positive technological impetus."

The overall picture regarding settlement compression is of gradually increasing momentum towards shortened cycles, with FMIs either already shortening cycles or making background preparations that will support this. At the same time, market participants' expectations also appear to be accelerating with a notable decline in those expecting the common status quo of T+2 to persist and a similar increase in those anticipating a transition to T+1.

Digitalization

The exceptional pace of recent growth in digital assets[18] has resulted in the executive order that establishes a national policy for them.[19] This growth has also been broad ranging, covering areas from trade finance[20] to real estate.[21] Meanwhile, crypto asset regulation has also recently been agreed in Europe in the form of the Regulation on Markets in Cryptoassets (MiCA).[22]

Digitalization has also elicited multiple responses from the financial sector across multiple areas, from Morningstar introducing a new digital assets category to its services[23], to the Alternative Investment Management Association (AIMA) publishing formal digital asset guidance for its members,[24] and the Shanghai Data Exchange launching a new digital assets trading section.[25]

This rapid rise in digital asset activity has been accompanied by an equally rapid rise in institutional investor interest. A recent survey of traditional hedge funds by PWC revealed a near doubling in the percentage of funds investing in digital assets to 41%,[26] while an international study by Grayscale Investments found that 71% of professional investors believe institutions will hold 60% of digital assets within seven years, compared with just 3% today.[27] Elsewhere, Eurex's report "Digital Asset Trading 2021", which surveyed its institutional users, found that 59% of respondents had a positive perception of digital assets. Their most appealing attribute – cited by 77% of respondents[28] – was that they saw them an asset class in their own right.

Activity and opportunity: plenty of both

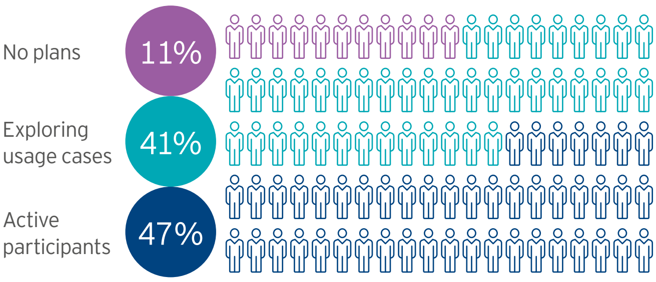
This positive institutional interest in digital assets was again reflected by the market participants surveyed by Citi this year, with 88% of respondents (the same percentage as last year) stating that their organization was either actively participating or exploring use cases in digital assets, blockchain or distributed ledger technology (see Figure 5).

FMI interviewees were also again similarly engaged with digital assets, with the majority already live with (or working on) digital asset initiatives, tokenization and fractionalization, while publicly available data shows that at least a further 10 FMIs globally are already invested in the digital asset/blockchain area. In comparison with last year, there was a slight shift among traditional FMIs, with more of them working on projects involving assets created solely in digital format from the outset, rather than just creating digital versions of existing traditional assets.

Some FMIs are also slightly skeptical about the value of digitizing existing assets, other than as an intermediate step towards native digital assets. They accept that the relatively limited amount of new equity issuance in the form of IPOs each year means that some digitizing of existing assets is unavoidable, but it should not become the default. They cite depository receipts as an example of why this should be avoided, due to the resultant need for running two systems and reconciling between them.

