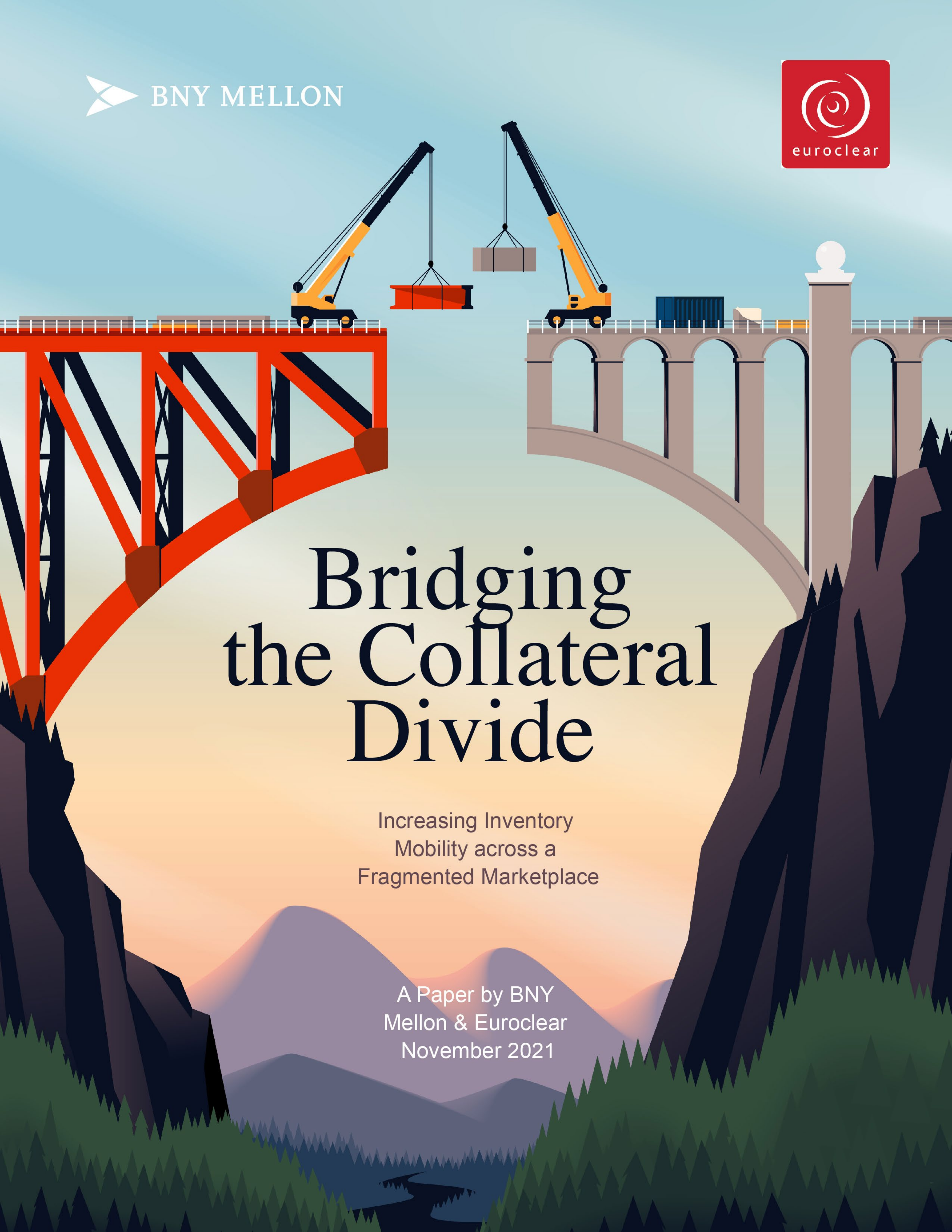

Bridging the Collateral Divide

Increasing Inventory Mobility across a Fragmented Marketplace

A Paper by BNY Mellon & Euroclear

November 2021

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Executive Summary

In this paper, BNY Mellon and Euroclear examine the contours of the global collateral marketplace and explore ways to improve it for all participants. We believe that harmonization of processes would significantly reduce fragmentation and enable increased mobility in international collateral management.

Given our different vantage points, we are uniquely positioned to see activity occurring today that is suboptimal for users of the marketplace. That has enabled us to identify several aspects of the current structure that all market participants, operators and end users alike might wish to change in order to have collateral usage be more efficient and effective. Given the focus on the optimization of financial resources across the industry, we think it is timely to provide our perspective and to try to start the conversation in order to help initiate change.

Our analysis suggests there is potential for increased efficiencies in the deployment of collateral if there is greater industrywide standardization and a more holistic approach to the efficient deployment of collateral.

This paper concludes by outlining a number of steps that stakeholders in the collateral management industry could commence work on to harmonize the collateral landscape and increase market efficiency.

Contents

INTRODUCTION

The Collateral Ecosystem

In the years since the 2008 Global Financial Crisis, much has been accomplished to make global capital markets both more resilient and more efficient. The fruits of these efforts are visible across numerous asset classes.

In money market funds, reforms around floating net asset values (NAVs) have been implemented to eliminate occurrences of money funds "breaking the buck." In over-the-counter (OTC) derivatives, mandatory clearing and margin requirements have significantly mitigated counterparty risk. In securitized markets, higher underwriting standards have substantially improved the credit quality of mutualized debt instruments. The list goes on.

While tremendous industry effort has been focused on these asset classes, one of the main tools for increasing resilience and reducing risk has been to incentivize market participants to move away from unsecured trading and into secured transactions. Nevertheless, an area of financial markets closely related to secured transactions that is primed to benefit from the introduction of greater efficiencies – and one that is often overlooked – is the collateral marketplace, and its associated inventory management processes.

Collateralized exposures are the segment of the markets in which counterparties post collateral assets to each other in order to secure and support another financial transaction, such as capital markets trading activity that generates an ongoing counterparty credit exposure.

A common example of a collateralized trade is a repurchase transaction (repo), in which a liquidity seeker posts securities as collateral to another party in exchange for cash.

