

Global Banking



Out of the shadows: Central clearing of repo

A transparent market structure for cash borrowers and lenders

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Out of the shadows: Central clearing of repo

*Although personally I am quite content with existing explosives,
I feel we must not stand in the path of improvement.*

— Winston Churchill

Article at a glance

Repurchase agreements (repo) are the largest part of the “shadow” banking system: a network of demand deposits that, despite its size, maturity, and general stability, remains vulnerable to investor panic. Just as depositors can make a “run” on a bank, repo lenders can take their money out of the market, thereby denying the lifeblood of cash to broker-dealers (stand-alone or those owned by banks or bank holding companies), which rely on leverage to operate.

The entire shadow banking system has been demonized as a place where loans are hidden within derivatives among nonbank counterparties rather than displayed on the balance sheets of traditional, regulated banks. In reality, the shadow banking system is a legitimate market for *secured financing*, in which cash is lent in exchange for collateral. Repo in particular has many positive attributes, including disclosure on the balance sheet; nevertheless, the financial crisis exposed several flaws in the secured financing markets in general and repo in specific, and the Federal Reserve System ultimately interceded with liquidity to prevent the further collapse of banks and broker-dealers.

While not categorized as a “derivative,” repo is an over-the-counter (OTC) contract that shares many key characteristics with derivatives, including a reliance on its counterparts to meet obligations over time. The inability of regulators to measure activity in OTC derivatives resulted in the passage of the Dodd-Frank legislation,¹ which requires that certain instruments be moved to a *central counterparty clearing house* (CCP). As the nexus of all trades, a CCP provides visibility to regulators and credit intermediation for all market participants.

The benefits of central clearing are directly applicable to the repo market and are crucial to the global money markets that are relied on as a safe, short-term investment for individuals and institutions alike. Central clearing is needed to provide lenders with guaranteed return of cash without sensitivity to collateral or credit. A CCP also lays the groundwork for lenders to interact directly with borrowers in a true exchange with transparent pricing.

Central clearing of repo can also provide capital efficiency and more stable funding for banks and broker-dealers. Ultimately, a CCP for repo can evolve into a hub of funding activity for many forms of liquid collateral, thereby bringing the majority of the shadow banking system into full view.

Repo fundamentals

Repo is most easily understood as a sale of securities accompanied by an agreement for the seller to buy back the securities (to “repurchase” them) from the buyer at a future date. A pair of “sale-repurchase” transactions becomes a repo when they are bound together by formal documentation. Taken as a package, the repo is recognized as a *financing* (borrowing) rather than as a *disposal* (sale) for tax purposes—the seller effectively borrows the cash proceeds until they are returned by repurchasing the securities.²

In repo, the securities are referred to as *collateral*, and the entire transaction is essentially a collateralized loan. By convention, the party that borrows cash is said to enter in a repo on its collateral and is referred to as the “seller.” The party that lends cash is said to enter into a “reverse repo” and is referred to as the “buyer.”³

¹ Dodd-Frank Wall Street Reform and Consumer Protection Act (Pub.L. 111-203, H.R. 4173).

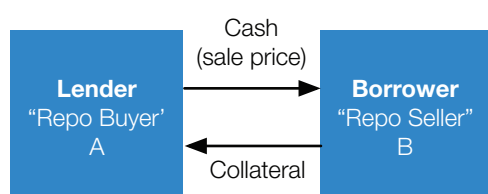
² From a tax and accounting standpoint, it may be fraudulent to account for the sale of securities with no repurchase agreement as a “financing” or to claim as “sold” any securities for which there is an agreement to repurchase.

³ For the purposes of this article, we will use the term “lender” rather than “buyer” and “borrower” rather than “seller” to emphasize the banking nature of repo over the conventions of the market.

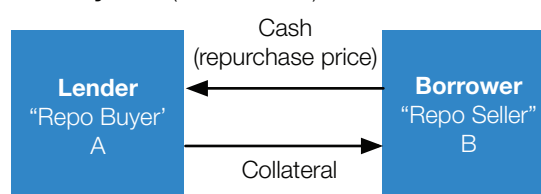
Exhibit 1

Bilateral repo

Inception date (trade date +1)



Maturity date (trade date +2)



Once a repo transaction is agreed, cash is exchanged for collateral on two dates: *settlement* (inception), and again at *maturity*, when the loan must be repaid. The sale price for the securities establishes the amount of cash lent to the borrower, while the repurchase price reflects the loan amount plus interest charged by the lender. As a result, the repurchase price is equivalent to the sale price plus interest to maturity. *Exhibit 1* illustrates these two exchanges in an “overnight” (one-day) repo that settles on the day after the trade date and matures on the day after settlement.

A repo transaction may be initiated either by a lender trying to invest a certain amount of cash or by a borrower seeking to raise cash from securities. The loan amount is equal to the market value of the collateral minus a *haircut*, a percentage calculated to protect the lender in the event of default by the borrower (a risk examined in greater detail below). In the event that the borrower defaults (fails to repay the loan), the lender may liquidate the securities, thereby recovering the loan.

Repos are contracted between broker-dealers and their customers, between broker-dealers and banks, inter-dealer and inter-bank. In addition to acting as principal lenders and borrowers in the repo market, certain banks may act as *agent* or *custodian*, holding cash and securities on behalf of other borrowers and lenders. It is also common to find a *depository* or central registry for repo transactions to facilitate the matching of settlement instructions.

Repo life cycle

As with all OTC products, the life cycle of a repo involves several standard processes: *documentation*, *execution*, *clearing*, *settlement*, and *custody*. Repo is negotiated and executed privately between a borrower and a lender. As such, it is referred to as a *bilateral* agreement.

Clearing is the matching of trade notices generated by the two parties and the initiation of settlement instructions for the movement of cash and securities. Clearing takes place multiple times during the life cycle of a trade: dealers match trades between themselves and their clients, and custodians and depositories match the resulting settlement instructions.⁴

Settlement of repo involves the physical delivery of cash and collateral. *Custody* of the cash and securities related to a repo involves the maintenance of two accounts—a cash account and a collateral account—for both the lender and the borrower. These accounts are held by broker-dealers themselves, by custody banks representing either party to the transaction, or by a single bank serving as custodian for both parties simultaneously.

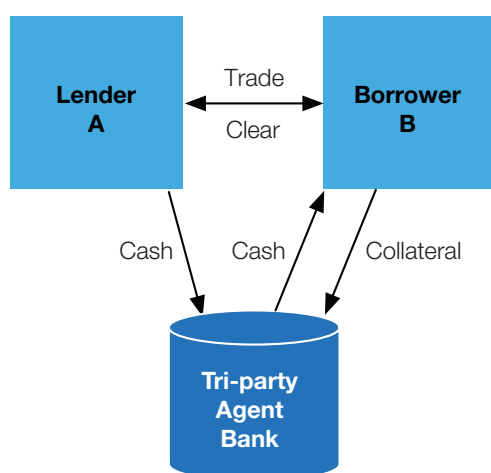
Tripartite repo

When both parties to a repo share a common custodian to hold collateral and to transfer cash, the arrangement is referred to as *tripartite* or “tri-party” repo. The custodian is not a principal in the transaction, but acts as agent for both parties, holding cash and collateral accounts for the borrower and the lender. *Exhibit 2* illustrates the role of a tri-party agent in holding the borrower’s collateral and transferring the lender’s cash.

The tri-party agent bank plays a key role in the risk management of repo transactions by providing valuation services to ensure that collateral is sufficient to meet the terms of the contract. The bank may also accommodate borrowers in the substitution of different collateral securities over the life of the repo. Beyond a single transaction, tri-party agent banks can support the optimal use of a borrower’s collateral in simultaneous repo transactions among a network of lenders,

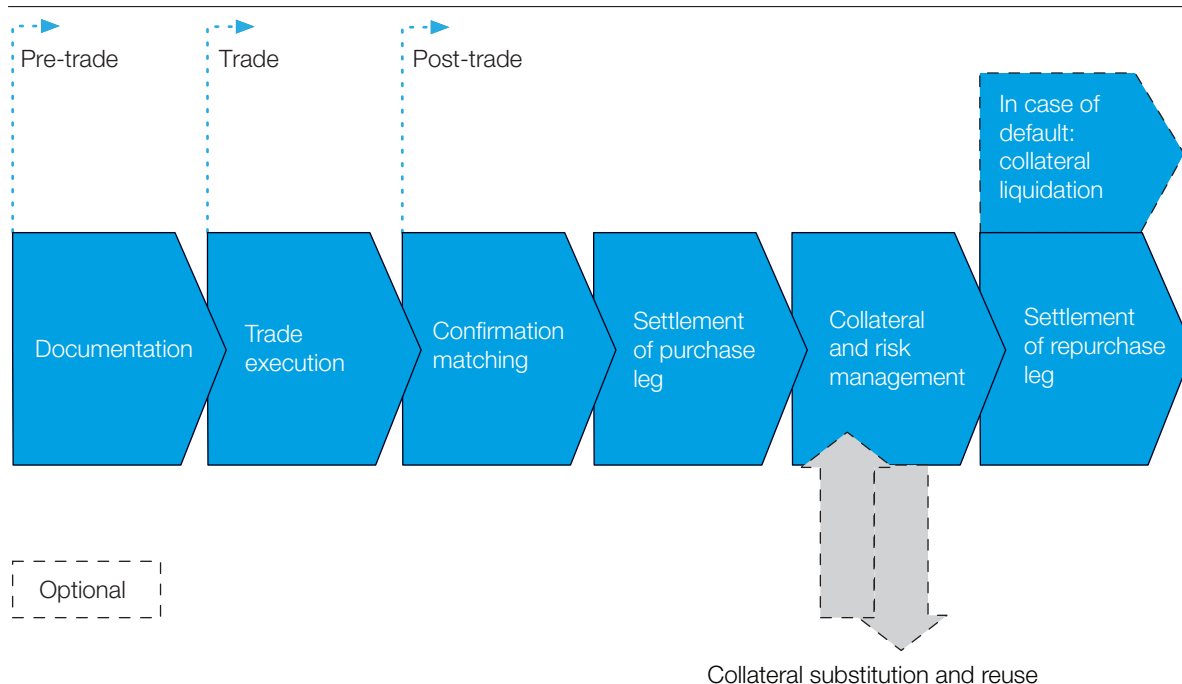
4 See *Functional Definition of a Central Counterparty Clearing House (CCP)*, The European Commission, November 2004.