5 Engagement of digital assets, blockchain or DLT

More people are acting than planning



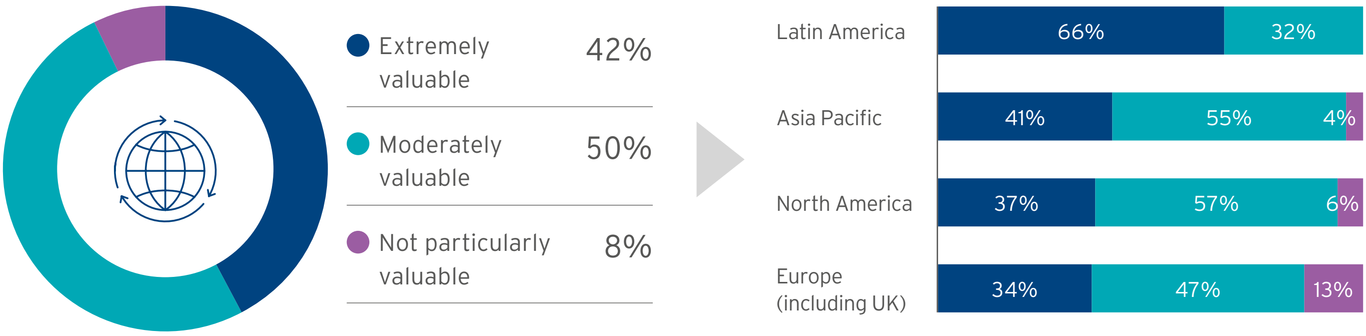
...Latam and Asia-Pacific lead the way

Question: Is your organization currently engaging in digital assets, blockchain or distributed ledger technology?

6 The benefits of tokenization are clear according to market participants

92% of the market sees value in it today

Potential benefit of tokenization to market liquidity and variety of tradable assets (% of respondents)



Question: In terms of increasing market liquidity and tradable asset variety, tokenization is likely to be...

Nevertheless, market participants clearly have major expectations of tokenization, with almost 90% of respondents feeling tokenization was likely to be extremely or moderately valuable in terms of increasing market liquidity (see Figure 6). This liquidity angle also found favor with FMIs but mostly (as last year) in the context of illiquid asset classes such as art, syndicated lending or real estate. An additional tokenization benefit (not mentioned by FMIs) is as a more efficient model for collateral processes, since collateralization is possible 24x7 — unlike fiat assets, which are restricted to market operating hours.

The importance of regulation and legal infrastructure to the evolution of native digital assets was again raised by FMIs. Apart from a few jurisdictions, this was still lacking, which meant that the majority of digital assets were still being created by tokenizing existing physical assets. As these assets were not being created natively, they did not include functionality such as smart tags that post-trade teams could use for settlement or management information systems.

As with regulation, FMIs are similarly concerned that there should be more international collaboration on evolving consistent legal standards for digital assets. Legislation such as Germany's Electronic Securities Act or Switzerland's Distributed Ledger Technology Act are seen as steps in the right direction. However, without greater cross border collaboration, FMIs feel that there is still a potential risk of digital islands forming that would negatively affect the value and usability of digital assets through legal or standards inconsistency across jurisdictions.

US Executive Order on Ensuring Responsible Development of Digital Assets

The Executive Order (EO) outlined a holistic government-wide approach for handling the risks and potential benefits of digital assets, plus the related underlying technology. Since then, government departments have been working collaboratively to develop frameworks and policy recommendations that support the six key priorities outlined in the EO:

- Consumer and investor protection
- US leadership in the global financial system and economic competitiveness
- The promotion of financial stability
- Financial inclusion
- Countering illicit finance
- Responsible innovation

FMIs are also active in fractionalization. While this is often mentioned in the context of illiquid assets with high individual item prices, such as fine art, several FMIs are also exploring it in the context of liquid asset classes, with a view to extending the range of investors involved. A case in point is the Santiago Stock Exchange, which is working with a startup to tokenize and fractionalize bonds. Through fractionalization the exchange intends to attract retail clients into an asset class historically dominated by institutional investors. This follows on from BondEvalue's initiative in APAC which was detailed in last year's Citi whitepaper.

Digital asset infrastructure: separate or integrated?

As digital assets continue to grow in importance, the question of how the infrastructure for settling digital assets would interact with that for settling legacy assets becomes more pressing. Will FMIs run the two infrastructures in parallel or attempt to combine them into a single consolidated infrastructure? As in 2021, the majority of FMIs remain in favor of running the two alongside each other. Several of them felt that this approach was likely to be the norm for some time to come, with a few mentioning the Australian Stock Exchange's digital CHESS replacement as an illustration of how challenging building a single system for both asset categories could be.

Nevertheless, some FMIs appreciated that this parallel approach would require a similarly parallel approach by market participants in order to connect to them. To minimize this inconvenience and effort, these FMIs felt there was value in using their CSD(s) as a single connection point, effectively acting as user gateway or bridge to both traditional and digital assets.