Another is a securities lending transaction, in which cash, fixed income or equity assets are posted as collateral against the loan of a security or pool of securities.

The efficiency of these transactions depends on inventory management processes to support the collateralization leg of the trades, as well as the principal leg of a securities lending transaction. In the current collateral marketplace, however, substantial inefficiencies arise from the problem

Inventory vs. Collateral: A Note on Definitions

Throughout this paper, the terms "inventory" and "collateral" are used frequently. Although the two terms are similar and closely related, they are not interchangeable. As such, it is important to define at the outset what we mean by each:

Inventory: The securities that a collateral provider holds in its accounts at a global custodian or a central securities depository that sit unallocated to any sort of financial exposure. These securities simply sit in the account and are not delivered or transferred to support other investment or financing activities.

Collateral: The securities that are used to collateralize any sort of financial exposure, such as a repo, a securities loan or an OTC derivatives transaction.

In short, it is the action of allocating an asset as delivered or transferred in connection with some other financial obligation that transforms inventory into collateral.

of inventory being located in places where the securities cannot be optimally deployed against relevant exposures in other locations. The assets that secure these transactions – such as government bonds, agency securities, investment-grade corporate bonds and equities – are typically held around the world in custody at a global custodian, at a central securities depository (CSD) or at an international CSD, referred to as an (I)CSD.

Market participants often hold the same type of assets across several custodians, CSDs and (I)CSDs in different parts of the world pertaining to the specific trading activity and risk exposures they have in the region. When participants seek to use their assets as collateral most efficiently, they routinely encounter a problem: The most optimal collateral cannot be accessed expeditiously or easily mobilized to their counterparty.

For example, the most efficient eligible collateral for a market participant to post on a European repo trade executed via a triparty agent may be Italian bonds. Due to the activity that the participant has been undertaking in Italian fixed income, its securities may be sitting at a location (a custodian or (I)CSD) that is different from the location where the triparty repo trade was executed and where it will settle.

In this instance, since the most efficient assets are sitting in a location remote from the triparty platform through which the participant is seeking to raise cash, it might not be possible for the securities to be mobilized to the triparty agent and posted as collateral in a timely manner. As an alternative, less-efficient securities must be used instead to secure the repo.

This is the nature of the fragmented global marketplace: Assets are often held in custody at a location other than where they can be utilized as collateral most optimally, introducing drag on performance and increasing funding costs and other expenses for market participants throughout the value chain.

The solution to this problem is to improve the infrastructure supporting collateral mobility so that securities can move seamlessly between custodians and (I)CSDs and from one region to another with the speed, efficiency and fungibility of cash. How does the industry accomplish this goal?

The first step is to identify the dimensions of the issue, define the contours and explore the obstacles that must be resolved along the way and then outline a clear plan of action to achieve the goal.

In this paper, BNY Mellon and Euroclear examine the inventory fragmentation question and its implications and explore the steps that the global collateral community could take to enhance collateral mobility, promote collateral optimization and make the marketplace more efficient for all.

In part one of this paper, we lay out the parameters of the collateral marketplace, its size and the role it plays in the global financial system.

In part two, we share data from an exercise undertaken by PwC to analyze the extent of the similarities between BNY Mellon and Euroclear in terms of clients, assets used in triparty and the triparty transaction types being leveraged in order to determine the potential for optimization between both venues.

In part three, we identify six issues that are contributing to inefficiencies in the marketplace.

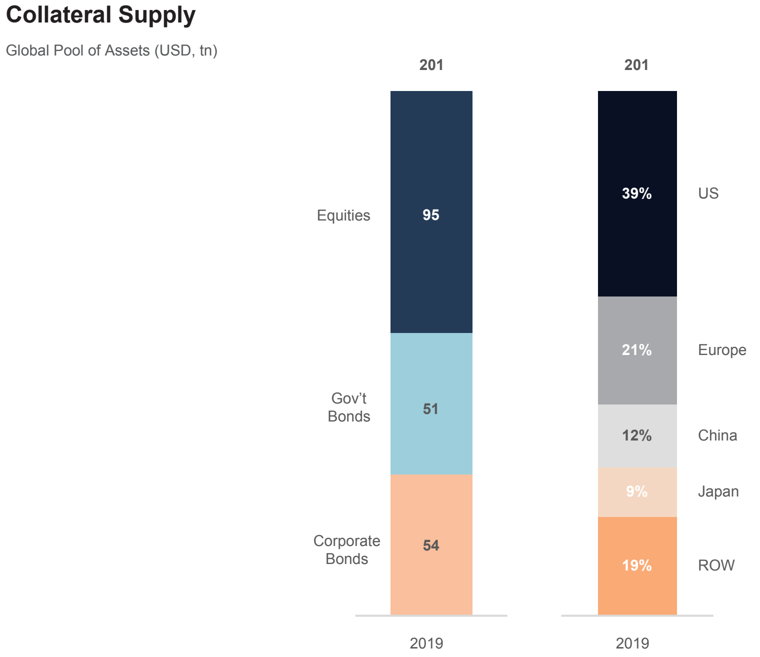
Finally, we conclude with a call to action for all collateral market stakeholders to join us in working toward realizing greater mobility of inventory and fostering a less fragmented and more cohesive marketplace that encourages the efficient allocation of assets as collateral for the benefit of participants around the world.

PART ONE

Understanding the Global Asset Landscape

Before we share our analysis of the current state of the collateralized marketplace, it is necessary to place the landscape in its proper context. Put simply, what is the total amount of securities assets in existence globally?

FIGURE 1: GLOBAL COLLATERAL SUPPLY BY SECURITY TYPE AND REGION, 2019[1]



A Primer on Collateralized Transactions

Repo: In a repurchase transaction (repo), one party sells an asset (or pool of assets in triparty) to another party at one price and commits to repurchase at a different price at a future date. Repo trades are a way for market participants to raise financing while enabling their counterparty to generate yield on their cash. As well as providing market participants with liquidity, repo transactions are a common lever deployed in monetary policy to manage liquidity within the financial system as a whole.