Exhibit 2
Tripartite repo



a service that is critical to all broker-dealers in their quest to finance trading operations at the lowest possible cost. *Exhibit 3* illustrates the life cycle of a repo.

Exhibit 3
Life cycle of a repo



Repo for borrowers: Secured financing

Repo is the most prevalent but by no means the only transaction that defines the shadow banking system. Other *secured financing* transactions (in which cash is borrowed against securities) include secured loans, securities lending transactions, and derivatives such as total return swaps, forwards, and “delta-one” option combinations. While economically equivalent, each of these forms of secured financing is governed by different documentation as well as tax, accounting, and regulatory treatment.

Market participants use different forms of secured financing for many reasons, the most common of which is market convention surrounding the collateral. Repo is the vehicle of choice in the fixed income (bond) markets, while total return swaps, margin and stock lending are more common in the equity markets. Most market participants select financing to comply with collateral conventions. Occasionally they may buck those conventions to take advantage of lower funding costs or haircuts, or to comply with their own limiting statutes.

Borrower risks

The primary risk to borrowers is that financing dries up. In a world awash with liquidity, many market participants assume that financing can be renewed when the current transaction expires. However, repo financing may not renew when lenders become concerned about the quality of collateral or the ability of a borrower to repay. With its contractual maturity date, repo provides an abrupt termination mechanism. There is no assurance that the financing can remain in place, even with a modification to the loan amount, haircut, or interest rate.

The majority of secured financing transactions, including repo, are of short duration, analogous to demand loans. When short-term funding is used carry longer-dated assets, the borrower is exposed to losses if the funding is no longer available and the assets cannot be sold. In creating and granting the Financial Stability Oversight Council (FSOC) supervisory authority over banks and other institutions, Section 113 of the Dodd-Frank Act identifies maturity mismatch and reliance on short-term funding as indicators of financial instability. The Basel Committee on Banking Supervision has introduced the Net Stable Funding Ratio (NSFR) to promote longer-term funding of bank activities.⁵

The fragmentation of secured funding activities across repo, total return swaps, securities lending, and other structures is a risk management challenge for broker-dealers not only in tracking funding sources, but also in tracking asymmetrical contract terms such as notice periods and cross-default provisions in repo and derivatives documentation. These asymmetries can have unintended, adverse consequences during times of stress, including increased collateral calls or termination.

Repo for lenders: Money market investing

Money markets supply the shadow banking system with cash through direct investments in a variety of short-term instruments, including certificates of deposit, commercial paper, Treasury bills, and mortgage- and asset-backed securities. In contrast, longer-term securities are financed indirectly via repo, with the securities used as collateral instead of purchased and held to maturity.

Money markets are where Main Street intersects Wall Street. When money market mutual funds enter into tripartite repo with broker-dealers, they directly participate in the shadow banking system by lending cash to broker-dealers. Money markets are also linked to the activities of large custody banks. Specifically, the securities lending market includes \$320 billion of U.S. equity securities, most of which is held by banks (The Bank of New York Mellon, State Street Bank, JP Morgan Chase, Northern Trust, and Citibank) that serve as custodian and agent lender to mutual funds.⁶ A bank may arrange to lend the fund's equity securities to other banks and broker-dealers to facilitate the settlement of equity trades. The custodian requires cash while the securities are on loan. The cash is in turn invested in money market securities, most often repos that result in the cash being exchanged for Treasury securities. The recirculation (more technically, rehypothecation) of cash and securities effectively owned by retail investors is therefore considerable. The example also points to the connection between the repo and securities lending markets, in which two types of liquid collateral (U.S. Treasuries and equity securities) are financed within a larger system of connected but largely unobservable transactions.

Lender risks

The primary risk to lenders in repo is a default by the borrower that requires the lender to sell the collateral. If the market value of the collateral has dropped and the haircut is too small, the lender loses money when liquidating to recover cash. A money market mutual fund in this situation “breaks the buck,” with its investors receiving less than one hundred cents per dollar invested.

Limitation of tripartite repo. The insertion of a tri-party agent into a repo transaction mitigates some risks by placing them on the agent bank, but does not eliminate them. As the Federal Reserve Bank of New York (FRBNY) identified in its white paper,⁷ banks serving as tri-party agents take on considerable exposure in bilateral repo transactions when collateral is pending delivery. This intra-day credit exposure, also referred to as “daylight risk,” is what the FRBNY proposes to minimize, but not eliminate, through the imposition of timing standards on tripartite repo. Tripartite repo does not eliminate the lender's risk in liquidating collateral if and when the borrower defaults.

⁵ The Basel Committee on Banking Supervision, *International framework for liquidity risk measurement, standards and monitoring*, December 2009.

⁶ DataExplorers, *Securities Lending Yearbook, 2009-2010*.

⁷ The Federal Reserve Bank of New York, *Tri-Party Repo Infrastructure Reform*, May 17, 2010.

The state of repo in the U.S.

Unlike regulated depositories, the shadow banking system has no ability to suspend withdrawals, provide collective guarantees, ensure sufficient risk management, or otherwise eliminate credit exposure and information-sensitivity to collateral. The repo market is currently self-regulated, despite the fact that its practitioners individually fall under the jurisdiction of various government regulators. There is currently no formal exchange or price discovery mechanism for repo. Trade parameters are not reported to a central data base or market board. Electronic trading tools exist to facilitate communication and processing among active participants, but they do not constitute a formal electronic communication network (ECN) directly accessible to lenders.

The repo market in the U.S. currently lacks a centralized clearing capability for all participants, relying instead on the combination of a central securities depository (CSD) for certain transactions and dealers self-clearing with their customers for others. Advancements in the marketplace have thus far been limited to primary dealers approved to do business directly with the Federal Reserve.⁸ The Fixed Income Clearing Corporation (FICC), a subsidiary of the Depository Trust & Clearing Corporation (DTCC), is the largest repo depository in the U.S. and provides clearing services. The largest tripartite custodians in the U.S. repo market are JP Morgan Chase (JPM) and The Bank of New York Mellon (BNY). This system serves only a subset of market participants and limited types of collateral, a fraction of the overall demand for cash.

General collateral finance

General Collateral Finance (GCF) repo is a variant of tripartite repo that supports borrowing and lending among dealers willing to accept a prescribed list of Treasury and other related securities as collateral. It was introduced in 1998 by FICC and the two largest clearing banks, JPM and BNY, in an effort to reduce transaction costs and enhance liquidity in the repo market. GCF repo grew rapidly in popularity among dealers and was estimated to account for 54 percent of inter-dealer repo transactions on Treasury collateral by 2002.⁹

The GCF system has encouraged electronic connectivity among dealers and the development of a suite of services surrounding a list of securities set by the Government Securities Division of FICC (GSD Products).¹⁰ Although limited in terms of participants and acceptable collateral, GCF repo illustrates the benefits of improved trading standards, collateral substitution, and netting of obligations. *Exhibit 4* depicts GCF repo as it is conducted today in the U.S.

While a step in the right direction, neither the GCF system nor the larger tripartite system offers direct access for all potential lenders or broader pools of collateral for borrowers.

Repo market principals

As repos are privately negotiated, there are no official figures for haircuts, interest rates, the overall size of the market, or the identities of participants.¹¹ Similarly, there are no official tallies for the securitization markets that create collateral or for the margin requirements associated with derivatives contracts. Estimates put the U.S. repo market at \$12 trillion (the size of the total assets in the regulated banking sector) in notional amount at its pre-crash peak, with \$2.8 trillion transacted in tripartite form among the primary dealer banks reporting to the Federal Reserve.¹² (See *Table 1*.)