An important point made by several FMIs was that the use of DLT for infrastructure was not synonymous with shorter settlement cycles – one was perfectly possible without the other. For those with sufficiently future-proofed conventional settlement infrastructure, the need to embark on major DLT implementations was limited. These FMIs might well have ongoing DLT projects, but they were not planning to use these for major reengineering or replacement of existing settlement technology.

Digital asset infrastructure is also an area that some FMIs feel is heavily dependent on the stance of their local regulators. Any major changes, such as building completely new infrastructure for processing both traditional and digital assets, would require a lengthy regulatory approval process. There is therefore a strong incentive to keep asset infrastructure separate for each asset category. One FMI even remarked that local regulation meant that they see the creation of new digital assets not as a technological issue but a regulatory one.

Immediate atomic settlement

31% of market participants see atomic settlement[29] as achievable by 2026 and 48% as achievable by 2030. This is a more positive view than FMIs, some of whom see it as theoretically possible by 2026, but stress that this would only (possibly) apply to a small subset of specific instruments (such as the commercial paper example mentioned earlier – see '*Netting: the limiting factor?*' above). For activities such as major equity market settlement, most are extremely skeptical that this could be achieved by 2026.

The main reason for this skepticism is the loss of netting benefits (see 'Netting: the limiting factor?' above) implicit in atomic settlement, together with the major overheads and logistical headaches of positioning cash and securities to achieve it. For example, most of the middle and back office systems currently in existence would be unable to handle the gross volume of all the transactions involved.

However, some FMIs have conducted exploratory research into how the workload impact of atomic settlement on intermediaries could be minimized. For instance one FMI has explored a concept whereby it would act as a central cash depository with which all investors would open cash accounts directly. Under this model, cash clearing banks would be completely removed from the process chain and brokers would only fulfill purely broking functions and would no longer have any settlement involvement, though this approach would effectively require prefunding for all transactions.

Digital assets have continued to grow in importance since the 2021 Citi whitepaper, which is reflected in the positive stance taken by both market participants and FMIs, though the latter are more nuanced in their optimism, especially with regard to the value of digitizing existing conventional assets. FMIs are also slightly more cautious on related matters, such as the viability of atomic settlement by 2026.

Technology and the journey to digital transformation

Recent events have continued to underline the role technology is playing in the digital transformation of the settlement process. On the infrastructure/regulatory side, ESMA opened a call for evidence on the EU's DLT Pilot Regime at the start of 2022, which was followed in June 2022 by the EU's formal adoption of the regime [30] (with full implementation set for March 2023). Under the regime, eligible firms can apply to operate a DLT-based settlement system and/or trading facility for financial instruments within what is effectively a regulatory sandbox. This should support the development of secondary market infrastructure for both native and tokenized digital securities, as well as informing any changes potentially needed to existing regulatory frameworks. (The UK is likely to follow suit with a similar scheme in 2023 [31].)

Elsewhere, FMIs have continued to take stakes in and/or collaborate with fintechs working in the DLT settlement space. For instance, Euroclear has made an investment in Fnality [32], as part of its drive to deliver a solution for the settlement of digital securities against digital cash on DLT, while SDX has also collaborated with F10 and Aequitec [33] on the first tokenization of equity shares in a fully regulated CSD based on DLT.

There has also been the first settlement of an agency securities lending transaction using a DLT platform [34], the launch of an AI powered settlement prediction tool by Clearstream [35] and the announcement by Asia Development Bank of a project to trial blockchain for settling cross border securities transactions.[36]

DLT: growing activity, but niche

FMIs' use of DLT exemplifies the greater sense of purpose prevalent among them this year. Almost all FMIs interviewed are actively engaged in live DLT projects or proofs of concept, while the remaining few are conducting research.

Euronext has invested in the blockchain fintechs LiquidShare and Tokeny and in conjunction with these has participated in multiple DLT test projects around security settlements, both with and without central bank money. It is also directly engaged with a number of major banks on facilitating the banks' DLT projects, by connecting them to its CSDs. Other FMIs, such as CSDC, have been working on using blockchain for activities other than actual settlement, such as improving anti-fraud detection.