Securities Lending: In a securities loan, the owner of stocks or bonds transfers the assets temporarily to a borrower. In return, the borrower transfers other shares, bonds or cash to the lender as collateral and pays a borrowing fee. Securities lending can be used to incrementally increase fund returns for investors.

Derivatives: A derivatives trade requires initial margin (typically securities collateral) and variation margin (typically cash collateral) to be exchanged in order to secure both parties in the transaction. Derivatives are traded either via an exchange, a trading venue or over the counter.

1. Bank for International Settlements, World Federation of Exchanges. We omit cash deposits from this analysis as there is not a consistent up-to-date source to provide this information. Sources for primer definitions: Repo, ICMA, Sec Lending, BlackRock.

As of 2019, the universe of marketable securities across the globe was estimated to be worth approximately $201 trillion.

As Figure 1 denotes, corporate and government bonds accounted for a little over half of this total, valued at $105 trillion, with $95 trillion in equities constituting the remainder of the marketplace.

The regional split reflects a fair degree of balance in the locations from which these securities originate. While the US made up over a third of the total and Europe a little over one-fifth, a still-emerging China already accounted for 12% of the total.[2]

This $201 trillion is a crucial number from which to begin our analysis because it shows us the total potential supply of marketable securities available globally for usage as collateral.

By contrast, the actual usage of marketable securities as collateral by market participants is estimated to be $17.4 trillion (excluding central banks' open markets operations and intraday liquidity arrangements) as of 2019 (see Figure 2).

An alternative way of assessing the size of the collateral markets is to compare it to the breadth of cash markets. For example, in the US, $1.2 trillion of business is traded each day in cash markets across fixed income and equities, whereas the average daily volume outstanding in the US repo market is $4.8 trillion.

Government securities represent the largest category of collateral, given their wide acceptance as eligible collateral, relatively low risk profile, ease of sale and, consequently, the typically low haircuts applied to them. The breadth of assets eligible as collateral has expanded in recent years,[3] and other more widely accepted collateral today includes blue chip equities, exchange-traded funds (ETFs), agency securities, money market funds (MMFs) and investment-grade corporate bonds.

Looking forward, we see five market themes influencing the collateral landscape in the near term:

- **Optimization and new collateral trading models** are being driven by capital and balance sheet scarcity. Banks will need to optimize collateral across a range of regulatory-driven obligations such as the supplemental leverage ratio (SLR), the liquidity coverage ratio (LCR) and risk-weighted assets (RWA).

- **Fund structures** including ETFs and MMFs have grown in popularity over the past decade, allowing investors low-cost access to diversified holdings across several indices, sectors and asset classes. Given the continued trend toward passive investing,[4] we expect to see sustained growth in the usage of these funds as collateral.

- Given the growing importance of cross-border and cross-platform business, there is a corresponding increased need for the **seamless movement of collateral** between geographies and time zones, and among global custodians and triparty agents.

- The **APAC region continues to offer new opportunities** for the international investment community. For example, as China continues to open up its financial markets, distribution channels such as Hong Kong Stock Connect[5] and Bond Connect[6] are enabling vast new asset pools to be introduced into the global collateral ecosystem.

2. Pandemic-related debt issuance by governments around the globe in 2020 and 2021 drove this number higher. For the purposes of this analysis, however, we consistently employ data from 2019 to ensure like-for-like comparison across data sets.
3. Aerial View: ETFs to Join the Collateral Party, October 2019.
4. BNY Mellon Insights: Q2 Rebound in Active and Passive Asset Flows: Three Key Themes, November 2020.
5. BNY Mellon Insights: Hong Kong-China Stock Connect 2.0, April 2020.
6. BNY Mellon Triparty Now Accepts Chinese Bonds as Collateral, April 13, 2021.

- With **environmental, social and governance (ESG) concerns** becoming more prevalent in the financial services industry, collateral management will require more screening capabilities as market participants will need to be confident that the collateral received is in line with their broader ESG strategy.

Collateral management has fundamentally changed in recent years, pivoting from being seen as an operational function to a potential strategic differentiator for firms that can do it well. The next step in this process of strategic differentiation will require a move from "in-venue" collateral optimization at a single location to an increasingly "cross-venue" optimization across custodians and (I)CSDs.

As market participants face increased regulation, balance sheet restrictions and pressure on margins, there will be an ongoing expectation for financial institutions to continue to focus on the efficient management of collateral and liquidity.

Collateralized Markets

Several of the regulations[7] introduced following the Global Financial Crisis have sought to reduce bilateral counterparty credit risk within financial markets and oblige firms to appropriately manage other risks. One of the main tools used to accomplish this goal has been to alter capital requirements so as to incentivize market participants to move away from unsecured trading and into secured transactions.

In addition to improving the credit quality of the assets that banks and broker-dealers hold (through applying capital charges on risk-weighted assets, or RWA) and increasing the amount of excess liquidity they hold (through the application of a liquidity coverage ratio, or LCR), Basel III and CRD IV have increased the amount of capital these institutions must hold against the overall size of their balance sheet.

The financial services industry has not stood still in the wake of these new regulations. To satisfy investor targets for return on capital and equity (ROC/ROE), today banks and broker-dealers are required to think carefully about their resources, placing much more emphasis on their treasury departments' financial resource management (FRM).

This emphasis on FRM has led to a dramatic shift in where and how these institutions allocate balance sheet across their different lines of business. Banks and broker-dealers have innovated around the post-crisis regulations and have developed new financial transaction mechanisms to continue servicing their client base while achieving a similar ROC/ROE outcome. Consequently, there have been numerous significant changes in the corresponding market structures of the underlying products with which these institutions service their clients.