Broker-dealer funding practices

The management of a broker-dealer trading operation relies to a degree on “self-funding,” or the extent to which the sources of collateral (risk positions, long derivatives hedges, and securities pledged against margin loans) offset the uses of collateral (short hedges, stock lending) resulting from customer trading activity. Any residual securities that are not offset or *internalized* in this way must be financed externally. The importance of prime brokerage to a broker-dealer is that its customer financing activity increases the sources and uses of collateral, thereby increasing the potential for the broker to become self-funding. The need for coordination during the financial crisis led many firms to consolidate prime brokerage, securities lending, and repo under common management.¹³

8 http://www.newyorkfed.org/markets/pridealers_current.html

9 Michael J. Fleming and Kenneth D. Garbade, *The Repurchase Agreement Refined: GCF Repo*, Current Issues in Economics and Finance (New York: Federal Reserve Bank of New York), Volume 9, Number 6, June 2003.

10 GSD products include: U.S. Treasury bills, notes, bonds, strips and book-entry non-mortgage-backed agency securities, certain mortgage-backed securities, and Treasury Inflation-Protected Securities (TIPS).

11 Rates and volumes for the GCF segment of the repo market are reported by DTCC. See <http://www.dtcc.com/products/fi/gcfindex/index.php>

12 Gary Gorton, *Questions and Answers about the Financial Crisis—Prepared for the U.S. Financial Crisis Inquiry Commission*, February 20, 2010.

13 See *The Future of Prime Brokerage: Lessons Learned from the Financial Crisis*, High Line Advisors LLC, April 2010.

Exhibit 4

Current model for tripartite repo trading and settlement in the U.S.

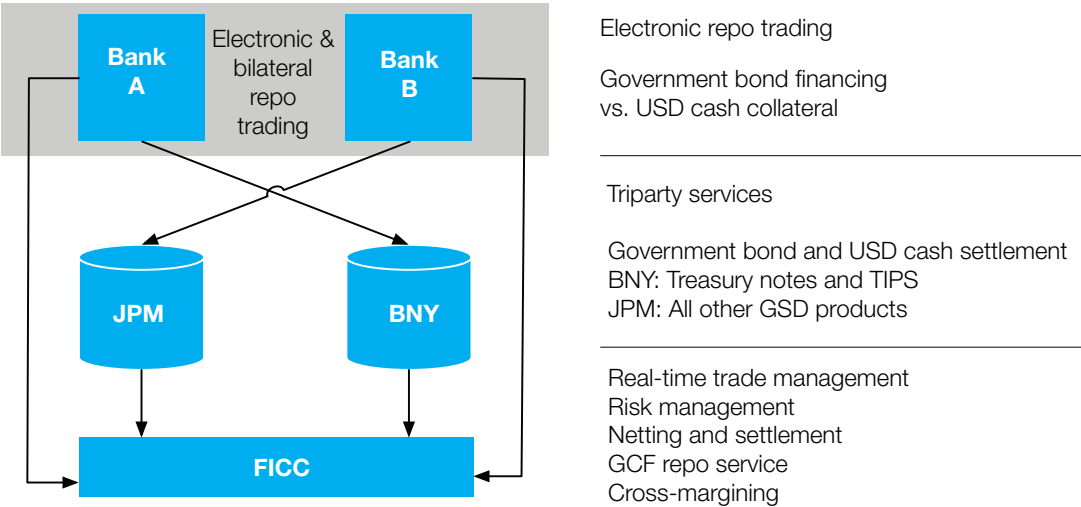


Table 1 Tri-party repo market participants

Largest borrowers via tripartite repo	Largest borrowers via tripartite repo
• Bank of America/Merrill Lynch • Barclays Capital Inc • Credit Suisse Securities (USA) LLC • Citigroup Global Markets Inc • Daiwa Capital Markets America Inc • Deutsche Bank • Goldman Sachs • HSBC Securities (USA) Inc • Jefferies & Company Inc • JP Morgan Securities • Mizuho Securities Inc • Morgan Stanley & Co Inc • Nomura Securities International Inc • RBC Capital Markets LLC • RBS Securities Inc • UBS Securities LLC	• BlackRock • Citibank (Agent Lender) • Deutsche Bank Advisors • Dreyfus • Federated • Fidelity • Goldman Sachs Asset Management • Invesco (AIM) • JP Morgan • Northern Trust (Agent Lender) • PIMCO • Schwab • State Street Global Advisors • UBS • Vanguard • Wells Fargo • Western Asset Management

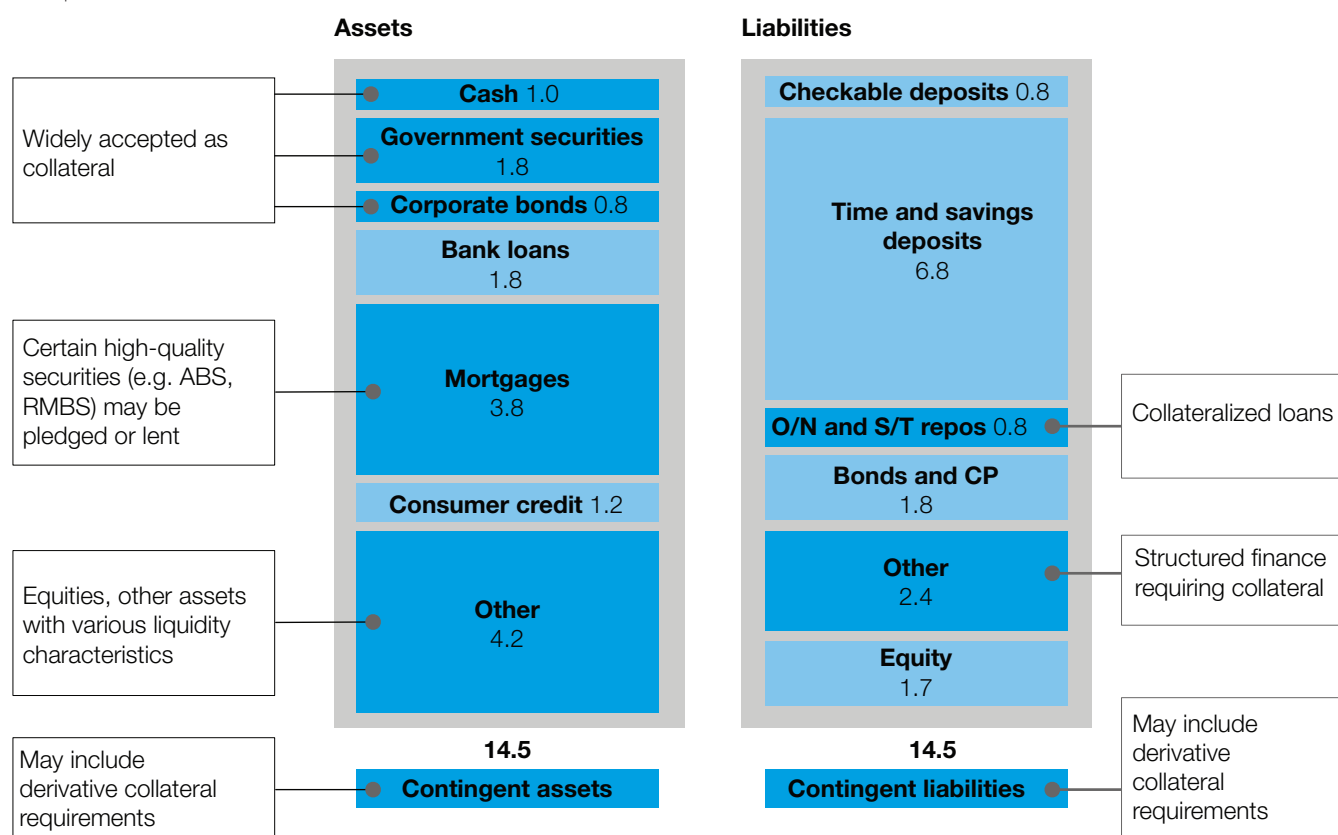
The capital structure of a broker-dealer is designed to provide stable sources of liquidity under a number of scenarios. Sources of liquidity span a wide range across structural and temporary capital. Repo and other secured funding transactions are a significant part of this capital structure,

and continuous access to these markets is critical to the business model. If secured funding sources disappear, a broker-dealer’s only recourse is to rely on expensive, unsecured funding such as commercial paper, longer-term debt, or equity. Firms must exercise judgement regarding the

Exhibit 5

Aggregated balance sheet of U.S. commercial banks

U.S. \$ trillions



Source: Federal Flow of Funds; McKinsey

durability of funding in crisis scenarios. Greater stability in the repo market would reduce the probability that structural capital would be needed in a crisis.