Elsewhere, Iberclear BME CSD has been live since 2019 in cooperation with BME Clearing with a small-scale service in the Spanish market that uses DLT. While only a few participants currently use this live service, it gives the CSD valuable insight and information on how it might use DLT advantageously in the future.

In Chile, the Santiago Stock Exchange created a blockchain consortium in 2019 with the central securities depository DCV and the tech company GTD. One output of the consortium has been a production solution for a securities lending repository and short sales, another has been one for proxy voting at shareholders' meetings.

> *"It's an open ecosystem. So we are also working with various different startups and companies that wish to build their own applications on it."*
>
> **Andres Araya Falcone, EVP & Chief Business Officer, Santiago Stock Exchange**

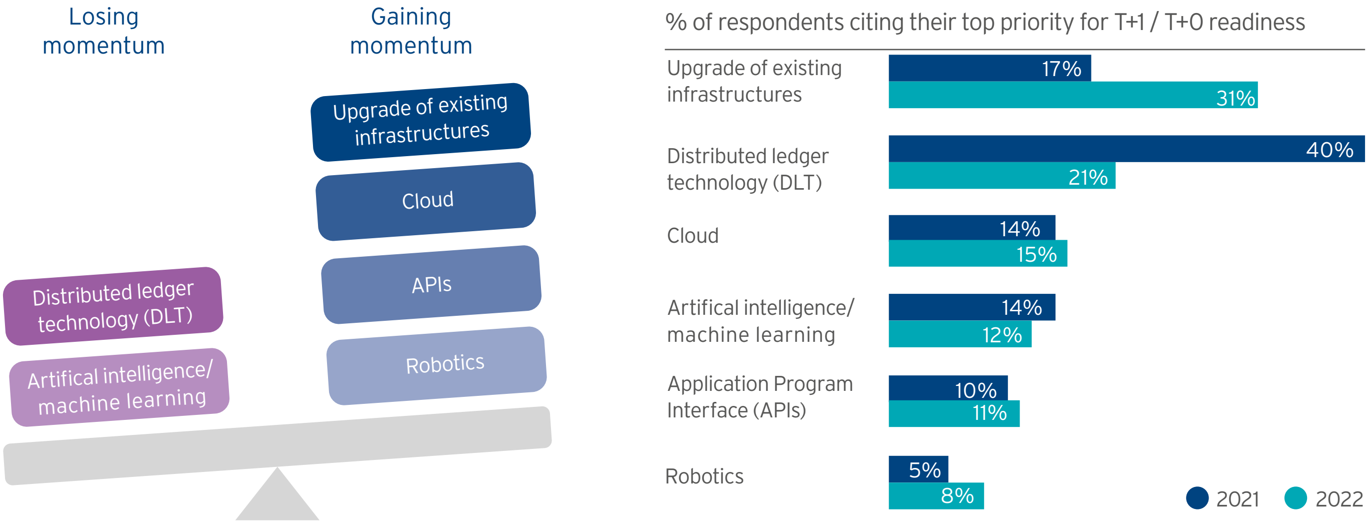
On the advantages of DLT for settlement, several FMIs point to the substantial reduction in data duplication through having access to a single authoritative ledger copy, which could offer very substantive cost savings. However, while the reduction in data duplication was clearly a bonus, it would require appreciable changes by participants.

For instance, internal teams would need to re-orient themselves to very different working practices and internal platforms would need to refocus from data storage to efficient data consumption. More generally this ultimately affects the pace of widespread DLT adoption.

> *"For every evolutionary step, there is a time and investment dimension attached. Some departments at market participants may be very forward looking, but it's the speed at which the overall organization can move that ultimately determines the timing of DLT adoption. Yet innovating the market structure end-to-end also offers an unprecedented opportunity to review and simplify today's banking platforms, reducing their total cost of ownership."*
>
> **Marco Kessler, Head of Business Design, SIX Digital Exchange**

7 What do we need to do to prepare for accelerated settlements?

Practical considerations at the forefront



Question: What technologies do you think will be core to a successful transition to T+1/T+0?