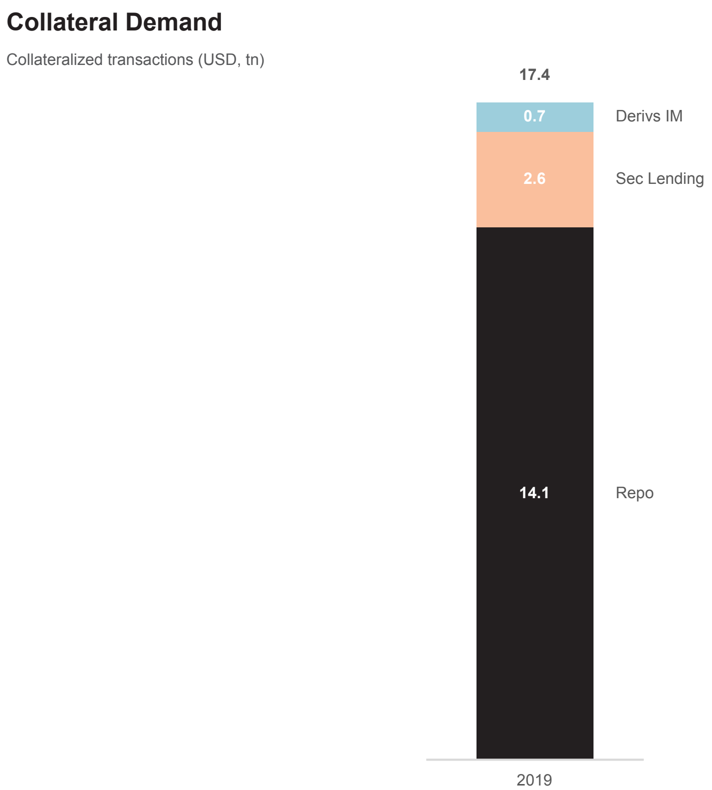
For example, banks and broker-dealers have employed synthetic financing transactions, known as total return swaps (TRS),[8] as a means to give hedge fund clients the short exposure they are looking for. Rather than enter into an actual securities loan, which consumes considerably more balance sheet, a TRS synthetically mirrors the financial exposure of the physical loan.

In securities finance, the trend toward noncash collateral has continued, with roughly two-thirds of the trades now noncash, as banks and broker-dealers try to mitigate/reduce the LCR impact of cash collateral and reduce the amount of cash they hold on the balance sheet.

7. These regulations include the Basel III Accord, the European Union's Capital Requirements Directive IV (CRD IV), the US Dodd-Frank Act, the European Market Infrastructure Regulation (EMIR) and global Non-Cleared Margin Rules.

8. TRF: Total Return Futures are used to perform the same function (TRFs being exchange traded, rather than Total Return Swaps, which are traded OTC).

FIGURE 2. GLOBAL COLLATERAL USAGE, SPLIT BY COLLATERALIZED TRADE TYPE, 2019[9]



Both the Dodd-Frank Act and European Market Infrastructure Regulation mandated the execution of certain standardized OTC derivatives on trading venues (such as US swap execution facilities, or SEFs, or European multilateral trading facilities, or MTFs) and the central clearing of such instruments at clearing houses (also known as central counterparties, or CCPs), dramatically boosting the utilization of these financial market infrastructures.

As well as facilitating the clearing of standardized OTC derivative transactions, CCPs have become an important part of the global repo market structure, providing an essential balance sheet management tool for banks and broker-dealers.

Clearing a repo transaction not only reduces the RWA component of the trade: CCPs also enable market participants to net down exposure much more efficiently than bilateral repo. In the US, the Depository Trust & Clearing Corporation's Fixed Income Clearing Corporation (FICC) has seen tremendous growth in its sponsored repo program over the past two years as banks and their sponsored member program clients have made use of these netting efficiencies. On the other side of the Atlantic, clearing houses such as LCH and Eurex have operated significant repo clearing businesses for many years and are also introducing sponsored clearing options for their repo products in Europe.

With the majority of rulemakings and regulations required to be promulgated under Dodd-Frank and EMIR now in force, non-cleared margin rules for OTC derivatives remain the last major outstanding

9. Sources: Securities Industry and Financial Markets Association, International Capital Markets Association, International Securities Lending Association, IHS Markit, International Swaps and Derivatives Association, BNY Mellon analysis. Where cash collateral is used in securities finance, we recognize it is possible there is a degree of overlap between the securities finance and repo figures shown. Given that the extent of this overlap is unknown, we have kept the figures consistent with how they were published in their respective sources.

post-crisis regulation for market participants to navigate, having just completed phase 5 in September 2021 and with phase 6 due in September 2022.

These regulatory requirements will likely increase the utilization of noncash collateral as initial margin. Furthermore, repo and securities finance transaction volume can be expected to grow as more market participants source eligible assets to satisfy these additional collateral requirements.

The largest driver for the growth of noncash collateral is balance sheet efficiency. This is due both to the netting benefits achievable with securities and because noncash assets do not have to be reinvested in facilities like reverse repo to achieve balance sheet optimization. The combination of these twin drivers should propel sustained growth in noncash collateral in the years ahead.

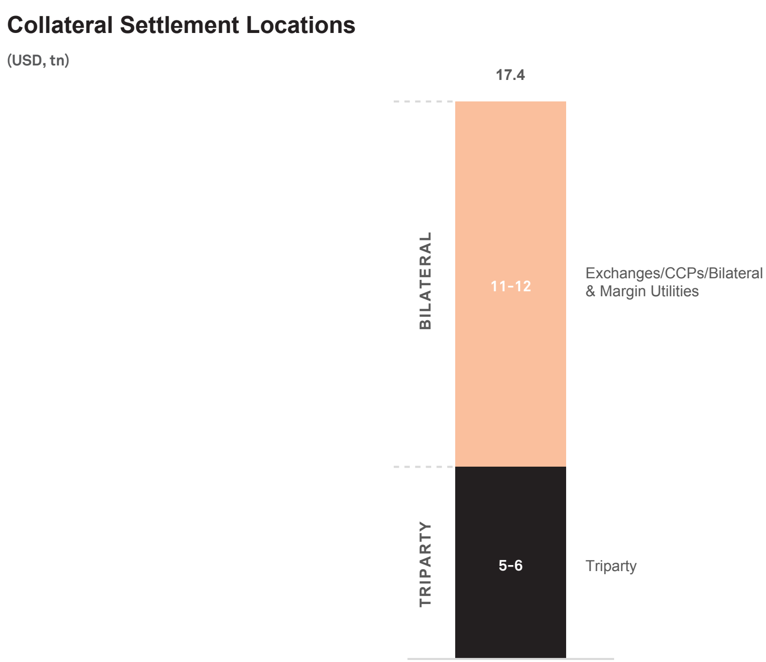
As Figure 2 shows, repo represents the lion's share of the collateral marketplace, with more than $14 trillion in overall activity globally. In contrast, securities lending is just a $2.6 trillion industry, representing less than 15% of the collateral landscape. This leaves $700 billion in collateral as initial margin supporting exchange traded and OTC derivatives trades. The modest size of this number may be surprising given the eye-catching size of the global derivatives marketplace on a purely notional outstanding basis – $558 trillion as of year-end 2019, according to ISDA.[10]