Exhibit 5 shows the aggregate balance-sheet composition of U.S. banks. With regulatory limitations on the use of deposits to support trading activity, firms with a larger presence in the capital markets face greater dependence on the secured funding markets and a greater reliance on unsecured debt and equity for less liquid assets that cannot be used as collateral.¹⁴

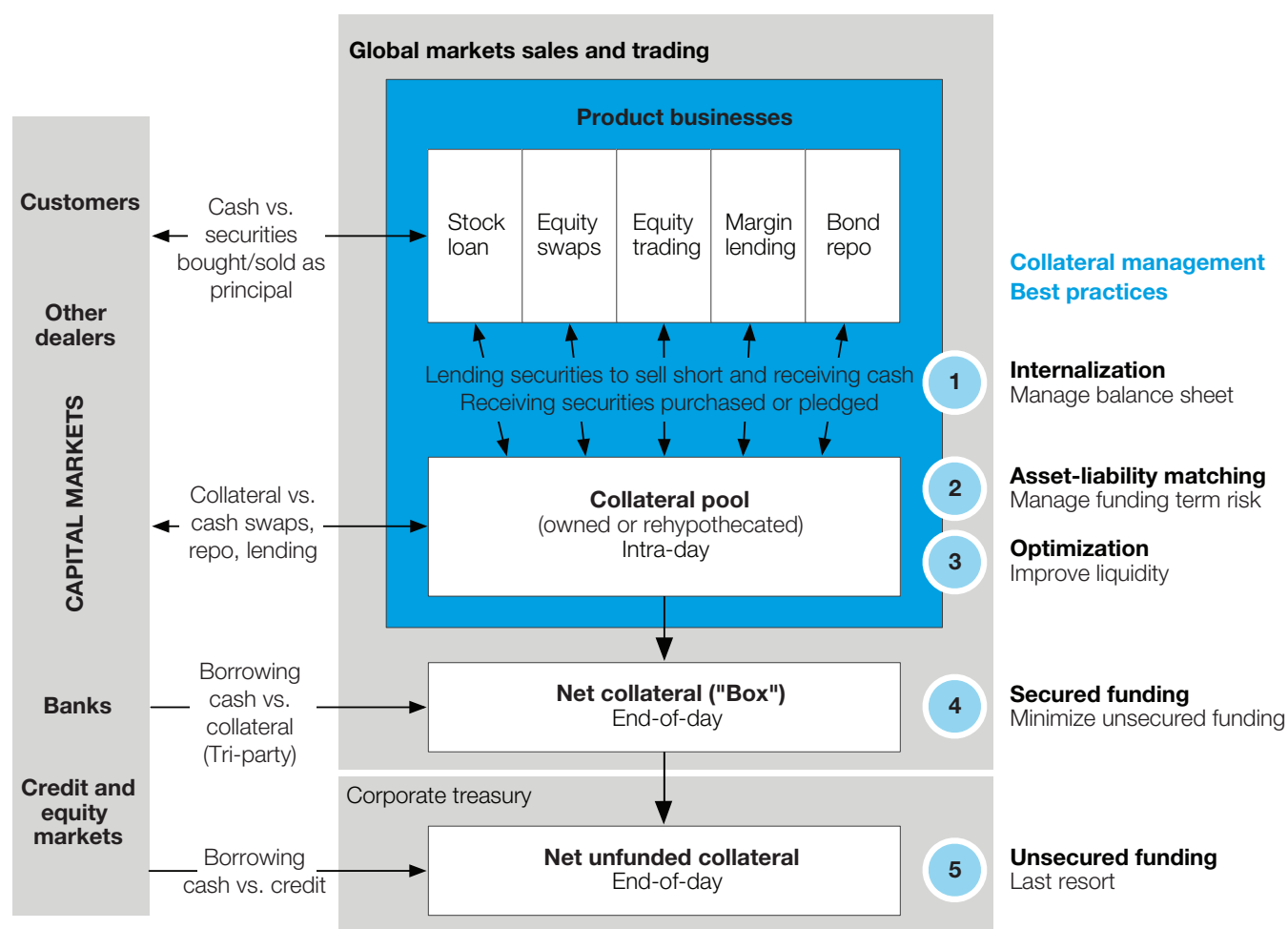
Exhibit 6 highlights best practices for funding the balance sheet of the sales and trading operation of a broker-dealer. Principal trading and financing activities bring collateral onto the balance sheet. Ideally, sources and uses of collateral are met internally, sometimes across product areas. When collateral is not available internally, further trading is required to exchange what is available for what is needed. The remaining liquid securities held “in the box” must be financed at the end of each day, often through tripartite repo. Illiquid securities ultimately require structural capital such as equity or long-term debt.¹⁵

¹⁴ Asset-backed securities (ABS) include a wide range of instruments, a subset of which may be accepted as collateral in secured financing transactions at one time or another. Examples include securities backed by credit card or auto loan receivables, Residential Mortgage-Backed Securities (RMBS), and Commercial Mortgage-Backed Securities (CMBS).

¹⁵ See *Collateral Management: Best Practices for Broker-Dealers*, High Line Advisors LLC, March 2011.

Exhibit 6

Funding the balance sheet of a broker-dealer



When lenders participate in tripartite repo, they are directly financing the operations of broker-dealers. Customers who trade derivatives and pledge collateral as margin provide indirect financing to broker-dealers who rehypothecate their collateral. Regulatory requirements and the desire of customers to segregate their collateral with a third party will deny broker-dealers access this source of funding. Clearly, credit sensitivity on the part of lenders persists and the system remains under pressure.

Repo during the financial crisis

The orderly functioning of the money markets is based on the lender/investor's belief that its cash will be returned. When this belief is shaken, the markets contract in numerous

ways, including higher haircuts, fewer acceptable collateral securities, curtailment of credit lines, and even complete withdrawal from lending, thereby punishing any business that relies on short-term leverage. Repo played a central role in each stage of the financial crisis, from investor distress in early 2007 to the collapse of major financial institutions at the peak of the crisis in October of 2008. Issues that require additional scrutiny include the following:

Inadequate risk management. The financial crisis exposed the degree to which leverage was available on illiquid collateral, for broker-dealers and their clients alike. Investor defaults in the repo market as early as 2007 drew attention to lax risk management in the secured lending of cash by brokers to their clients. Haircuts for repo are set by negotiation or

convention, yet should always be a function of the *liquidity* and the *volatility* of the collateral, thereby minimizing the probability that the value of the collateral will fall below the loan amount during the time it takes to sell the collateral. These guidelines were often disregarded, resulting in losses among broker-dealers financing hedge funds. (It is notable that similar defaults did not occur in margin lending practiced by prime brokers, which generally require much higher haircuts over more liquid assets.) Problems for brokers financing their clients quickly turned into problems for brokers financing themselves. Surviving firms now rely on permanent capital to finance illiquid positions.

Systemic relationships. A repo lender's exposure to the borrower's creditworthiness means that the transaction can be impacted by seemingly unrelated events, and even overnight repo on Treasury collateral is not immune to externalities. Although the recent financial crisis began with a shock to the subprime sector of the housing market, the negative impact spread to repo because the extent of exposure to subprime assets among participating banks was unknown. Some lenders turned away even Treasury collateral in an effort to reduce credit lines to some borrowers.

Connection to individual investors. Money market funds dealing directly in certain types of collateral "broke the buck" as the secured funding markets contracted. Losses on the reinvestment of cash owned by mutual fund investors as a result of securities lending transactions were absorbed by the banks acting as agent, but could have been passed back to the end investor.

Mismatch of liabilities to assets. The presumption of continuously available financing and attractive positive carry led banks and broker-dealers to finance long-dated assets with short-term repo. When repo transactions ended and lenders withdrew from the market, borrowers were forced to take back securities and faced catastrophic cash shortfalls.

Dependence on leverage. Pre-crisis balance sheets were comprised of approximately 10% equity and 40% debt, with the remaining 50% financed in the secured markets, across repo and other vehicles. It is easy to see how a crisis-induced increase of 20% in financing haircuts (equivalent to a corresponding withdrawal of cash from the system) could and did consume all of a broker-dealer's equity. Further erosion resulted in insolvency unless additional capital was raised.¹⁶

Fragmentation of borrowing activity. At the height of the crisis in late 2008, many broker-dealers lost control over their sources of funding because there was neither consistency nor standardization in secured financing practices. Credit lines and customer assets previously available for rehypothecation were withdrawn. The Federal Reserve System became the repo counterparty (lender) to the entire U.S. market, accepting all manner of collateral from banks and bank holding companies.¹⁷ Repo market contraction was the principal catalyst for the demise of the stand-alone broker-dealer model amongst the largest investment banking firms; Goldman Sachs and Morgan Stanley became bank holding companies so that they could raise cash against securities pledged to the Fed.

Loss of confidence in the interbank and money markets occurred quickly and with dramatic results. Once the market began to contract over credit concerns, a chain of events ensued: Lenders in the repo market withdrew their funds outright or via larger haircuts, and the interbank lending market collapsed; the shortfall in cash led dealers to raise capital; once all capital sources were tapped, dealers de-levered by selling assets, which in turn reduced the prices of the assets; ultimately the crisis wiped out the equity of many participants, resulting in insolvency and government bailouts.

The challenge for the markets is to learn from this experience and to take steps to reduce vulnerability to another panic in the secured funding markets.

The case for cleared repo

A CCP acts as the seller to every buyer and the buyer to every seller. CCPs apply specifically to transactions that carry ongoing exposure beyond an initial transfer of ownership. As a result, derivatives exchanges operate as a CCP while exchanges for cash products, such as equities, do not. Repos, like derivatives, require participants to perform obligations over time. Bilateral trades between two parties may be cleared (matched) without the use of a common or central counterparty; however, a CCP can neutralize credit exposure over the life of the contract.