Another advantage of a single authoritative DLT data source was the eradication of reconciliation points between systems. However, several FMIs are careful to draw the distinction between decentralized and centralized DLT, with the former seen as unwieldy for processing the very large transaction volumes involved in real time. Nevertheless, even those who see the possible long-term potential of DLT feel that it is not yet proven in the context of large scale securities settlement. One FMI also mentioned that previous misapplication of DLT was undermining confidence in its future potential.

Euronext highlights the value of DLT's potential for standardization across several hundred exchanges, CSDs and other market infrastructures, all with different practices. Replacing these practices with a limited number of DLT infrastructures and technology that could be rolled out across all markets was particularly appealing in terms of simplicity and efficiency. However, this requires wide industry adoption to maximize the distributed promise of the technology. Euronext's own ecosystem illustrates the scale of this challenge: it has some 400 market participants distributed across all four of its CSDs, but only a very few are connected to all four and a few dozen are connected to two or three. The size range of these participants is also extremely diverse, ranging from major global banks to very small savings banks with a handful of employees.

Overall, while FMIs are impressed about the potential for DLT, they remain unconvinced about its applicability to very large scale mainstream securities settlement. By contrast, although market participants have significantly moderated their expectations for DLT since last year, they still appear more optimistic than FMIs. 21% see DLT as core to a successful transition to T+1/T+0, compared with 40% last year (see Figure 7). On the matter of possible cost savings through DLT market infrastructure, FMIs are relatively cautious, with none committing to a specific figure and most seeing it as a matter of conjecture. Market participants are again more optimistic, with a quarter of respondents anticipating that DLT based market infrastructure could cut post trade processing costs by 31-50% and 54% expecting it will produce savings of 10-30% (see Figure 8).

AI/ML: more to offer

Most FMIs interviewed this year are already using artificial intelligence (AI) and/or machine learning (ML), but similar to last year, none see it as critical to compressing settlement per se. However, as settlement cycles continued to compress, some feel it would increase in importance for exception management or dispute resolution. With less time available for manual intervention, intelligent automation driven by AI/ML could prove a critical advantage in improving settlement ratios, while simultaneously reducing costs.

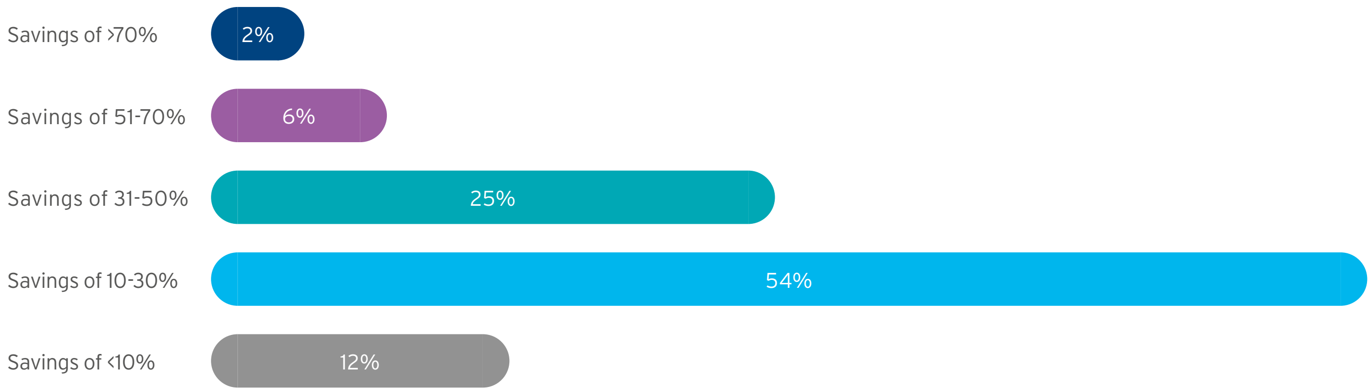
There is also a view that AI/ML might also facilitate the tokenization of existing securities, particularly in document reading and especially where it involves language translation (a point also raised more generally last year). It was also felt that both technologies could add value by enabling the industry to make better use of the data it already had and that FMIs might be able to leverage this to provide additional reporting services.

8

Why DLT?

33% of the market expects savings of over 30%

Expected trade processing efficiencies



Question: I anticipate that a DLT based market infrastructure could cut post trade processing costs by...