Collateralized Markets – Post-Trade Processing

Having described the overall supply of assets globally, current usage and the activities for which market participants utilize collateral, the final element to explore is where collateralized markets transact and how they operate.

In the post-trade space, collateral markets can be classified into two mechanisms: bilateral and triparty.[11]

FIGURE 3: SETTLEMENT LOCATIONS FOR BILATERAL AND TRIPARTY COLLATERALIZED MARKETS[12]



10. International Swaps and Derivatives Association, Key Trends in the Size and Composition of OTC Derivatives Markets in the Second Half of 2019.

11. Cleared transactions can settle in triparty, but cleared trades are primarily collateralized bilaterally at present.

12. Sources: ISDA, Clarus Financial Technology, ISLA, SIFMA, ICMA, BNY Mellon analysis.

Bilateral

Bilateral collateralization of trading exposures involves two parties transacting directly with one another as principals without an intermediary, collateralizing the position with one another directly. These trades typically see both parties retain control over and responsibility for collateral management elements of the transaction.

As Figure 3 shows, the majority of repo, securities finance and derivative transactions settle bilaterally. Bilateral post-trade processing accounts for between $11 trillion and $12 trillion of the overall collateral marketplace.

Triparty

In transactions settled under the triparty model, the trading relationship remains between the two trading counterparties, but many or all of the collateral management processes of the transaction are outsourced to a triparty agent that strictly applies pre-agreed criteria between the trade counterparties. This allows both parties to keep control while minimizing the operational burden of managing the collateral.

As well as playing an outsourced and independent third-party role to both counterparties, triparty agents often provide value-add services to their clients, a key segment of which are banks and broker-dealers.

Triparty services have become an integral part of banks and broker-dealers' FRM, maximizing the efficiency of resource allocation and reducing the overall cost of funding.

For example, triparty agents provide optimization tools to help collateral providers allocate assets from their inventory to their collateral obligations and adhere to collateral eligibility schedules. Agents also issue margin calls, process the delivery of collateral, and provide ongoing post-trade position maintenance and reporting that assists clients in the efficient usage of their available pool of resources.

Triparty represents a smaller part of the overall post-trade collateral marketplace, accounting for between $5 trillion and $6 trillion in 2019. Triparty's share of the collateralized marketplace is growing, however, as clients better understand the benefits delivered by these outsourced providers.

PART TWO

A Highly Fragmented Collateral Marketplace

In the previous section, we detailed the global collateral landscape, depicting it to be a $17.4 trillion marketplace, dominated by repo, securities lending, and exchange traded and OTC derivatives transactions.

Armed with this comprehension of the size of the global collateral universe, we can now dive deeper and explore the types of securities that make up this asset pool, where those assets reside and the activities they are being used to support.

In this part of the paper, we seek to ascertain the degree of efficiency or inefficiency that exists in the collateral marketplace today – due to where market participants custody their assets – and how these securities are bifurcated across the marketplace.

For example, if a bank or broker-dealer holds a large volume of assets as inventory at separate (I)CSDs, custodians and triparty agents, even with sophisticated and automated inventory management systems, they must navigate “real-world” friction (different settlement cutoffs between locations/agents, lack of real-time information, etc.), resulting in suboptimal deployment of assets and associated higher cost of asset ownership.

A Note on Methodology

In this section, we will draw exclusively from an analysis BNY Mellon and Euroclear commissioned PwC to undertake. The analysis was based on data provided by the two firms, but the information was only presented to PwC and not shared between BNY Mellon and Euroclear.*

The aim of the analysis was to identify whether, on a hypothetical basis, efficiencies for the market could be gained through increased precision of inventory management capabilities for common clients between BNY Mellon and Euroclear in their respective collateral management businesses globally.

PwC examined the degree of client overlap between BNY Mellon and Euroclear in collateral management. PwC also examined the type of assets that the clients held with the two firms as well as the total market value and the overall percentage share each asset type represented as a proportion of total assets. Further, the PwC researchers parsed the data to determine what activities (if any) overlapping clients were using their collateral to support.

Although the collateral universe is much broader than the overlapping client assets under custody at BNY Mellon and Euroclear, for the purposes of this section of the paper, we will restrict our discussion to the observations and results that PwC reported.

*Data from all BNY Mellon collateral platforms was included in the analysis.

The Opportunity for Efficiency

The main objective of both BNY Mellon and Euroclear when they commissioned PwC to conduct a study into the composition of the global collateral marketplace in 2019 was to answer two related questions.

First, what steps could be proposed to deliver greater collateral efficiencies for the benefit of our respective clients, and second, could such proposals benefit the collateral ecosystem more broadly?

Given BNY Mellon's position in the US collateral marketplace and Euroclear's role in Europe, it seemed obvious that some cohort of clients would be common. What would be the extent of the client base, and therefore the potential for efficiencies, and would the analysis indicate any key potential focus areas?