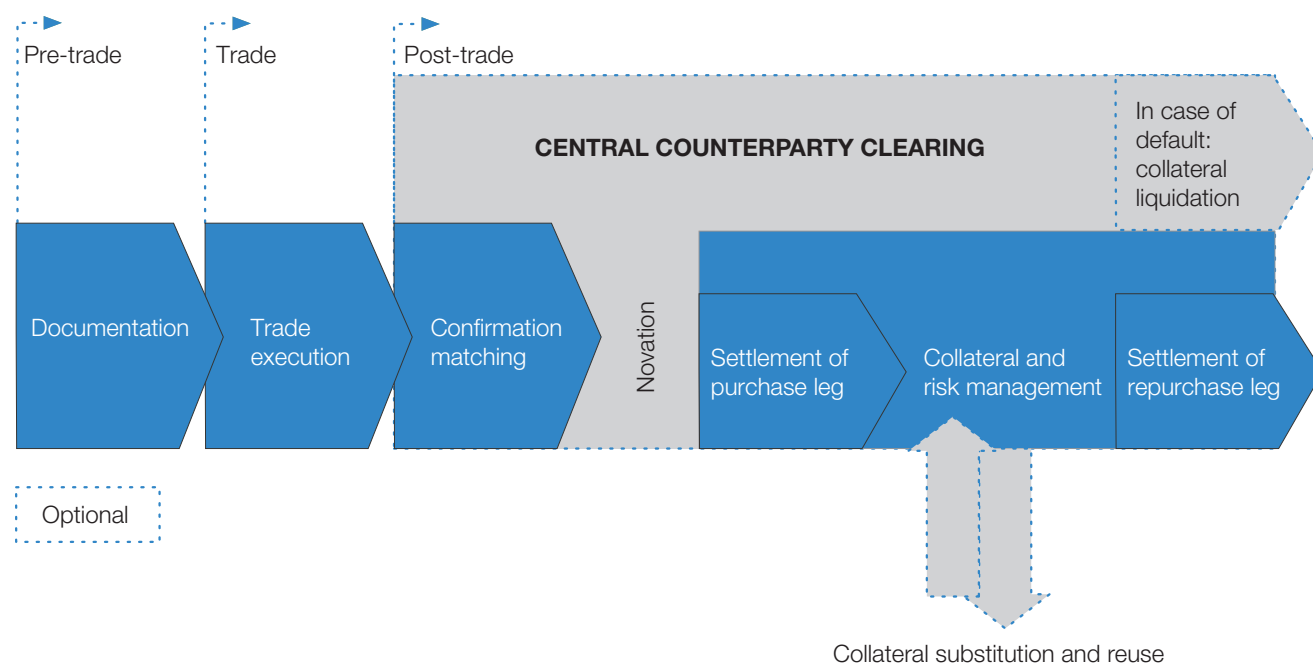
Exhibit 7 enhances the life cycle of a repo to show how a CCP may be interposed to create a centrally cleared transaction. When a CCP is introduced into the life cycle of a repo, note that collateral, risk, and liquidation (if necessary) are all managed by the CCP.

¹⁶ Gary B. Gorton, *Slapped by the Invisible Hand: The Panic of 2007* (Oxford University Press) 2010.

¹⁷ Liquidity facilities introduced during the crisis include the Term Auction Facility (TAF), the Term Securities Lending Facility (TSLF), and the Primary Dealer Credit Facility (PDCF).

Exhibit 7

Life cycle of a centrally cleared repo



Source: Bank for International Settlements

Without explicitly suggesting a CCP, the Fed white paper on tripartite repo made a case for central clearing that was soon highlighted in the financial press.¹⁸ By reducing the likelihood of a run, a CCP for repo would supply a public service as well as potentially save taxpayer money.

Cleared repo will not replace all forms of secured lending. It will, however, establish the core of the market for standard terms and liquid collateral. Lenders who stay within the CCP can take comfort that their cash will be returned. Other lenders may still elect to venture outside of the CCP and take on counterparty exposure, collateral liquidation risk, or non-standard terms in exchange for increased reward. Over time, the CCP should demonstrate the capability to accommodate more types of collateral and flexible terms without increasing lender risk.

Immediate and future benefits

Centralized clearing for repo not only addresses risks highlighted by the financial crisis, but also sets the stage for

market evolution and considerable improvements for the benefit of borrowers and lenders alike. These improvements include the following:

Mutualization of risk. The principal benefit of a clearing house mechanism is the mutual obligation of its members to meet the obligations of any single member. This shared liability encourages members to allow the clearing house to enforce risk guidelines such as membership and trading rules, collection of performance bonds, timing of events, collateral haircuts, and the maintenance of a dedicated clearing fund in excess of the margin on individual trades. As a result, rating agencies have bestowed a AAA-rating on such entities.¹⁹

Federal Reserve powers. Title VIII of the Dodd-Frank Act introduced the term “financial market utility” (FMU) for systems that transfer, clear, or settle payments, securities or other transactions among financial institutions.²⁰ The Act permits “systemically important” FMUs, including CCPs as determined by the Financial Stability Oversight Council, to have accounts at regional Reserve Banks and obtain access

¹⁸ Gillian Tett, *Repo Needs a Backstop to Avoid Future Crises* (London: The Financial Times), September 23, 2010.

¹⁹ Standard & Poor's Corporation, *Options Clearing Corp.* (New York: The McGraw-Hill Companies), March 12, 2010.

²⁰ Title VIII of the Dodd-Frank Act, P.L. 111-203, the Payment, Clearing, and Settlement Supervision Act of 2010.

to Federal Reserve payment and settlement services. Under extraordinary circumstances, the Act also permits the Board of Governors of the Federal Reserve System to extend credit to such FMUs.²¹

Risk management standards. A CCP ensures that collateral is properly priced (marked-to-market) and readily sold. In order for a CCP for repo to function properly, it must have knowledge of the liquidity and price volatility of each individual security pledged as collateral. The CCP can then set appropriate haircuts without yielding to the competitive and commercial pressures that exist in a bilateral market.

Expansion of acceptable collateral. A granular risk management framework for individual securities can accommodate an increasing variety of collateral. Each time a security is added to the system as acceptable collateral, borrower demand increases to the benefit of lenders, without additional risk. Borrowers may reduce their reliance on alternative, less stable sources of funding and consolidate their activity in the centrally cleared repo market. *Exhibit 8* illustrates an increasing number of financing trades moved onto the CCP through collateral acceptance.

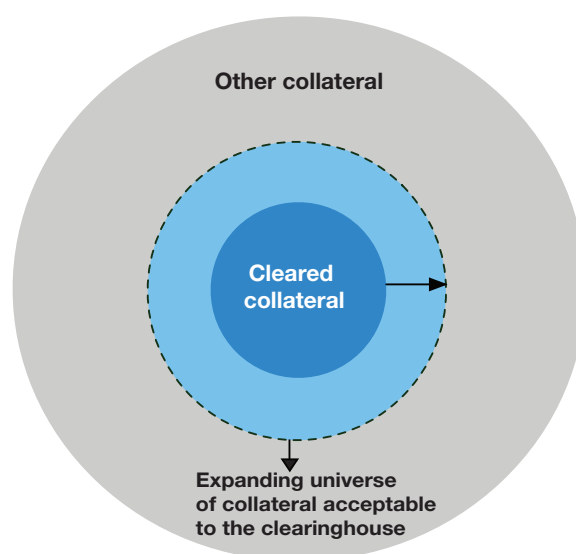
Observability of market size and pricing. The various forms of secured financing practiced by banks and broker-dealers remain difficult for regulators to assess for bank stability or systemic risk. Consistency in the money markets and consolidation on a CCP would provide better visibility to regulators.

Exchange development. Through standardization and risk management, a CCP essentially transforms any clearing member or client thereof into a homogeneous, highly rated borrower. This mutualization of credit is a precursor to anonymous trading through an electronic system that displays supply (offers) and demand (bids) for cash. With the development of a true repo ECN or exchange, price transparency and liquidity should increase for repo as they have for other instruments.

Direct lender participation. A CCP for repo may offer direct access to lenders seeking safe returns on their cash. A lender of cash presents no incremental credit risk to the CCP clearing membership. Large cash investors may have greater comfort lending into a CCP mechanism without sensitivity to collateral and with the added benefit of price discovery. As far as borrowers are concerned, the CCP is intended to

Exhibit 8

Expansion of cleared collateral



make the existing banking system more robust; it should not disintermediate the role of prime brokers by offering leverage directly to investors who do not meet the capital requirement of the clearinghouse.

Development of term repo market. "Term" refers to the maturity of a repo contract, the time between trade settlement and maturity. Overnight repo is popular among lenders concerned about counterparty risk to the point of forgoing higher returns. Failure to solve the counterparty credit issue hampers the development of a long-term repo market, which would provide the more stable funding needed by broker-dealers and measured by regulators. Lenders and borrowers alike will embrace longer-term repo if it is safe and cost-effective. A CCP structure for repo will allow borrowers to tap into long-dated funding sources at a rate established by supply and demand, without the cost of an additional credit spread or the risk of credit-linked early termination events.