As with DLT, market participants are somewhat at odds with FMIs regarding the importance of AI/ML. While FMIs see these technologies as useful, none see them as integral to faster settlement. By contrast, 12% (compared with 14% last year) of market participants think they would be core to a successful transition to T+1/T+0. (see Figure 7)

Cloud computing: complementing efficiency

In contrast with their views on AI/ML, FMIs generally regard cloud computing as being more mainstream in terms of the settlement process. For example, Marketnode is already 100% on private cloud and others are of the view that cloud computing is now a relatively proven technology that has a role to play in reducing settlement times. Some market participants take a similar view to FMIs on this, with 15% (compared with 14% last year) seeing cloud as core to a successful transition to T+0/T+1. (see Figure 7)

Apart from possible cost savings, the potential benefits of cloud mentioned by FMIs included scalability and resilience/failover. However, one FMI stresses the importance of careful implementation if these benefits are actually to be achieved; in mission-critical environments it is definitely not a click and forget solution. Possible regulatory restrictions on the physical location of data also need to be considered in certain jurisdictions and some regulators clearly have concerns about FMIs' increasing reliance on a small number of cloud servicing providers, as the Bank of England's recent letter to CSDs illustrates.[37]

Finally, the complementary nature of cloud and AI/ML was also noted. "Cloud provides high elasticity, high reusability, and high infrastructure capability, making for highly efficient data processing," says Dr. Lv Guohao, Senior Manager, Information Technology Department I, CSDC. "This provides strong computational support for AI applications, which in turn ultimately reduces costs for market participants."

Other key technologies

FMIs also see various other technologies as key to faster settlement cycles. Several of them mention APIs in this respect (none did so last year). The feeling is that well-documented APIs with a standardized architecture (e.g. a RESTful API) has much to offer in terms of improving and accelerating connectivity between FMIs and market participants. For situations where existing systems belonging to different entities need connecting (and a suitable API was not available) one FMI emphasized the need for high-capacity middleware that could facilitate the rapid exchange of information between parties.

Reducing the settlement cycle leaves less time between the point at which the trades enter the system and the point at which the infrastructure has to produce output settlement instructions. In view of this, Euronext also highlights the need for faster risk management technology across the industry. The need to compute the settlement obligations of the various participants far more quickly would in many cases require a significant upgrade to the risk management technology.

Technology gains for market participants: FMIs' views

As in 2021, FMIs see one of the main benefits to market participants of the technologies outlined above as cost savings. A number of FMIs also feel that the modernization inherent in shortening settlement cycles could also make it easier for market participants to expand their businesses into new areas to tap additional revenue streams.

Efficiency gains were again seen as being of similar importance to cost savings, with the conjunction of cloud and AI/ML again being mentioned as important for facilitating high volume scalable analysis and decision making. However, Euroclear stresses that while there might be benefits for market participants from new infrastructure and technology, the pace should not be forced.

"As a market infrastructure, we need to evolve in such a way that will enable our participants to leverage our new infrastructure and technology as and when they're ready, I therefore do not believe that we will see a big bang in terms of adoption."

Philippe Laurensy, Head of Group Strategy, Product Management and Innovation, Euroclear

The process improvements inherent in a shorter settlement cycle, were again seen by some FMIs as delivering more benefits to market participants than any particular technology. This certainly resonates with market participants who (as mentioned above) rated greater efficiency in investment and trading processes as the top ranked benefit of a shortened settlement cycle for their organization. (See Figure 3).

Digital transformation

All the FMIs interviewed were clear that digital transformation was a high priority for them and had been so for a long time. The Santiago Stock Exchange for example, has been working on a digital transformation program for the last 12 years.

Several FMIs mentioned that the digital transformation of their organization is also integral to enhancing their market participants' experience. A key part of that was to automate as many internal processes as possible to expedite the delivery of services and data to clients to a real time level.

Modernization of legacy technology is a major element in digital transformation for some FMIs. "The primary objective of our Post-Trade Modernization program that is currently underway is to modernize our core systems," says Johann Lochner at TMX Group. "That will give us the flexibility to meet the current and future business needs of our participants, who are operating in a continuously evolving industry."