FIGURE 4: BNY MELLON & EUROCLEAR CLIENT INTERSECTION ANALYSIS BY ASSET TYPE

Asset Class		BNY Mellon		Euroclear		USD Total Market Value	% of Total Market Value*	# of Unique Providers (Across 3 Days)
		Rank of Market Value*	% of Market Value*	Rank of Market Value*	% of Market Value*			
Equity		3	15.8	7	1.0	380	6.1	74
Debt	Supranational	8	0.2	3	3.8	5,640	90.0	97
	Sovereign	1	53.8	2	32.8			
	Sub-Sovereign	7	0.7	5	2.8			
	Agency	6	1.0	4	3.4			
	Non-Sovereign	2	23.4	1	52.8			
Funds		5	1.5	8	0.9	70	1.1	61
Other		4	3.6	6	2.4	180	2.9	70
Total		—	100.0	—	100.0	6,270	100.0	97

Source: BNY Mellon, Euroclear, PwC

***Bn USD equivalent, average of 3 days**

After analyzing data provided by the two firms, the PwC researchers identified **97 common collateral providers** across the two firms.

In terms of asset classes, the biggest area of overlap was in servicing debt securities (see Figure 4). All 97 overlapping collateral providers had fixed income under custody with both firms. When these fixed income securities were ranked by value, sovereign bonds emerge as the clear leader, representing almost 54% of all assets at BNY Mellon and almost 33% of securities held at Euroclear. None of this is especially surprising given that BNY Mellon is an important settlement agent/custodian for US Treasury securities, while the same is true for European government bonds at Euroclear.

Notably, the non-sovereign category was the largest debt asset type at Euroclear, accounting for 52.8% of all overlapping assets and 23.4% of assets at BNY Mellon. This category encompasses several different types of fixed income securities, however, including corporate, structured and convertible bonds, as well as fixed income assets classified by the PwC researchers simply as "other" securities.

Of the $6.27 trillion in securities identified as overlapping in the analysis, 90% of those assets, worth $5.64 trillion, were debt instruments.

In equities, 74 collateral providers overlapped across the two firms, but the market value of securities held by overlapping clients was much lower, representing 16% of securities at BNY Mellon and 1% at Euroclear.

Once again, this is not overly surprising given that Euroclear's triparty service is operated out of Euroclear Bank, the (I)CSD, which is an important settlement agent/custodian for European fixed income assets, whereas equities are more commonly held by dealers at domestic CSDs via local agents.

The analysis is nonetheless clear that non-fixed income assets make up a peripheral part of the overall common asset base, collectively amounting to just 10% of all common securities, with a market value of just $630 billion.

Securing Funding and Earning Revenue

After determining the assets that overlapping collateral providers were holding in custody as potential inventory across BNY Mellon and Euroclear, the PwC researchers next explored how the assets were being utilized as collateral in their respective triparty environments.

In this analysis (see Figure 5), a starker picture emerges of collateral providers using their assets for different purposes across the two firms.

FIGURE 5. BNY MELLON & EUROCLEAR INTERSECTION ANALYSIS BY TYPE OF TRADE ACTIVITY[13]

Trade Type	BNY Mellon		Euroclear		USD Total Market Value	% of Total Market Value*	# of Unique Providers (Across 3 Days)
	Rank of Market Value*	% of Market Value*	Rank of Market Value*	% of Market Value*			
01. Unallocated	3	14.3	1	85.8	3,850	61.5	93
02. Triparty Repo	1	47.8	3	5.3	1,240	19.8	61
03. Securities Loan	2	27.7	2	5.9	830	13.3	63
04. Initial Margin Segregation	5	1.0	4	1.5	90	1.4	54
05. Other	4	9.2	5	1.4	250	4.0	43
06. Total	—	100.0	—	100.0	6,270	100.0	97

***Bn USD equivalent, average of 3 days**

Source: BNY Mellon, Euroclear, PwC

The pairing data showed a high degree of overlap in the client sample across different trade types. Most notably, of the 97 overlapping collateral providers identified in total, 93 had assets unallocated at both firms, with a total market value of $3.85 trillion. These unallocated securities are understood to be custody assets not currently used for triparty collateral management purposes.

This means as much as 61.5% of the total common $6.27 trillion universe of assets was potentially unencumbered and could present an efficiency opportunity for assets to be moved between the platforms if better transparency on cross-institution collateral optimization was possible and if collateral mobility was more achievable.

Lastly, the PwC researchers found a very small proportion of assets allocated to segregating initial margin in relation to OTC derivatives trading. Just 1.4% of collateral was allocated to margin segregation, worth just $90 billion.

13. The Euroclear unallocated figure is significantly higher as the data includes assets held by clients in custody, not necessarily in Euroclear for collateral management purposes, whereas the BNY Mellon unallocated figure is much lower as the data generally includes only assets specifically mobilized to BNY Mellon for triparty purposes.

Preliminary Conclusions

The analysis revealed $2.41 trillion of inventory across 97 overlapping collateral providers between BNY Mellon and Euroclear in 2019, out of a total collateral marketplace valued at $17.4 trillion globally that year.[14]

It seems reasonable to assume that a similar level of broker-dealer asset fragmentation to that we have observed in this exercise would likely be found among other custodians and CSDs, since these financial institutions have assets across many locations around the globe.

If market participants were able to swiftly and seamlessly move these assets to where they are the most needed as collateral, we hypothesize that there is huge potential for practical efficiencies to be realized by market participants across the globe in meaningfully enhancing the management of their collateral.

How does the industry go about breaking down the current structure of the global collateral marketplace, beginning the process of increasing collateral mobility and enabling clients to realize enhanced collateral optimization, thus reducing drag on asset ownership?

In the next section of this paper, we will discuss some of the major challenges currently holding back the collateral markets and explore some of the potential fixes that could be introduced to make the marketplace more efficient for all participants.

14. We reach this $2.41 trillion number by deducting the $3.85 trillion in "unallocated" common assets between the two firms (understood to be custody assets not used for collateral management purposes) from the $6.26 trillion in total assets held by common clients across the two firms.

PART THREE

Optimizing the Global Collateral Marketplace

With inventory held at multiple locations internationally, market participants inevitably encounter inefficiencies in their day-to-day inventory and collateral management.