Favorable accounting for participants. Trading through a CCP offers balance sheet relief for broker-dealers. Long and short positions on the same instrument cleared with a CCP with rights of offset are generally eligible for netting in the calculation of assets and liabilities. Opposing trades

²¹ Anna L. Paulson and Kirstin E. Wells, *Enhancing Financial Stability: The Case of Financial Market Utilities* (Chicago: Federal Reserve Bank of Chicago) Chicago Fed Letter, October 2010.

Table 2 Reduction in margin requirements attributed to offsetting risk positions

Portfolio Contents	Identifier	Expiration	Quantity	Notional	Margin	Rate
Short-Term (2-year) T-Note Future	ZTE	6/30/11	-1	\$ 200,000	(820)	0.41%
2-year US T-Note	912828HV5	3/31/13	200,000	\$ 200,000	(890)	0.45%
Combined				\$ 400,000	(611)	0.15%
Savings					1,099	64%
Portfolio Contents	Identifier	Expiration	Quantity	Notional	Margin	Rate
Medium-Term (5 year) T-Note Future	ZTE	6/30/11	-1	\$ 100,000	(1,189)	1.19%
5-year US T-Note	912828NV8	8/31/15	100,000	\$ 100,000	(1,099)	1.10%
Combined				\$ 200,000	(657)	0.33%
Savings					1,631	71%
Portfolio Contents	Identifier	Expiration	Quantity	Notional	Margin	Rate
Long-Term (10-year) T-Note Future	ZNE	6/21/11	-1	\$ 100,000	(2,089)	2.09%
10-year US T-Note	912828HR4	2/15/18	100,000	\$ 100,000	(1,655)	1.66%
Combined				\$ 100,000	(1,146)	0.57%
Savings					2,598	69%
Portfolio Contents	Identifier	Expiration	Quantity	Notional	Margin	Rate
T-Bond Future (30-year)	ZBE	6/21/11	-1	\$ 100,000	(3,339)	-3.34%
30-year US T-Bond	912810EX2	8/15/26	100,000	\$ 100,000	(3,354)	-3.35%
Combined				\$ 200,000	(1,701)	-0.85%
Savings					4,992	75%

Source: The Options Clearing Corporation

in a bilateral context retain different credit exposures and are not recognized as offsetting under generally accepted accounting standards.²²

Operational improvements through consolidation.

Knowledge of securities posted as collateral is the same expertise required to manage risk in derivatives based on the same securities. By this logic, repo, single stock futures and options, and securities lending transactions are all candidates for convergence on the same CCP platform, reducing operational complexity as well as risk.

Capital efficiency across one or more products. Just as the netting of trades through a CCP reduces the size of a broker-dealer's balance sheet, its margin requirements can be reduced as well. In calculating margin, a CCP may give credit for offsetting positions in the same product as well as risk-reducing positions across different products. A CCP therefore offers a powerful counteraction to regulatory forces that would otherwise increase demands on capital.

Capital efficiency

At a CCP that clears repo along with other derivatives, margin relief for dealers can be considerable. For example, if a dealer were to pledge two-year Treasury notes as collateral in a repo, the margin might be 0.41 percent, or 41 basis points. If the dealer were to have a short position in two-year interest rate futures, the margin on the trade might be 45 basis points. Although they are not a perfect hedge, if these two positions were held by the same dealer they are naturally offsetting. Rather than margining both positions separately for a total of 86 basis points, the CCP might require margin of only 15 basis points on the two positions combined, resulting in a 64% smaller collateral requirement.

Table 2 shows this and three other examples of margin relief attributable to risk-reducing positions in repo and other derivatives. In each case, the capital saved by the dealer is considerable.

²² Financial Accounting Standards Board of the Financial Accounting Foundation, *FIN 41: Offsetting of Amounts Related to Certain Repurchase and Reverse Repurchase Agreements*, December 1994.

The significance of margin relief cannot be overstated. Regulation of bank activity through increased capital and liquidity requirements will place considerable pressure on broker-dealer operations. In the U.S., current capital and liquidity proposals (Basel III) could reduce return on equity (ROE) by 320 basis points if no compensating action is taken.²³

Exhibit 9 illustrates the cumulative effect of these proposals: The capital efficiency that comes from dealing with a CCP rather than bilaterally represents the means to lessen this impact.

Cleared repo in Europe

The U.S. trails Europe in the development of electronic trading and central clearing for repo. As shown in

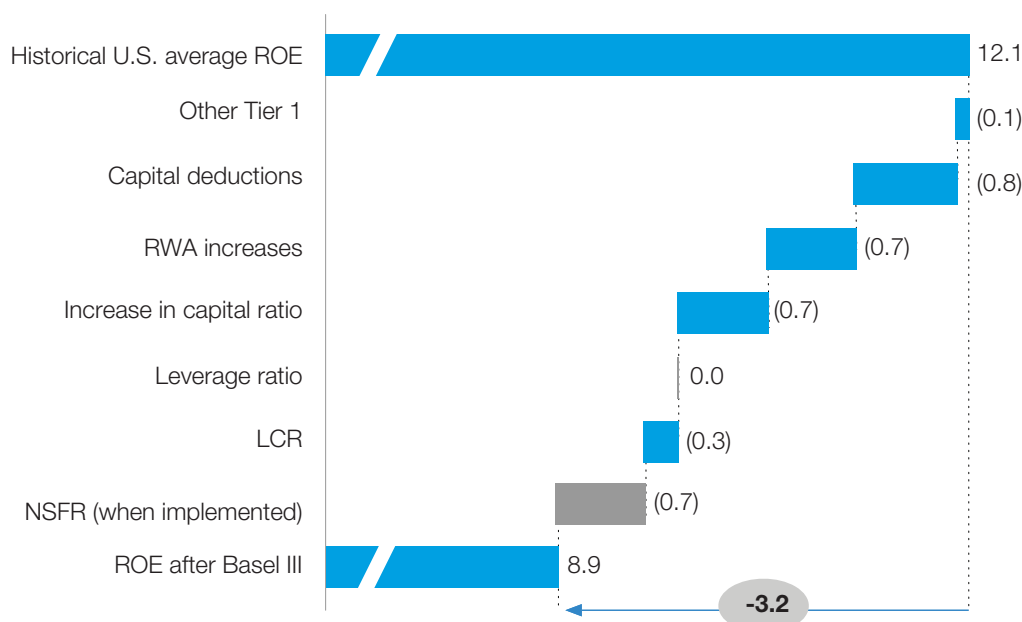
Exhibit 10, nearly half of all European secured money market transactions were done on a CCP in 2010, a response to the need to limit credit exposures, market risks, and the impact of capital adequacy requirements.²⁴

As early as 2005, Eurex Repo, Eurex Clearing, and Clearstream Banking introduced GC Pooling, a system combining electronic trading of repo through a CCP with a real-time collateral management system. The average outstanding volume of GC Pooling reached EUR 110.9 billion in December 2010, an increase of 31% compared to the prior year (EUR 84.3 billion) and a continuous annual growth rate of 78% since inception.²⁵ The initiative provides a useful precedent for evolution of the U.S. repo market, starting with GCF repo.²⁶

Exhibit 9

ROE impact of Basel III capital and liquidity proposals

Percentage points



Source: Bank for International Settlements; Bloomberg; McKinsey

²³ The third of the Basel Accords (Basel III) is a set of global regulatory standards on bank capital adequacy and liquidity agreed by the members of the Basel Committee on Banking Supervision. In Exhibit 7, RWA = Risk Weighted Assets; LCR = Liquidity Coverage Ratio; NSRF = Net Stable Funding Requirement.

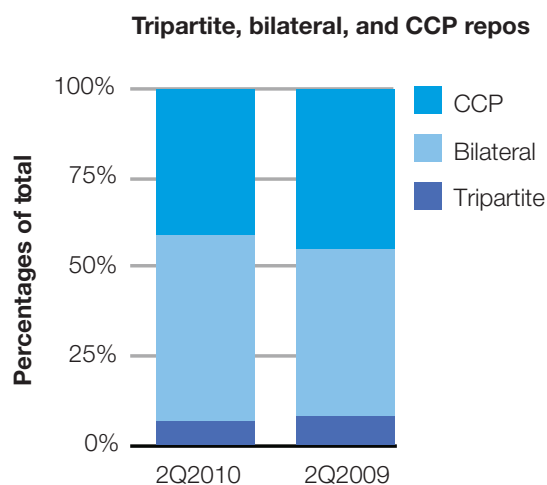
²⁴ European Central Bank, *Euro Money Market Study*, December 2010.

²⁵ Eurex Repo, Volume Development, February 2011.

²⁶ Bank for International Settlements (BIS), *The Functioning and Resilience of Cross-Border Funding Markets*, March 2010.

Exhibit 10

Cleared repo in Europe



Source: ECB Euro Money Market Study, December 2010

Initiatives in France (Collateral Basket with Pledge, or CBWP) and Italy (Collateralized Interbank Market in Italy, or MIC) were launched in 2009. Both initiatives offer clearing and guaranty by novation, with netting, position keeping, risk and default management, and reporting of repo activity among members.