Other FMIs see managing controls as particularly important when undertaking digital transformation. Transforming legacy processes without carefully considering the smallest element of each change could incur risks.

"In our experience, basic operational processes, such as control and regulatory oversight, are extremely important during digital transformation," says Greg Lee at Paxos. "If you try just to change things in a vacuum, how can your participants have faith in these control functions? Therefore, I think some very old school principles are exceptionally important in the digital transformation."

US Settlement Cycle Reduction

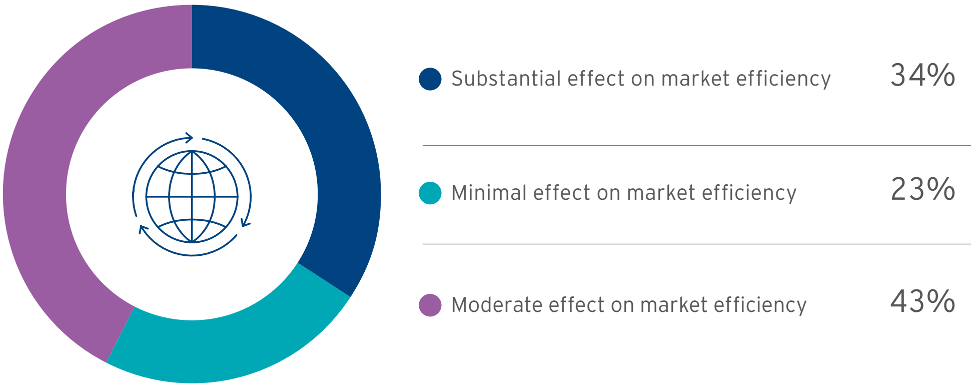
The US market is reducing its settlement cycle from T+2 to T+1. At the same time, Canada and certain Latin American markets with securities cross listed in the US are following the same trajectory. In August 2022, DTCC, SIFMA, and ICI developed playbooks and functional documentation for each intermediary to perform scope analysis and implementation framework guidance. Parallels with the previous transition from T+3 to T+2 included shortened allocation, affirmations, and securities lending cut-off times. Particular areas of focus include participants analyzing their underlying manual processes and dependencies on FX and clean cash to fund T+1 transactions. A further key consideration for all intermediaries (and their underlying clients) is the potential for an initial increase in settlement failures post go-live, due to the interdependency among participants' states of readiness.

At present, the recommended SIFMA compliance date for T+1 is Tuesday, September 3, 2024 (immediately after the 2024 Labor Day weekend).[38]

9 The impact of digital money

77% see a positive impact of digital money but is it too early to size the efficiencies still?

Potential impact of digital money (% of respondents per category)



Question: Digital money will have a...

Digital money

Most FMIs interviewed see digital money as an almost inevitable market evolution, though they all feel it premature or unlikely that it would be used to support securities settlement by 2026. If nothing else, they see the logic of a digital currency being used to pay for digital assets as apparent. However, some regard it as critical in a more general sense in that by enabling 24x7 movement of cash it would remove the risk that today accumulates during periods when existing cash settlement system are closed. This is also seen as especially germane in the context of markets extending their trading hours.

Almost without exception, FMIs feel that if any digital currency is used to support securities settlement, that currency will be CBDC. However, the exact nature and implementation of CBDC was less certain. One view is that much will depend on how the US Federal Reserve progresses with its CDBC assessment and the impact that will have on other central banks. However, the benefits of a CBDC could be affected by whether central banks opt for an intermediary or direct account model. Some were skeptical that central banks would wish to manage the CBDC accounts of their entire populations themselves and so would be more likely to involve intermediary banks. However, would that then risk jeopardizing the 24x7 availability of the CBDC?

More generally CBDCs are seen as inevitable, if nothing else than as to provide a reference point for other digital currencies. While most FMIs noted that they would provide important market efficiencies, others are less convinced that CBDCs are likely to offer huge benefits over existing wholesale cash settlement systems.

"When people speak about digital EUR or digital USD, they think about replacing coins by an electronic record in a system run by the central bank," says Pierre Davoust at Euronext Securities. "But a settlement participant in Euronext already has that capability because it has a fully electronic account with a central bank with the balance recorded electronically. This effectively means that digital EUR is essentially a retail rather than wholesale debate. On the wholesale side, systems such as Target2 can and should be improved – but this means enhancing an already existing form of electronic money, rather than moving from a physical to an electronic form of money."