The drivers for these inefficiencies are easily understood. Many broker-dealers use a European (I)CSD to custody their European government bonds, a natural outcome given that it is a key settlement location for those assets. In a similar vein, US-based custodians are typically used by broker-dealers for US Treasury securities.

While the rationale for this divide is clear, effectively managing inventory across multiple locations and time zones is complicated due to differences in settlement timings, intraday liquidity challenges and numerous other idiosyncrasies that lead to friction, inefficiencies and, therefore, significant liquidity and capital costs.

In an ideal world, the collateral marketplace would be defined by collateral mobility, with inventory moving seamlessly and near instantaneously from where it currently resides to where it is most needed. Today's marketplace is some distance from this vision, but there are steps the collateral community can take in this direction.

We identify six features of the current marketplace structure that make optimizing inventory and collateral management challenging for market participants:

1. **Settlement times differ widely between countries and custodians.**

2. **Daily cutoff times are not uniform at custodians across the industry.**

3. **Collateral located in other continents and time zones can take days to move.**

4. **Collateral commonly accepted in one region may not be accepted in another.**

5. **Counterparties use different reference data to identify and value eligible collateral.**

6. **Real-time information isn't always available, and even where it is, real-time optimal decision-making and subsequent inventory mobilization is challenging.**

This list is far from exhaustive, but it provides a sense of some of the structural challenges preventing the smooth movement of collateral in the marketplace.

In aggregate, these six issues make it extremely difficult for participants in the marketplace to find, move and deploy the cheapest-to-deliver collateral from one custodian to another with ease and in a timely fashion.

Some efforts are already underway to attempt to create a more harmonized global collateral landscape. For example, ISDA, ISLA and ICMA are cooperating on the development and rollout of a Common Domain Model to facilitate greater automation of collateral in derivatives, securities lending and repo markets.[15]

15. ISDA Common Domain Model.

The European Central Bank's Single Collateral Management Rulebook for Europe (SCoRE) is also looking to implement measures to recognize and overcome collateral fragmentation by defining rules for managing collateral using common messaging standards, processes and workflows across the European Union.

Below, we share six changes (some of which are contained within the SCoRE framework) that the collateral management industry could institute, or at least commence work on, in order to address the problems outlined above.

1. Set a T+0 or T+1 Settlement Goal for the Industry

Settlement times for the movement of collateral currently differ around the world. Globally, some markets adhere to T+1 settlement and others to a T+2 time horizon, and for transactions in emerging markets, settlement can take even longer.

A truly efficient collateral marketplace would see all participants, agents, global custodians and (I)CSDs able to facilitate intraday settlement, in which the instruction for the movement of assets from a CSD in Europe and the settlement of that collateral in a custody account in the US all takes place on the same day.

If an intraday standard may not be feasible in the immediate term, there is much value in driving the industry toward a universal T+1 settlement standard. There is an efficiency in settling T+1 since clearing/settlement agents and CCPs are able to offer risk mitigation and netting services to aggregate trades into one net position for settlement, reducing associated costs.

As a result, a cost-benefit analysis would be recommended to evaluate the relative benefits and use cases of being able to offer same-day settlement versus T+1.

Although this is a complex objective, given the potential benefits, the industry should be pushing harder to make progress toward this goal.

2. Synchronize Operating Windows across Custodians and Financial Market Infrastructures

Inconsistency in operating windows between different venues is a frequent source of trade disruption and delay. Cutoff times in cash markets frequently fail to sync up with securities cutoff times at custodians and market infrastructures. A fund manager looking to secure repo financing against a portfolio of bonds may find that the repo trade settles at the appointed custodian, but cash received cannot be moved into the payment system because that day's cutoff time has passed.

In such an instance, the financing trade cannot be executed until the following day, leading to a potential liquidity drain.

Improving the synchronization and harmonization of operating windows across custodians and market infrastructures – which is a specific objective of SCoRE in its second wave – could be a relatively simple change to remedy this trading inefficiency.

3. Institute a 24-hour Inventory and Collateral Management Service Model

One step beyond harmonizing cutoff times is to eliminate them altogether. International broker-dealers have operations spanning the world from East Asia to the west coast of North America. A San Francisco-based subsidiary of a global broker-dealer may determine that Japanese government bonds (JGBs) are the most optimal collateral to deliver on a transaction, but the JGBs in question are at a custodian located in Tokyo that has closed for the day.

Instituting an industrywide 24-hour service model that enables inventory management and access to assets around the world from the Asia open on Monday morning through to the close of business on the US Pacific coast on Friday evening would vastly expand the ability of market participants to move these assets to where they can be deployed most optimally as collateral.

4. Create a Consistent Classification of Assets

Market participants routinely mobilize collateral that they think is eligible only to discover it is not. For example, take a privatized telecoms provider in a location where its national government still holds a controlling interest. Determining whether the debt securities of this issuer should be treated as a government agency bond or a corporate bond can make managing these assets complicated.

Another example is industry classifications, which can be great tools for collateral management but do not always align across different providers. Stricter and harmonized classification of assets would minimize the potential for such misunderstandings, as well as potential funding and liquidity impacts.

5. Standardize Valuations

Disagreements can also arise over the valuation of collateral. The same asset could be priced slightly differently by one provider versus another valuation agent. When an institution comes to use a security as collateral, if its view of the asset value is different from that of its counterparty or collateral manager (such as a triparty agent), it might be faced with a collateral dispute, which would require it to post more collateral. Alternatively, it might be faced with excess collateral being held at a location when that asset could be more optimally used for another obligation elsewhere.

Instituting the use of shared or consistent valuation sources or methodologies for the value of collateral could avoid these time-consuming dispute processes and help improve the decision-making process around collateral management. Transparency into the reference rate or source both parties will use to price collateral – and other specifics of the trade – could be exchanged at the outset of a trading relationship so that both parties are referring to the same price from the start. Tools currently provided by triparty collateral management service providers could also assist in the collateral selection process. Alternatively, using a triparty agent acting on behalf of both parties will achieve price consistency.