Proposed evolution of the U.S. repo market

The introduction of central clearing of repo need not be a disruptive event, if managed in stages. Systemic improvements and benefits to market participants would be realized at the completion of each stage.

Stage 1: Novation of bilateral transactions

The first stage in market evolution preserves the way repo transactions are currently conducted. After the trade is agreed, the CCP is introduced into the transaction by a process of *novation*, whereby the repo is divided into two separate and offsetting transactions with the CCP interposed as the counterparty facing each of the parties. While a CCP platform requires standardization of documentation, novation to the CCP has no impact on the initial negotiation of critical terms between the participants.

In the traditional, bilateral arrangement illustrated in *Exhibit 11*, the lender is exposed to the extent that the borrower's collateral is insufficient, while the borrower is exposed to the lender for the return of collateral. In the CCP arrangement illustrated in *Exhibit 12*, the CCP has no net market risk, and each participant is exposed only to the credit of the CCP for the return of cash or collateral. The figures show the flow of cash and collateral at the inception of the trade, leaving clearing, settlement, and custody out of the diagram for the moment. At the maturity of the repo

Exhibit 11

Bilateral repo

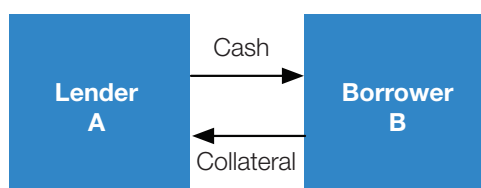


Exhibit 12

Repo novated to a CCP

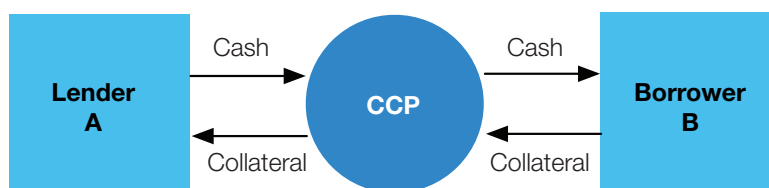


Exhibit 13
Bilateral repos

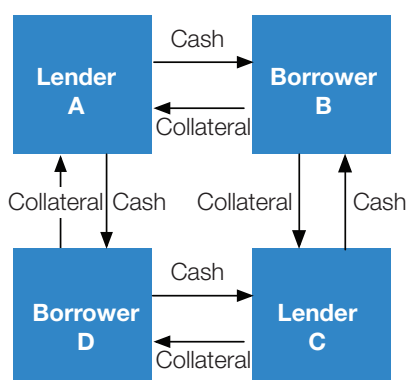


Exhibit 14
Repos novated to a CCP

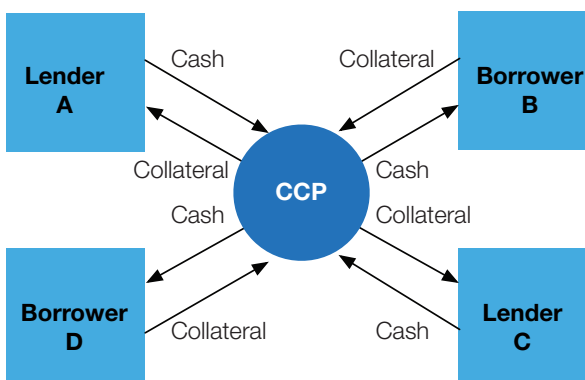


Exhibit 15
Tripartite repo

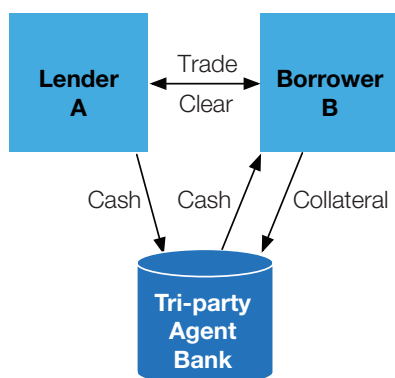
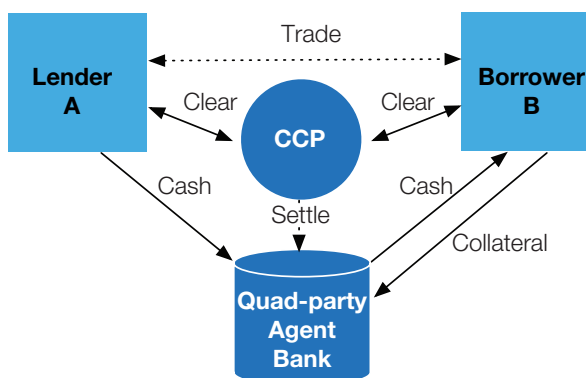


Exhibit 16
Quad-party repo novated to a CCP



the flows are reversed, as cash is returned to the lender and collateral securities are released to the borrower. The figures are similar to any high-level representation of bilateral, OTC transactions.

The appeal to a regulator seeking visibility over the system becomes more apparent as the number of participants in the marketplace goes up, as shown in *Exhibits 13* and *14*.

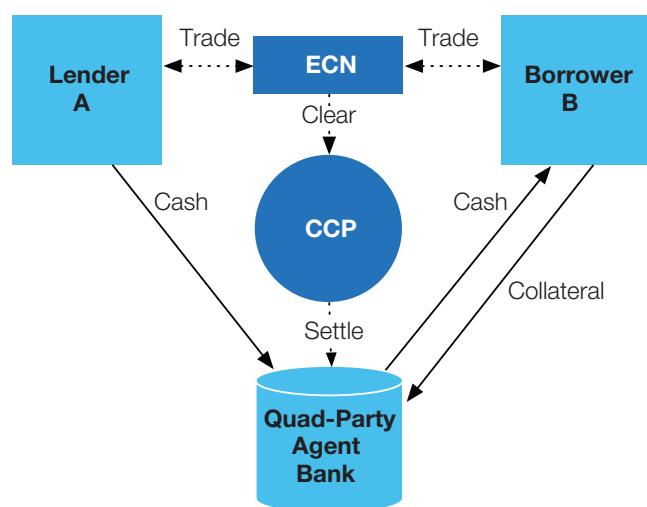
The CCP acts as the hub of a marketplace with a theoretically infinite number of spokes. Whereas the size of a purely bilateral market can only be estimated through accurate and timely reporting from individual participants, a CCP can at all times provide a clear picture of the number and amount of transactions novated to it.

Tripartite repo (shown in *Exhibit 15*) is an important segment of the market, and the introduction of a CCP neither replaces nor diminishes the role of the tri-party agent. The benefits of tripartite repo and the efficiencies observed in the GCF market argue for use of an agent bank in all centrally cleared trades. The benefits of a tri-party agent are complimented by the CCP, whose enforcement of trading standards and risk management directly address the concerns expressed by the Federal Reserve (see Appendix 3 for more detail).

Exhibit 16 illustrates how the CCP becomes a fourth party to the transaction and the tri-party agent becomes a *quad*-party agent. At this point it becomes useful to introduce clearing and settlement functions into the figures. Note that the

Exhibit 17

Quad-party repo with ECN



collateral is called for by the CCP and held by the agent bank rather than transferred to the account of a lender.

Stage 2: Electronic communication of supply and demand for cash

All exchanges need a clearing house, but not all cleared markets have visible exchanges. The next step in the evolution of a centrally cleared repo market is the creation of an *electronic communication network* (ECN) or formal exchange with direct connectivity among participants.

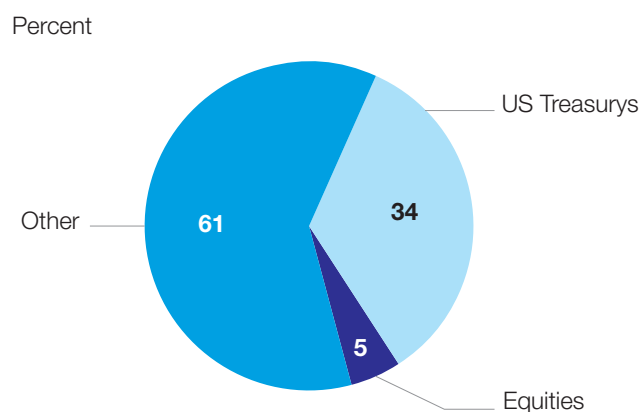
Exhibit 17 illustrates the interaction of borrowers and lenders through an ECN, with the trade cleared through a CCP. The ECN allows lenders to offer their cash anonymously to potential borrowers, with the repo (loan) going to the highest bidder in the form of the highest rate. The presence of the CCP makes the lender indifferent to the identity of the borrower, with collateral management handled without risk or operational complexity. By eliminating counterparty credit risk, price can be set by supply and demand. A larger pool of eligible collateral will boost demand for cash, while the CCP ensures that the collateral poses no additional risk to the lenders.