Most FMIs report varying degrees of activity at their central bank in terms of preparing CBDCs, ranging from public testing to only very preliminary exploration. Contingent upon the availability of these, some FMIs have plans to start using CBDCs for securities settlement in the not too distant future.

"If conditions permit, we may consider using digital RMB to settle share transactions. This will improve efficiency for the market as a whole."

Kangjun Yang, Director of the Clearing and Settlement Management Department, CSDC

Market participants are more optimistic than FMIs on the timeline for digital money, with 73% feeling that digital money would be used to support securities settlement by 2026. Participants are broadly in line with FMIs with 48% seeing CBDCs as the likely means of securities settlement by 2026. Both parties are also aligned as to whether digital money will deliver market efficiencies (see Figure 9)..

Technology continues to drive digital transformation of the settlement process. Cloud computing is seen by both market participants and FMIs as an important example of this. Other technologies, such as AI/ML, are seen as useful but not necessarily essential to digital transformation. Regarding DLT, while market participants are rather less optimistic than last year, they still remain more positive than FMIs – especially with regards DLT's applicability to high volume mainstream securities settlement.

Conclusion

While the transition of the US and its closely associated markets to T+1 has attracted considerable attention, the decision of India to do the same may in due course also be seen as an important inflection point. This year, these changes have been accompanied by a generally greater sense of purpose among FMIs about future settlement compression, with several conducting pilots and tests to support this goal, while others are now in detailed discussion with their market participants regarding a transition to T+1. Market participants have also become significantly more certain that T+1 will be the dominant settlement period by 2026.

The importance of digitalization has been underscored this year by the establishment of a US national policy for digital assets in March and by the new MiCA cryptoasset regulation in Europe. Similar to the sentiment regarding settlement compression, market participants and FMIs seem well-aligned, with both groups actively engaged in implementations of and investment in digital assets. However, there was less accord on atomic settlement, with FMIs notably more cautious. A related digitalization theme last year for FMIs that they strongly re-emphasized was the critical role of regulators and legislators in providing the necessary framework to facilitate common standards and frameworks for digital assets.

Technology has unsurprisingly continued to play a critical role in securities settlement, though FMIs were again quick to stress that it was a means to an end, not an end in itself. DLT activity among FMIs appears to be accelerating, though for now this seems to be restricted to niche areas and/or pilots and most are unconvinced about its use for very large scale mainstream securities settlement. Market participants remain more optimistic on this last point, though much less so than last year.

Regarding specific technologies, most FMIs now appear convinced that cloud computing is sufficiently tried and tested to be suitable for production environments. For the first time, several also mentioned APIs as having potential for the critical task of improving and accelerating connectivity between FMIs and market participants.

The overall picture revealed by FMIs and market participants is even more positive than last year. On several points – such as the use of DLT – there is closer accord between the two groups, but there is also an even greater sense of purpose and active preparation. Ultimately, the industry appears increasingly cohesive and prepared to invest the time and effort to further improve the settlement experience across a growing number of asset types.

Acknowledgements

We would like to thank our financial market infrastructure partners and clients who have contributed their time and insights to this whitepaper.

Endnotes

1 Digitization: convert data (e.g. in document form) to a digital format. Digitalization: convert business processes to use digital technologies, rather than analogue or offline systems such as whiteboards.

2 Citi Securities Services Evolution 2021 whitepaper

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9 Traditional FMIs were defined as long-standing exchanges, centralized securities depositories and clearing houses

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27 https://www.etfexpress.com/2022/06/15/309998/institutional-investors-replace-retail-investors-major-holders-digital-assets

28 https://www.eurex.com/resource/blob/2872736/38c6dd474131994bfe2b45e7e76a0a45/data/20211208_crypto-survey-report.pdf

29 The transfer of two assets linked so as to ensure that the transfer of one asset occurs if and only if the transfer of the other asset also occurs. Settlement is therefore conditional, so the outcome is either a full and successful exchange or assets, or no transfer taking place at all.

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