6. Improved Inventory Management

Limited real-time transparency into where assets are deployed and held at venues and custodians around the world has long frustrated collateral managers. The lack of one panoramic dashboard view of where assets are currently located globally has proven a major impediment for firms trying to optimize how they deploy and allocate collateral.

While some firms have made progress in embedding tools that provide visibility into where assets sit, the next step – that of providing real-time optimization across multiple liabilities and locations – is less widely available. Switching a corporate bond attracting a large haircut in one location with a similar profile asset from another region that requires a lower haircut reduces the overall amount of collateral being posted.

For large broker-dealers with hundreds or thousands of collateral line items, such inventory management could yield substantial benefits. Nonetheless, given the complexities described above regarding differences in cutoffs, lack of certainty on eligibility and other factors, this does not happen as much as it could. New technologies, such as distributed ledgers, may have an important role to play here.

The priority for the collateral management industry over the next decade should be to create a marketplace that encourages – and is ultimately defined by – collateral mobility and optimization.

In a sector where market participants have assets located across a variety of custodians, (I)CSDs and other venues, it should be a strategic priority for all stakeholders to work together to overcome the barriers currently preventing the seamless movement of assets from where they are located to where they are needed.

The steps outlined above represent the initial strides the global collateral marketplace could take to begin breaking down the barriers that are inhibiting the sector from reaching its full potential.

These are far from definitive measures, but they do represent a realistic starting point from which all market participants can begin in order to create the harmonized global collateral landscape in which all wish to operate.

PART FOUR

Conclusion

The objective in discussing the results of the BNY Mellon and Euroclear analysis has been to give the industry at large a glimpse – for the first time – into the potential benefits attainable through enhanced inventory and collateral management using the intersection of clients (and their assets) between the world's largest custodian and a leading (I)CSD as a proxy.

The extent of this intersection between the two firms provides a real-world illustration of the opportunity that exists in the industry and presents empirical data from which the collateral community can begin the process of rationalizing this marketplace.

It is the hope of both BNY Mellon and Euroclear that this paper will provoke a broad discussion across the industry around how to introduce a series of refinements into the entire collateral ecosystem in the hope of tackling market fragmentation and, ultimately, to have collateral usage be more efficient and effective.

In an ideal world, that discussion would propel the collateral marketplace on a trajectory toward a more seamless and efficient market. That journey would involve five phases:

1. **Introduce More Transparency:** As the first deep dive into the intersection that exists within the collateral marketplace, both firms are hopeful that other market participants will be inspired to provide more insight into the challenges they face across inventory and collateral management going forward.

2. **Market Awareness:** Once additional transparency is introduced into the marketplace, custodians, (I)CSDs and other market infrastructure should invest in raising awareness among market participants about the fragmentation challenge and what can be done to make the marketplace more efficient.

3. **Cross-Venue Optimization:** Market infrastructure providers should work closely together to identify ways to encourage more cross-venue optimization, including attempting to institute many of the goals outlined in part three.

4. **Collateral Mobility:** As these cross-venue optimization efforts begin to bear fruit, market participants should begin to enjoy the benefits of collateral mobility, with inventory moving from one venue to another faster and more seamlessly and, ultimately, seeing those assets deployed as collateral much more efficiently.

5. **Collateral Velocity:** The end state to these efforts should be a noticeable improvement in collateral velocity as inventory moves around the marketplace faster, with less operational drag and, ideally, in a manner more analogous to the swiftness and ease with which cash moves across regions.

With the realization of collateral velocity across a harmonized and seamless global collateral marketplace as the ultimate goal at the end of this process, the first step on this road is to begin the industry discussion. BNY Mellon and Euroclear have identified three initial steps in order to get this debate underway:

Consistent Messaging and Raising Broad Awareness

That rationalization process begins by consistently and repeatedly delivering the same messaging around the potential efficiency gains in the collateral marketplace and the changes to financial market practices necessary to foster greater collateral mobility and harmonization, both mandatory prerequisites to achieve collateral optimization.

The six actions outlined in the previous section would deliver meaningful efficiencies to all stakeholders along the investment value chain, not just collateral managers, treasurers and other back-office functions that interact directly with the collateral markets. They would also benefit the investor community collectively – and not just the collateralized portion of capital markets.

Industry conferences and working groups are logical venues to begin this messaging campaign. Market participants should push to have these issues added to the agenda of such industry events in order for the broadest possible audience to be involved in the discussion.

Engage with Industry Associations

Since industry associations play a crucial role in collateralized transactions such as repo and OTC derivatives, their involvement in pushing for changes to increase the efficiency and resiliency of these collateral markets will also be necessary.

Industry bodies should take a leading role in establishing a clear set of aims and principles that market participants would like to see implemented in this space and then act as the voice of the financial services community in setting standards in order to see these goals implemented.

In turn, collaborating closely with advocacy bodies, a list of best practices should be developed outlining clear, tangible goals for the industry to begin working toward, ideally with set milestones to which the industry will be expected to adhere.

Advocate for Change at the Grassroots Level

In tandem with the push to involve trade associations in the discussion, market participants may wish to advocate directly for more efficiencies to be introduced in the course of their normal dialogue with key industry stakeholders.

Institutional investors, asset managers and buy-side participants at large may wish to communicate to liquidity providers, custodians, (I)CSDs, clearing houses, trading venues and other key collateral market infrastructure providers their wish to see changes implemented to enhance collateral mobility and utilization.

Individual action at the grassroots level to communicate a widespread desire among the institutional client base to see more action taken to enhance the efficiency of the collateral marketplace may be an effective approach to hasten change.

Ultimately, collateral market stakeholders demanding more efficiency may result in the implementation of the changes required to promote better asset mobility and more utilization of assets globally – and may make the collateral markets both more efficient and more resilient for the benefit of all stakeholders.

We welcome the opportunity to discuss the themes raised in this paper, with our respective clients reaching out to us directly, through industry groups, via bilateral discussion or at industry conferences.

We look forward to working with all participants in the marketplace on these important themes in the coming months and years ahead.

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