Stage 3: Expansion and substitution of collateral

Transition of repo to a CCP needs a starting point, and U.S. Treasuries are the logical collateral because they comprise

Exhibit 18

Tripartite repo collateral, January 2011



Source: Federal Reserve Bank of New York

34% of the known secured funding activity. *Exhibit 18* shows the composition of the \$1.6 trillion in securities pledged as collateral in the tripartite market as of January, 2011. Ultimately, the benefit for borrowers comes from expansion of the types of collateral accepted by the CCP, with the ability to freely substitute collateral over the life of the transaction. As the system matures, collateral haircuts are established such that securities are deemed equivalent to Treasuries for use as collateral. For example, a U.S. Treasury security at a 2% haircut may be deemed equivalent to ABC common stock at a 5% haircut. In each case, the haircut is deemed adequate by the CCP for the recovery of cash in the system. Fungibility (free substitution) of collateral across U.S. Treasuries and equities alone would provide for \$631 billion of daily financing needs in the tripartite market.

Equities carry the additional complexity of corporate actions such as dividends; however, clearinghouses with experience in equity derivatives and/or stock loan should be able to provide the necessary collateral and risk management.

Fungibility of Treasury and equity collateral would make it possible for repo to integrate with the larger stock loan market onto a single financing platform. Convergence of stock loan and repo activities through a CCP would pave the way for broker-dealers to optimize capital usage to offset higher requirements pending under Dodd-Frank and Basel III.

Opponents of a CCP structure for repo will argue that the market for Treasury repo does not require credit

intermediation or central clearing, and that additional costs will result. The fact remains that counterparty credit in the repo market is a sensitivity that results in market contraction during times of stress. During the crisis of 2008, many counterparties saw their repo lines severely curtailed, even for Treasury collateral, and were turned away by their customary lenders. While alternative lenders were eventually found, timing and price for replacement financing was anxious and uncertain. Any additional cost should be considered insurance against future crises and may be offset in the future as trading through the CCP increases.

Summary of cleared repo benefits

The central clearing of repo provides many benefits for those participating in the shadow banking system, directly or indirectly, as well as for those responsible for monitoring it. Standardization and centralization are also the first steps toward automation and an exchange trading mechanism.

Benefits for cash lenders

1. Ability to anonymously offer cash to all repo clearing members and their customers to obtain highest rates
2. Guaranteed return of cash plus interest to the repo maturity date
3. Collateral requirements set by CCP—no need to evaluate or liquidate collateral
4. No necessity for or risk associated with collateral liquidation—CCP returns cash

Benefits for cash borrowers

5. Collateral fungibility and rights of substitution
6. Balance sheet optimization

7. Ability to access liquid market for term repo as required by regulation or prudent risk management
8. Capital efficiency through margin offset (netting) at CCP for certain offsetting transactions in repo and other products cleared at the same CCP

Benefits for regulators and central banks

9. Transparency of the portion of the market cleared at the CCP
10. Elimination of “daylight” risk in the tripartite system; rapid confirmation
11. Focal point for action or assistance if needed

□□□

Central clearing with a CCP for repurchase agreements is a critical step in the maturation of the secured financing markets, a shadow banking system that is integral to the functioning of the capital markets as well as the investment of cash for individuals and institutions alike. Central clearing can neutralize the risk of creditor panic and subsequent bailout by providing stability to the money markets and bank balance sheets. The CCP guarantees the return of lender cash, provides a source of information for regulators, and a focal point for central bank assistance if required. The most sensible response to the recent banking crisis is to bring secured financing transactions out of the shadows and into clear view, through a series of non-disruptive steps that can ultimately lead to exchange-based trading and price transparency for all participants.

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Appendix 1

Composition and concentration of tripartite repo collateral

Asset group	Collateral value (billions)	Share of total	Concentration of top 3 dealers
ABS (Investment & Non Investment Grade)	\$39.75	2.4%	38.9%
Agency CMOs	\$131.25	8.0%	44.2%
Agency Debentures & Strips	\$150.60	9.2%	39.4%
Agency MBS	\$495.24	30.2%	38.8%
CMO Private Label Investment Grade	\$20.83	1.3%	48.6%
CMO Private Label Non Investment Grade	\$21.25	1.3%	53.0%
Corporates Investment Grade	\$86.17	5.3%	40.0%
Corporates Non Investment Grade	\$33.32	2.0%	49.8%
Equities	\$79.56	4.8%	48.6%
Money Market Instruments	\$28.45	1.7%	65.0%
US Treasurys excluding Strips	\$491.03	29.9%	43.8%
US Treasury Strips	\$46.02	2.8%	49.7%
Other ¹	\$17.78	1.1%	
TOTAL	\$1,641.25	100.0%	

¹Other includes CDOs, international securities, municipal debt, trust receipts, and whole loans.

Appendix 2

Distribution of investor haircuts in tripartite repo

Asset group	Cash investor margins levels		
	10th percentile	Median	90th percentile
ABS (Investment & Non Investment Grade)	2.0%	5.0%	10.0%
Agency CMOs	2.0%	3.0%	5.0%
Agency Debentures & Strips	2.0%	2.0%	5.0%
Agency MBS	2.0%	2.0%	3.0%
CMO Private Label Investment Grade	3.0%	5.0%	10.0%
CMO Private Label Non Investment Grade	2.0%	8.0%	8.0%
Corporates Investment Grade	2.0%	5.0%	8.0%
Corporates Non Investment Grade	3.0%	8.0%	10.0%
Equities	5.0%	8.0%	15.0%
Money Market Instruments	2.0%	5.0%	5.0%
US Treasurys excluding Strips	2.0%	2.0%	2.0%
US Treasury Strips	2.0%	2.0%	2.0%

Total number of individual repo deals	6,478
Total number of collateral allocations	9,474

Source: Federal Reserve Bank of New York; Tri-party repo margin data

Appendix 3

FRBNY task force recommendations

Area of concern	Task force recommendation	Cleared repo solution
Daily unwind	Allow for the automated substitution of securities collateral supporting a tripartite repo transaction while that transaction remains in place.	Supports term borrowing (1-day auto roll, 7-day, 30-day, 60-day and 90-day) so there is no need to unwind daily until the term is reached. Supports auto-substitution of collateral to meet margin obligations thus eliminating the need to close and reopen should margin collateral need to be replaced.
Intra-day credit extension	"Practical elimination" of intra-day credit provided by the clearing banks	Cash is not credited to the borrower until it is drafted from the lender. If a lender fails to deliver cash, the trade is not consummated and the lender is punished for failure. Trades are settled twice a day with a cutoff time early enough to allow for alternate funding means should a lender fail.
Matching of liabilities to assets	Dealers should lengthen and stagger the maturity profile of their financing.	Dealers have access to a bid/offer market that quotes funding availability both on an overnight basis and a term basis in one central system.
Dependency on short-term borrowing	Emphasis on funding over 30 days	CCP supports both short- and long-term borrowing.
Unprepared for dealer default scenarios	Tripartite repo activity must be an essential focus for liquidity risk management. Dealers should not assume that secured financing is inherently stable. Since cash investors are "at risk" if the Dealer defaults, Dealers should realize that some Cash Investors may reduce and/or eliminate funding as the credit quality of the Dealer deteriorates, despite the existence of collateral.	Dealer default is handled by the CCP and is standardized. Guarantees ensure that defaults are handled cleanly and efficiently.
Margin	Market participants in many cases did not anticipate the extent to which market conditions could worsen and did not set margins accordingly, leading to procyclical increases in those margins. When conditions did worsen during the crisis, most Cash Investors did not anticipate the potential for losses as collateral prices declined.	Margin is assessed on a daily basis and collateral posted to satisfy margin is marked-to-market daily to mitigate default risk.
Concentration	- Liquidity Stabilization Utility (LSU) that would function as a bank by providing liquidity against collateral to Cash Investors after a Dealer default - Cash Investors obtaining committed lines of credit - A central counterparty facility that would substitute its credit standing for that of individual Dealers in the tripartite market - An Emergency Bank to which a troubled Dealer could transfer its repo portfolio, possibly supplemented by a guarantee fund	Anonymous trading allows for a broader market participation thereby spreading risk and encouraging more parties to interact with the market. Clearing through a CCP standardizes credit commitments and default scenarios.

Appendix 4

Cleared repo vs. tripartite repo

	Tripartite repo	Cleared repo
Legal documentation	Bank Custodial Undertaking in connection with Master Repurchase Agreement	Bank Custodial Undertaking in connection with Master Repurchase Agreement amended to include the CCP as Successor Seller and as Successor Buyer.
Trade details	The Lender and Borrower bilaterally agree to the repo rate, security description, and duration. The seller manually enters the terms to the Bank.	The Lender and Borrower bilaterally agree to the repo rate, security description, and duration. The seller manually enters the terms to the Bank for further submission to CCP for novation.
Collateral management and reporting	All collateral and cash transfers facilitated through Bank system.	All collateral and cash transfers facilitated through joint Bank/CCP system
Exposure	Bilateral counter-party credit risk	AAA-rated CCP for all novated transactions
Default risk	Prior to the maturity, the Lender is exposed to the difference between the value of the liquidated collateral and initial funds invested.	CCP returns 100% principal plus interest to lender at maturity.
Credit lines	Each Tri-party agreement utilizes Lender's credit lines.	Lenders gain additional access to repo collateral through the CCP guarantee.

